natural impressions

A centre for wetland, estuary & marine conservation
in the iSimangaliso Wetland Park

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I, Kimesha Govender (926115) am a student registered for the course ARPL7003 in the year 2014.

I hereby declare the following:

I am aware that plagiarism (i.e. the use of someone else’s work without permission and/or without acknowledging the original sources) is wrong. I confirm that the work submitted for assessment for the above course is my own unaided work except where I have stated explicitly otherwise. I have followed the required conventions in referencing thoughts, ideas, and visual materials of others. I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my own work.

Kimesha Govender
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**NATURAL**

adjective natural

- existing in or derived from nature
- felt instinctively to a person; innate

(Oxford Dictionaries; n.d)

**IMPRESSION**

noun impression

- the first and immediate effect of an experience or perception upon the mind and consciousness
- an idea, feeling or opinion about something, especially one formed without conscious thought or on the basis of little evidence.
- an imitation

(Oxford Dictionaries; n.d)
“Architecture is essentially an extension of nature into the man-made realm, providing the ground for perception and the horizon of experiencing and understanding the world.”

Juhani Pallasmaa, 2005
Climate change is a clear indication that humanity’s innate affiliation with nature has been suppressed, and that our detrimental anthropogenic activities on the earth’s natural resources and systems, have exceeded the earth’s ecological capacity to cope and regenerate. This threatens environmental sustainability, which subsequently has social and economic implications.

Environmental conservation is humanity’s aim towards re-affiliating its deep rootedness in nature, in order to ensure a sustainable co-existence with other species and natural systems, and thus convince responsive lifestyles, which allows humanity to match natural-resource extraction to the rate at which the earth can regenerate.

The role of environmental sustainable architecture, towards mitigating humanity’s impact on global warming, still leaves a disparity between human relationships and interactions with the natural environment. The notion of a phenomenology-guided design inquiry, an application of enhanced multi-sensory experiences is identified, to re-affiliate humanity with nature and to provoke a sense of urgency for greater protection of the natural environment, through an immersive experience of enhanced human-nature interactions with nature. Furthermore, this notion is applied in the programme of eco-tourism and qualitative ecological research; the proposed site choice; the concept design approach and technical resolution of the project.

The research recognises the conservation of sensitive ecosystems such as the iSimangaliso Wetland Park in northern KwaZulu-Natal, as one of the core strategies for environmental sustainability, and its appropriateness as a site for immersed experiences with nature and the sharing of ecological knowledge for the benefit of the wider communities in South Africa and internationally.

The research proposes an environmentally responsible and contextually appropriate architectural design, for a wetland, estuary and marine conservation centre in the iSimangaliso Wetland Park. Furthermore, the programme responds to the key contextual issues concerning the park by assisting with the ecological conservation and growth, as well as the social and economic sustainability of the iSimangaliso Wetland Park and surrounding communities. This is achieved by proposing an architectural programme which functions as an interface and mediator for the key issues concerning the park, that is of research, education, tourism and community participation, through which the most concerning issue of ecological conservation occurs.
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introduction
Motivation & Document Structure
INTRODUCTION

As a result of urbanisation and other detrimental anthropogenic activities, the earth’s natural resources and systems have been abused and are now severely vulnerable. Urban societies have become apathetic, recklessly irresponsible and the innate affiliation humans should have with nature has been suppressed. The greatest threat facing the natural environment and humanity today is climate change caused through global warming. Despite scepticism, global warming has already proven to be detrimental to environmental sustainability, which subsequently has social and economic implications. South Africa is one of the most biologically diverse countries in the world, yet globally we are one of the leading contributors responsible for carbon emissions. It is the developing nations like South Africa that will experience a greater challenge in terms of our capacity to respond to the impacts of global warming. The alarming role that the built environment played in contributing towards global warming provoked a response to investigate this matter further.

This research identifies a disparity between human relationships and interactions with the natural environment, and suggests further roles that architecture can assume, to re-affiliate humanity with nature and provoke a greater response from humanity to protect it. The research focuses on the notion of phenomenology, an application of multi-sensory experiential architecture to create identifiable and meaningful spaces for humanity with nature, via immersed experiences within nature.

The thesis proposes an environmentally responsible and contextually appropriate architectural design, for a wetland, estuary and marine conservation centre in the iSimangaliso Wetland Park in northern KwaZulu-Natal. It is intended that an immersive experience in a site that is rich with ecological value and natural beauty, would reawaken this innate sense of affiliation humanity ought to have towards nature. The proposed architectural programme functions as an interface and mediator for the key issues of research, education, tourism and community participation, through which the most concerning issue of environmental protection of the park occurs.

This thesis does not aim to provide a solution to the conservation and socio-economic challenges implicated through climate change. Rather, the thesis focuses on how architecture can re-affiliate humanity with nature in order to provoke a greater protection of the natural environment through individual mitigating responses, whilst addressing the key conservation and socio-economic issues concerning the park.
This thesis is structured into the following sections:

**THEORY** - A theoretical essay identifies a disparity between human-nature relationships in the built environment. The notion of phenomenology provides insights to re-affiliating humanity with nature, through sensory-experiential design. It identifies the notion of tourism and qualitative conservation research as relevant programmes and concludes by introducing the primary site criteria for the thesis.

**SITE** - The iSimangaliso Wetland Park in northern KwaZulu-Natal is determined as a suitable site for phenomenological immersive experiences in nature, and opportunities to share and acquire ecological knowledge for the greater public. A background on the regional and local context of site, history, and the roles local communities, research and tourism contribute towards conservation, and site analysis is provided. The user groups of the park are recognised as the potential users of the proposed project.

**PROGRAMME & VIABILITY** - The developed project brief is influenced by the theoretical principles and site informants. Using the concept of synergy, an integrated, mutually beneficial programme for eco-tourism, conservation research and local community was developed, through which conservation of the prioritised ecologies occur. The viability of the proposed programme is explained, with focus on financial considerations, implementation, organisation structures, and feasibility of the proposed project.

**PRECEDENT STUDIES** - An analysis of existing architectural interventions has provided insights on building typologies, that have influenced the proposed design in terms of concepts, architectural design, technical resolution, responses to environmental and social contexts, and environmentally sensitive and sustainable design.

**DESIGN** - Having determined phenomenology as a design strategy for enhanced human-nature interactions, the concept of journey was explored through the design process, design development, and technical resolutions of the project. The design provides environmentally sensitive and climatic responses to the site, in order to mitigate its impact on the natural environment. The design process considers and consolidates the theoretical principles; site informants; precedent analysis; and programme in the architectural design.
theory

The greatest threat facing the natural environment and humanity today is climate change caused through global warming. The alarming role that the built environment played in contributing towards global warming has provoked a personal response to investigate this matter further.

Personally interested in how architecture has transformed to be responsive for sustainable solutions, instead of contributing to the problem, an overview of the current strategies undertaken in South Africa and the built environment were evaluated. The research provides insight on the existing relationships, or lack thereof, between urbanised societies and nature; the similar issues that are prevalent in present day sustainable architecture in South Africa; and a review of alternative strategies that respond to these issues.

This research applies an architectural perspective to derive potentially realistic and applicable strategies to alleviate the prevalent and foreseeable issues, that we as a country and world face. This is in terms of environmental sustainability and conservation, and mitigating the individual’s impact towards global warming. This research intends to advance an understanding for architectural designers in creating and engaging with environmentally stimulating spaces, through an investigation of Juhani Pallasmaa’s notion of phenomenology, where multi-sensory experiential design is applied to create identifiable and memorable spaces for place-attachment, with the intent to re-affiliate humanity with nature.

This essay works towards proposing an appropriate architectural intervention that reconnects humanity with nature, as well as furthers a greater protection of the natural environment. It identifies tourism and research as relevant programmes, for enhanced human-nature interactions and ecological conservation, and concludes that a site rich in ecological value and natural phenomena be proposed.

The following key Issues will be discussed:
• Climate Change and Architecture’s Response
• Sensory Intimacy for Place Attachment
• Phenomenology and Nature
• Journey as a Narrative for People and Place
• Phenomenology for Research
I DON'T BELIEVE IN
GLOBAL WARMING
CLIMATE CHANGE:
The global issue of climate change is regarded as the greatest environmental and humanitarian challenge threatening the world today. The accelerated rate of climate change seen over the past 50 years is a result of human activities. Excessive greenhouse gases, such as unprecedented levels of carbon dioxide emission, and other degrading anthropogenic activities, are causing increased surface temperatures of the earth, by trapping heat within earth’s atmosphere – where heat would have otherwise radiated out into space. Despite initial scepticism by many international political figures, academics, and scientists from various research fields, climate change has already proven to be detrimental to environmental sustainability and subsequently social and economic sustainability across the world (NASA, 2014).

One of the leading contributors to global warming and environmental degradation is the building industry, due to its construction, operations and demolition activities. Globally, the building industry is responsible for the use of 15% of the world’s fresh water resources; 40% of the world’s energy and about 23 – 40% of the world’s greenhouse gas emissions. In South Africa, operations by the building industry are responsible for 23% of the country’s greenhouse gas emissions, while emissions from the manufacturing of construction-related materials are about 4% (CIDB, 2009; as cited by Gunnell, 2009).

Considering that the building industry has been proven to be one of the leading contributors to carbon dioxide emissions and ultimately to global warming and climate change, drastic immediate action is needed, in order to alleviate the impact the building industry has on our natural environment on a global scale. In recent years, we have seen the research, information and knowledge, systems, techniques, design, implementation, construction, performance, endorsement, and support for sustainable architecture grow substantially, locally and abroad.

The environmental implications of global warming in South Africa are alarming, and are deeply concerning regarding the threat it has on our rich biodiversity that makes this country unique. South Africa is considered to be the 3rd most biologically diverse country in the world, after Brazil and Indonesia, yet the country is ranked in the top 15 countries of the world that are responsible for carbon emissions, based on energy consumption (Union of Concerned Scientists, 2014). South Africa is listed among only 17 countries in the world that have been identified by Conservation International to be “Megadiverse.” The “Megadiverse 17” countries cover roughly only 10% of the earth’s land mass, but contain “the greatest number and diversity of animals and plants,” which is 70% of the global species diversity (Du Toit, 2012).
Although the cause of global warming is mainly attributed to the developed nations, it is the developing nations such as South Africa, that will experience a greater challenge in terms of its impact and the capacity to respond to it. It is estimated that should the world continue to warm up at its current rate, the following is predicted for South Africa: coastal regions will warm by around 1-2 °C by 2050 and 3-4 °C by 2100; interior regions will warm by around 3-4 °C by 2050 and 6-7 °C by 2100. There will be significant changes in rainfall patterns; reduced water availability and distribution; increased frequency of wildfires; increased population of alien invasive plants; droughts; floods; temperature extremes; increased frequency and severity of extreme weather events; coastal vulnerability, and increased vulnerability and threats to biodiversity. This would then have dire consequences on the socio-economic and socio-cultural sectors, especially in terms of water and food security; nutrition; and healthcare (COP 17 | CMP7, 2011; DEAT, 2004).

This imminent threat to the nation is recognised by South Africa’s national government, which has resolved to: "strengthen the resilience of our society and economy to such climate change impacts and to develop and implement policies, measures, mechanisms and infrastructure that protect the most vulnerable" (National Climate Change Response White Paper, 2011).

"The destruction of ecosystems means that something in humans also dies. Humans...are part of this web and linked intrinsically with all species of nature. If they destroy nature, they will eventually destroy themselves". – Hitesh Mehta
SENSORY INTIMACY FOR PLACE ATTACHMENT

In his book, The Eyes of the Skin (2005), Juhani Pallasmaa argues for the phenomenological qualities of the human existential experience and consciousness in architecture, in response to the homogenising effects of modernity and globalization on the “postmodern condition” (Lyotard, 1986). As well as the “consequent disappearance of sensory and sensual qualities” from modern art and architecture (Pallasmaa, 2005, p. 10). He argues that architecture is continuously confronted with the development of new “digitally supercharged techniques,” and technological innovation, which “supplant our consciousness and diffuse our reflective capacity” (Pallasmaa, 2005, p. 8). This sentiment correlates to, and is further intensified by the manner in which architectural and construction industries have responded, in mitigating their environmental impact towards climate change...

The global need, appraisal and drive towards environmentally sustainable architecture and development, has made significant strides aimed at mitigating climate change by the industry itself. Architects, engineers and other consultants locally and abroad have become more technologically competent in the research, understanding, adoption and application of advanced, innovative environmental sustainable construction and systems. This global pressure has even seen the support and enforcement of municipal, provincial and the national government in South Africa, which has established dedicated departments, legislation, policies and regulations, and raised general public awareness and education towards environmental sustainability (Gunnell, 2009). It has also seen the formation of voluntary council bodies, such as the Green Building Council of South Africa (GBCSA), which provide the “tools, training, knowledge and networks” to ensure buildings are conceptualised, designed, constructed, managed, operated and performed efficiently in an environmentally sustainable way (GBCSA, n.d.). It has also supported the commercial-consumer industry in propagating environmentally sustainable building products, systems and innovations, which unfortunately has given rise to the “green washing” of products, whereby consumers are fraudulently misled on the (lack of) environmental sustainability credentials of the products (Tuffy, 2011).

However, the aforementioned initiatives have largely been fixated on the technicalities involved in mitigating climate change, and have therefore seen the implementation of rational and technical solutions and systems in place, for quantifiable results. These initiatives have hardly focussed on connecting and re-establishing the relationship of architecture and the built environment to the actual cause, which is nature itself, the biophysical environment. Architectural design remains to still separate people from nature.
One attempt at dealing with this issue is the concept of biomimicry. Biomimicry is the emulation of natural systems, principles, forms, processes and performance of the biophysical realm, in order to inspire, create and apply simple solutions to the many challenges designers attempt to resolve through environmentally sustainable architecture, as well as the broad spectrum of technological developments in sustainable innovations and systems. It offers architectural design, creative ideas that could remedy and mediate between nature and the built form. This inter-connectivity allows one to improve sustainable design for efficiency, balance, resiliency and simplicity. Although environmentally sustainable design attempts to accept, acknowledge and reflect that humanity and the built environment all perform within a natural ecosystem, one can argue that biomimicry offers only a direct translation of the mimicking of nature in the technical sense. One can then agree that sustainable solutions are detached from the environmental and spatial context, and consequently miss opportunities for “geo-cultural connectedness” (Knittel, 2013).

However, the issues concerning global warming are beyond the environmental consequences of architecture and the built environment, and beyond its technical regulations and resolution of environmentally sustainable design. It is an overarching global issue, a responsibility that burdens the ordinary South African and global citizen beyond the built environment and in almost every sphere of their life...but has this realisation resonated with the individual? Has environmentally sustainable architecture contributed to the suppression of the spiritual “consciousness” and “reflective capacity” of the individuals’ exceeding environmental responsibilities through its solutions of technical rationality? Then can architecture remedy and enhance the personal relations the individual has between the self and nature, within their reflective capacity? (Pallasmaa, 2005, p. 8)

According to Pallasmaa, “the ultimate meaning of any building is beyond architecture; it directs our consciousness back to the world and towards our own sense of self and being” (Pallasmaa, 2005, p. 12). In other words, for humanity to experience greater self-awareness and self-reflection towards an environment, the sense of space and place has to invoke an intimate, conscious response by provoking an emotional and spiritual connection to the space – a phenomenological experience. If architecture can uncover the spiritual potential of a given place, and through this give such place a meaningful and an identifiable connection for the user, the place can become dependent on the user’s sense of belonging and identity, since the emotions associated to the place are essentially then a manifestation of the user himself. This phenomenon of “place attachment,” is useful in unearthing the factors that influence the emotional attachments and ties of “people-place relationships” (Najafi & Kamal, 2012, p. 7637).
However, the article, The Concept of Place Attachment in Environmental Psychology, states that “the growth of human societies, development of technological advances, globalization, increased mobility, and encroaching environmental problems has threatened person–place relationships” (Scannell and Gifford, 2010, p.1; as cited by Najafi & Kamal, 2012, p. 7637). Urban planning developments of many modern cities has contributed to the detachment of people from identifiable spaces and places as they were conceptualised with an “Enlightenment world view, in which nature was seen as separate, from humans and their habitats” (Peres, Baker, & Du Plessis, 2015, p. 40).

Nature is broadly defined as: “The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.” (Oxford Dictionaries, 2014).

This definition is in line with the general perception that the natural environment of the earth and its natural systems are separate to that of humans and their creations. Humans are generally perceived in the western world to be dominant or superior over nature, or nature is to be regarded as something that is pristine and untouched by human intervention (Merrick; Price, 2008). However, surely all forms that emerge from the processes of nature are considered ‘natural,’ and by this logic, humans are then natural, as we are formed by nature, have evolved through nature, have adapted to nature, and interact with nature - all core principles that resonate with natural systems and the essence of ‘ecology.’

There is a complex and conflicting relationship between humans and the natural environment. This perceived separation of humans and the natural world have implications for the values, attitudes and behaviour of humans towards the natural environment. As discussed, urbanisation and technological advancements have resulted in urbanised, modern societies becoming alienated from what they perceive to be the natural world. Ironically, this detachment from nature has also promoted the notion of nature being revered as “sacred” and needing to be protected. The affection humans have for pets, the pleasure from gardening, and traveling to pristine natural destinations, are considered to be a reflection of humanity’s “yearning for a closer relationship with nature and the natural” (Merrick, YEAR; Price, 2008).
The unsustainable extraction and use of renewable and non-renewable raw materials and systems of the natural environment were recklessly exploited as a resource at liberty, for the service of humanity. This was “without consideration for the long-term effects; this in spite of the fact that humans have an inherent need to be part of nature” (Peres, Baker, & Du Plessis, 2015, p. 40). Global warming brings attention to the magnitude of humankind’s negligence, and never before has it been realised that this disconnection between the built-urban form and the natural environment, between humans and nature, has “threatened the physical functioning of cities, along with the physiological and psychological well-being of its citizens” (ibid, p.40).

As mentioned, humankinds’ “inherent need to be part of nature,” refers to a primordial intuition to be part of the natural environment. In his book, Biophilia: The Human Bond with other Species, Edward O. Wilson refers to the theory of Biophilia, that all humans have an innate, deep affiliation, consciously or subconsciously, to natural and living things. This emotional response towards living things is embedded within our biological evolution, in order to protect and sustain all life (Wilson, 1984). It is this affiliation that has been repressed through urbanisation and technological developments, which has alienated urban societies from nature. It is this detachment of urbanised societies that is impeding our realisation and understanding of our destructive habits on the earth’s natural systems. How then can we expect more individuals to foster an appreciation of nature, to show commitment and action towards the preservation of our natural environment? Also, how can the notion of biophilia be re-affiliated, in order to re-establish identifiable spaces for urban societies to which “place attachment” in nature can occur?

“Architecture is the constant fight between man and nature, the fight to overwhelm nature, to possess it.” - Mario Botta

The perceived separation of humans and nature is evident in the urban planning of Central Park, in New York City (See Fig.2.10). Although the park provides citizens with a recreational space to experience nature, it is evident that there is a clear distinction between the natural park and the surrounding, dense urbanised context.

The rigid, formal city-grid planning, contrasts to the sinuous, undulating and irregular landscape found in nature (See Fig.2.11 an indication of humanity’s absence from nature, further distancing the urban user from the untamed, raw natural beauty found within nature.

Fig. 2.11: Aerial Photograph of Lake St. Lucia
(Roger & Pat de la Harpe Photography, 2015)
The Mannahatta Project, by Eric Sanderson compares present-day New York with a 1609 portrayal of how the land would have been, before man’s presence. The project shows the urban transformation of the ecologically rich land over time. The comparisons depicts the disparities of human kind from the natural world in which we exist.
In memorable experiences of architecture, space, matter and time fuse into one singular dimension, into the basic substance of being, that penetrates our consciousness. We identify ourselves with this space, this place, this moment, and these dimensions become ingredients of our very existence. Architecture is the art of reconciliation between ourselves and the world, and this mediation takes place through the senses” (Pallasmaa, 2005, p. 72).

According to Pallasmaa, place attachment, “human rootedness in the world” or the expression of “man’s being in the world” is embedded in the existential experience of the human body, where the body is the “locus” of perception, thought, memory, imagination, consciousness and integration of our experience and understanding of the world around us (ibid, p. 10-11,16-18). The body is also significantly the medium through which our senses and thoughts are articulated, stored and processed (ibid, p. 10). Therefore the “life enhancing” qualities of meaningful architecture should articulate, mediate and respond to all the senses “simultaneously” and strengthen our sense of self to the experience of being in that space (ibid, p. 11). The sensory experience of that space would “integrate physical and mental structures,” and embody an “aura” or “spiritual essence” which captivates the user, providing their existential experience a “strengthened coherence and significance” (ibid, p.12). Therefore, a full sensory embodiment of natural systems and environments is needed for humankind, especially that of urban societies, to re-affiliate, identify and acquire a sense of attachment with nature.

Pallasmaa refers to the role, relevance and application of each sense towards the design of sensory, experiential architecture that facilitates people attachment and identity to a space and place. He particularly gives emphasise to the role of our tactile senses, through which all “sensory experiences” and “sensory modes” are extensions of. For it is through the tactile sense that our existential experience of the space and place around us is integrated with ourselves (ibid, p. 11). He refers to the process in which an architect conceptualises and designs through an interpretation and understanding of how one perceives things – a process that encompasses the body as a whole and its sense of self. He commends the design process that involves the haptic cognizance of the architect, through the physical practice of hand drawings and model-making, as it is through this that the mind is stimulated by the tactile senses (ibid, p. 13). The analysis and applications of the senses, according to Pallasmaa, are as follows:
“Ocular centrism” in architecture refers largely to the bias tendencies of western culture, to favour visually dominant and stimulating architecture. The sense of sight was favoured for its association with “truth,” fact, “reality” and through those associations - “knowledge,” also as consequence of people’s tendency to rely on vision to “grasp, fixate, dominate, secure and control,” their perception and understanding of themselves within their locale (ibid, p. 15). As a consequence, urbanised societies developed associations of “alienation” and “detachment” from the environment, in which they were experiencing a “mindless visual journey” (ibid, p.18&22). Pallasmaa further elaborates that the neglect of the “peripheral and unfocused vision” in our existential experience, “enfold(s)” the subject within its space, and aids us to locate and perceive ourselves within that space (ibid, p.10). He gives an example, where the use of light and darkness can be manipulated to give a greater sense of depth and presence. The sharpness of vision is supressed in spaces of darkness and deep shadows, and the imagination of the user is stimulated by the ambiguity of the peripheral vision (ibid).

In addition to this, visual perception and understanding is confirmed through the sense of touch. For example, the variations of textures, shapes and surface treatments, entice the eyes for the observer to engage and physically connect and touch the subject(s), and is later automatically understood by the user in his/her perception of sight, through haptic memory and associations which are acquired through that touch. Materiality in architecture, especially of natural materials, expresses the essence of time, matter, origin and use – a quality that lacks in contemporary architecture with technologically manufactured materials. This sense of materiality, and other elements of texture, density and temperature, introduces a sense of tactility, which entices the user to approach and engage with the subject(s) and adopt a sense of “sensory intimacy” between the subject(s) and the skin, and thus this becomes an experience of the space (ibid, p.34).

Pallasmaa goes on to describe the relevance of the other senses, such as: Acoustic intimacy, which refers to how, through sound, the extent of space inhabited becomes measurable in terms of its scale. Sound confronts the user, who unconsciously or consciously interprets the quality, connotations and meaning that sound suggests within a space. The sound then enhances the plasticity of that space, and gives it a greater meaning, via the users’ perception and understanding. In terms of architecture, he deems “tranquillity” as the greatest “auditory experience,” since it mutes sounds of the external, and invokes an internalisation of the space experienced. Pallasmaa also refers to the sense of smell as being the most “persistent” of the senses in terms of invoking memories and associations to a particular experience of a
space (ibid, p. 54). He further refers to other roles of the body, referencing itself for comparable scale in its encountered spaces; for its innate capabilities of remembering, imagining, perceiving and interacting with space, and its capacity to understand the potential of “implied action” or “active encounters” presented within, or directed by spaces (ibid).

From this, one can understand that the role of architecture should not be subjectively limited and orientated towards the visual appeal of the design and spatial quality, as it reduces the experience of the spatial to only a realm of vision and by so doing, suppresses the other senses. Thus the sensory complexity of being human and the comprehension of the human existential experience are reduced. Architecture has the capacity to facilitate as a medium through which all senses are simultaneously stimulated, for the space and place to engage physically, and above all psychologically, with the user, so as to acquire enough associations of the space that are memorable and identifiable. These spaces become emotionally layered and charged in the experience, and would provoke an attachment to the space and place for the user. This then proves that in order for humanity, especially those of urbanised communities to once again re-attain our innate biophilic affiliation and appreciation of the wonder that is ‘our’ natural environment, and to become attached and identify with nature, we require an immersed sensory experience within nature and architecture.

PHENOMENOLOGY OF NATURE
Nature as phenomena allows people the opportunity to be fully immersed in it, and elicits human-nature interactions. The numerous stimuli that nature presents, excites the senses of sight, sounds, touch, smell and even taste, which enable the presence of nature to be perceived. The human mind and body responds to: the natural elements of heat, water, wind and earth; the passing of time, whether yearly, seasonally, daily or by the hour; changing weather conditions; the quality of light and colour, and the observed interactions of natural living phenomena such as the flora and fauna. The affiliation that is then intuitively perceived, is related to personal memories, experiences and associations that nature has had in developing individual perceptions, and understanding personal narratives of nature, through this sensory stimulation. Such sensory experiencing of nature can be spiritually enlightening, therapeutic and healing, but most significantly it enables the one experiencing, to gain a greater awareness of the self in the presence of nature, and this is what attracts us to experience and appreciate nature.
JOURNEY AS A NARRATIVE FOR PEOPLE AND PLACE

Introducing the Notion of Tourism:
To further elaborate on the lost spatial experiences and person-place relationships of the urban dweller, modern transportation has increased the speed and physical distance we now travel to our destinations, which in effect is increasingly distancing ourselves from the experiences of our environments and its surroundings. Our sensitivity and consciousness to the stimuli that our environments present is diminished and our potential responses in perceiving the contextual narrative of these places are lost. The directness, linearity and at times repetitiveness of modern travel via roads, highways and air travel, as well as their supporting spaces of parking lots, underground parking and airports, further isolate the traveller from the stimuli of the surrounding context - and so the notion of journey is lost.

Through a more sensory, tangible experience of moving through space, such as walking to our destinations, we are directly exposed to the multitude of phenomena that surrounds us, at a pace that allows the body to sense, to comprehend and respond. It provides a tactile experience that allows us the flexibility to alter our direction and movement, in response to the stimuli with which we are confronted. It allows us the opportunity to encounter and interact with others, which forms our impressions of the place as social human beings. Through our own bodily movement through space and journey, the role of the human body again proves to engage the user’s senses in identifying memorable experiences and environments.

The notion of journey can then be understood as the tangible, physical experience through a series of sensory-engaging encounters, experienced by the individual through travel, that forms a personal narrative for the individual to later relay and reflect on. Travel fulfils the desire to develop this narrative of memories through experiences of other places: “the various phases within a travel experience - departure, journey, encounters and return - provide the story with a structure that then starts to raise the traveller’s expectations of things to happen” (Mikkonen, K. 2007), and in so doing elicits an imaginative journey experience beyond the physical journey. Travel allows for individuals to broaden their personal perceptions, understandings and appreciation of a world that is greater than their own recognised place, through a series of sequential, sensorial experiences that form a comparative narrative. It is this narrative that is the “necessary strategy of human expression and a fundamental component of human identity” (Altman, 2008, p.380), and it is the spirit and motivation that drives the concept of the ‘travel and tourism’ industry. Travel and tourism then provides a potential programmatic solution, for an appropriate architectural intervention to be proposed that re-affiliates humanity with nature.

“Two roads diverge in a wood, and I, I take the one less travelled by.”
- Robert Frost
Journey Enhanced Through Architecture:

The role of architecture in facilitating travel and tourism is substantial and varies: “It (architecture) not only facilitates investment, synthesizes the requirements of comfort and entertainment or organizes activities, technologies and spaces, but also creates identities and produces the imagery and iconography associated with branding of tourism investors” (Cetin, 2012, p.103).

However, the role of architecture in travel and tourism is not limited to the above. It also assists as a design tool that guides the traveller in forming this personal narrative from their experienced journey. Strategically designed, architectural features can be part of the built structure or the surrounding landscape design. Conventional tools for directing travellers through space have relied on using easily identifiable signage for navigation, whereas architecture can take advantage of the human senses and responses as tools for navigation.

For example, people are visually attracted to motion, such as the movement of nature found in wind and water. It draws the traveller to either move along or towards that motion; landmarks provide an orientation feature, that attracts people and makes the location surrounding it memorable; the use of well-defined pathways promotes movement; using sight lines along these pathways reveals to the traveller what is ahead; the visual character of the architecture further guides the traveller to locate the immediate context and perceive its distinguished place-identity from other contexts, based on its associated visual style, materiality, and vernacular distinction of the local architecture (Foltz, 1998).

Architecture can lure the traveller in, entice movement, lead the direction, and reveal the destination to the traveller. Architecture can show deeper meanings and interpretations of the space travelled. It can spatialize a setting or a moment; frame views; contextualise the space or immerse the user in the environment (Foltz, 1998). This is all occurs as the traveller navigates through the space, creating a journey that can be a memorable and sensorial experience.

Fig. 2.17: Journey through Nature. (http://www.centuryfarmoceanfrontcottages.com/wp-content/uploads/2012/03/DSCN0378.jpg)
This specialised knowledge is generally applicable and comprehensible to a specific audience, and is not necessarily engaging or accessible to the ordinary person. This means, that this knowledge and deeper meanings of nature are further restricted from the broader public, further alienating them from nature.

In the late 18th Century, Johann Wolfgang von Goethe, a German natural philosopher, proposed an alternative approach to studying nature. He argued for a more qualitative and intimate approach: an intense, immersive experience of direct, first-hand encounter, between the researcher and the subject, which was grounded in human sensory perception and understanding of this subject, as a phenomenon “in itself” (Seamon, 1998, p.2). According to Goethe, “the human being himself, to the extent that he makes sound use of his senses, is the most exact physical apparatus that can exist” (Goethe; as cited by Seamon, 1998, p.3), in essence, he proposed a phenomenological approach for research. The intent of this was to observe nature’s organisms and systems as integrated, dynamic beings, in order to determine its intrinsic qualities, and to reveal how it interconnects and responds to the environment that sustains it. This would provoke the researcher to unearth and appreciate deeper meanings and understanding of nature; enhance their sense of individual environmental responsibility and share these deeper meanings and sentiments with others (Seamon, 1998).

The type of research that conservationists and environmental scientists conduct, requires them to work directly and physically in the natural environment. Through personal interviews with conservationists and environmental scientists, it became apparent that their immersed, intimate, prolonged engagement with nature, had profoundly influenced their perception and appreciation for it. In general, they deeply understood the urgency to protect the natural environment; they were passionate about their work; some even volunteered beyond their scope of work to assure better protection of nature; they all made personal choices in mitigating their own individual impact on the earth and were eager to share their personal insights and experiences of nature.

In short, their responses reflected the desired outcome of Goethe’s approach to understanding nature, and indicated that this particular type of research is key to finding deeper meanings and understanding of nature, that are relatable for the ordinary person to comprehend, in order to re-affiliate humanity with nature and elicit greater protection. This line of work then provides a potential programmatic solution for an appropriate architectural intervention to be proposed.
CONCLUSION

Urban societies have become apathetic, distanced physically and spiritually from nature, and recklessly irresponsible towards the earth. The innate affiliation humans should have with nature has been inadvertently suppressed. As a result, this has left the natural environment vulnerable, with the greatest threat facing the natural environment and humanity today, climate change caused through global warming. The negative effects this will have on the natural environment are innumerable, and these then have severe social and economic implications. In response to the building industry’s responsibility towards mitigating its effects on the natural environment and global warming, environmental sustainable architecture is being enforced as a solution. However, there is little emphasis on re-affiliating humanity’s connection with nature.

Pallasmaa’s (2005) notion of a multi-sensory, stimulating, experiential design provides a medium through which re-affiliation to nature can occur through architecture, by provoking deep personal connections to a place. The body is a physical and sensory entity, through which memory, imagination, perception and understanding of the self within that space, is projected onto the spaces that we experience. This allows for the space to be identifiable with the user, and for place-attachment to then occur. Protection is a primordial instinct of any human, to things or lives that they deeply value and care for. For humanity to feel the need to protect the natural environment, a personal relationship and connection has to exist with nature, and this occurs through place-attachment.

Furthermore, urban environments provide little opportunities for people-place relationships to occur, especially with nature. The notion of travel and tourism then provides the traveller a chance to fulfil their desire and yearning to form meaningful, personal narratives, in order to enrich their experience and understanding of places, nature and the world. This need offers an opportunity for places of pristine nature

Fig. 2.18: Ekko’s architecture and sound installation (Webb, P; 2007)

Ekko’s sound installation enhances the sound of people’s voices and footsteps as they move through a passage of a distorted timber structure. Natural light, shadows, wind, sounds and materiality enhances people’s perceptions of experiencing the space.
to entice the traveller for an immersive experience, through which the notion of journey can be applied. This immersion in nature is a sensorial experience, which to the experiencing individual, makes the place identifiable and memorable and encourages re-affiliation with nature, through which a greater sense of personal responsibility to protect nature is realised. This notion of journey can be assisted by architecture, which further enhances and guides the traveller along his journey.

Conventional scientific research is undeniably necessary for the conservation of the natural environment. However, the level of objectivity and specificity that is required in this method of research, not only isolates the researcher from fully understanding the subject or perceiving the greater purpose of her work, but also restricts the potential knowledge and meanings that are shared to the greater public. A more humanistic inquiry will result in more relatable information that can be perceived by the ordinary person, as it appeals to the human conscience and emotions, likely provoking empathy and a re-affiliation to nature, with the desired outcome of increased responsible human-nature interactions; individual environmental responsibility, and environmental conservation.

Based on this argument, for a relevant architectural intervention to take place, the proposed site should be rich in ecological value and biodiversity, and of tourism potential. The intention of these site criteria, is to reawaken this innate sense of affiliation that humanity ought to have towards nature, which would subsequently raise a sense of awareness, a sense of identifying with space, and a sense of realisation of the potential loss of place - which is inevitable if humanity continues to degrade the environment at the current rate. It would place emphasis on the threats of climate change and other anthropogenic activities, so as to ensure a greater protection of natural areas and conservation efforts within the area, the province, the nation and the world, as well as to emphasise the urgency for monitoring, research and education towards those goals.

“Architecture is essentially an extension of nature into the man-made realm, providing the ground for perception and the horizon of experiencing and understanding the world” (Pallasmaa, 2005, p. 41).
“Architecture is bound to situation, and I feel like the site is a metaphysical link, a poetic link, to what a building can be.” – Steven Holl
As discussed, for a relevant architectural intervention to take place, it should be proposed on a site that is rich in ecological value and biodiversity, and of tourism potential. The following chapter validates why the iSimangaliso Wetland Park, and specifically the town St. Lucia, is a suitable site, and provides contextual information for understanding the site.

**Introduction to iSimangaliso Wetland Park:**
The name iSimangaliso means “miracle” in isiZulu, which aptly describes the area that the iSimangaliso Wetland Park protects. The park is located on the northern-east coast of KwaZulu-Natal, South Africa and is the third largest protected area in the country and holds immense ecological value. It extends over an area of 3,280 km² of natural ecosystems, spanning for roughly 280 km along the eastern coastline, from the Mozambican borders in the north to south of the St. Lucia town. It was recognised as South Africa’s first World Heritage Site by UNESCO in 1999, due to its rich biodiversity; unique and diverse interlinked ecosystems; global value; and natural beauty (iSimangaliso Wetland Park, n.d.; UNESCO World Heritage Centre, 2015). In addition to its ecological value, the area is ingrained in socio-cultural and socio-political history that forms part of this *layered landscape*.

**Understanding the Regional Context**

**The Kwazulu-Natal Province**
KwaZulu-Natal (KZN) is situated on the eastern seaboard of South Africa, along the Indian Ocean. The province is rooted in history and cultural diversity of western, eastern and African influences. Most notably the province is known for year round, warm sub-tropical climate and warm ocean; as well as its thriving biodiversity of flora and fauna, within areas of natural beauty that are unmatched in other South African provinces. Such attractions make KZN the leading domestic travel destination in the country. Although the province is divided into local municipalities, for tourism purposes, the province is colloquially identified by its tourist-orientated destination regions of natural, historical or cultural related significance by tourist marketing and the locals themselves. They are known as the North Coast, South Coast, Zululand, the Battlefields, Elephant Coast, and the KZN midlands, which include the two UNESCO World Heritage sites, the iSimangaliso Wetland Park and the uKhahlamba Drakensberg Park (TKZN, 2015).
TOURISM IN KZN

The province relies greatly on tourism for economic growth, which contributes “10% directly and indirectly to the province’s Gross Domestic Product (GDP)” (TKZN, 2015, p.3). Since KZN is the second largest contributor to the national GDP (DBSA, 2011), the tourism sector of KZN is nationally recognised as a key economic driver. According to the Development Bank of Southern Africa (DBSA), a “R1 million investment in the tourism sector is estimated to have an impact on GDP of R1.58 million” and a “creation of 10.88 employment opportunities” which is far greater impact than investments on other sectors. Therefore, progressions in the tourism economic sector, will potentially lead to further economic growth that is directly beneficial to people of KwaZulu-Natal, in terms of job creation, employment and potential entrepreneurship opportunities for small local businesses.

The graphs (Fig 3.4 and 3.5) shows that in KwaZulu-Natal, the GDP and employment impacts of investment in the infrastructure sectors (i.e. water, transportation, communication & energy) are low when compared to the productive economic sectors such as agriculture and tourism sectors. Investment in these sectors creates incentives for further investment by the private sector.

The primary source of KwaZulu-Natal’s foreign tourism markets come from its neighbouring countries, Swaziland (23%) and Lesotho (17%) (EDTEA, 2014). Since the iSimangaliso Wetland Park is a favourable travelling distance from Swaziland, and shares a border with Mozambique, it presents an opportunity for a relationship between the countries for economic development to occur and be sustained. This potential relationship has already been identified by the iSimangaliso Wetland Park. In the past it has seen infrastructural developments of road networks connecting these neighbouring borders to KZN, and to the park itself, and there are plans in the future to form a ‘transfrontier park’ to extend the park area beyond the Mozambique and Swaziland borders, (IWPA, 2014) thus increasing the conservation network of the park and enhancing the economic benefits of improved foreign accessibility into the park.

The main demand and appeal for KZN tourists are the recreational activities associated with its natural environment. Majority of foreign visitors to the province appreciated the beaches and visits to the nature reserves. A major attraction that domestic tourists appreciated were the beach-related activities in the province, accounting for almost 50% of all activities (Statistics South Africa, 2004, p. 103). This indicates that, nature-based tourism, especially of KZN’s beaches, presents an opportunity for strategically marketed tourism that is demand driven, in order to make the most of tourism’s economic benefits.
The KZN provincial government therefore takes seriously the tourism sector capacity to be an economic driver, and strives to take advantage of the province’s natural phenomena and thus market KZN locally, nationally and internationally, as a year-round tourist destination. The KwaZulu-Natal Tourism Authority (or Tourism KwaZulu-Natal), who are mandated by the provincial government’s Department of Economic Development, Tourism and Environmental Affairs through the KwaZulu-Natal Tourism Act, 1996, are responsible for both the development, local and international promotion and marketing of tourism in the province. The organisation aims for the KZN tourism sector, to provide economic benefits to all public and private stakeholders, “the province and its citizens, by initiating, facilitating, co-ordinating and implementing strategic tourism marketing, and demand-driven tourism development programmes” (TKZN, 2014).

The province, faces similar challenges to those of the country as a whole. The priority areas for social and economic development include rural development, urban renewal, economic and employment growth, poverty reduction and human resource development, all of which the tourism sector can address. Tourism KwaZulu-Natal recognises the economic benefits of tourism as catalyst for transformation of the socio-economic challenges facing local communities, by facilitating participation of the communities in the economic activities associated with tourism, and are especially motivated for initiatives that help previously disadvantaged people of the province with training, skills transfer and knowledge, job creation opportunities, and emerging entrepreneurship in tourism related businesses.

From this, it is understood that a valued relationship exists between nature, tourism, the economy and the local communities in KwaZulu-Natal. The natural attractions of KZN appeal to the demand-driven strategies for domestic and foreign tourism, which needs to be taken advantage of, in order to benefit from the economic influences it offers. It is an economic driver for both public and private sectors, and most notably the direct benefit it delivers for the local communities of KZN, by alleviating the socio-economic issue, through job creation, entrepreneurship, skills development and training, and infrastructural development associated with accommodating tourism (i.e. road networks, telecommunications, municipal services). Since tourism in KZN is largely dependent on its natural attractions, it would be deemed imperative to protect these natural assets to ensure that the socio-economic benefits are sustained.
CONSERVATION IN KWAZULU-NATAL

In recognition of the above, the provincial government has mandated the Ezemvelo KZN Wildlife to act as a parastatal agency for long-term conservation in the province. The organisation is tasked with maintaining sustainable biodiversity conservation of protected nature reserves in KZN, constituted under the KZN Nature Conservation Management Act of 1999. Ezemvelo manages conservation and eco-tourism across KwaZulu-Natal, and is largely responsible for the iSimangaliso Wetland Park. Ezemvelo has extended its work to be more relevant to surrounding communities living adjacent to the parks - primarily through job creation and sustainable natural resource harvesting. Ezemvelo has also substantially invested in repositioning ecotourism “for provincial growth and development, and where possible, reinvest to sustain biodiversity conservation activities.” Through ecotourism related operations, financial support for conservation is made possible. (Ezemvelo KZN Wildlife)

As a conservation organisation, Ezemvelo cannot operate without the input from ongoing applied scientific research in order to make informed decisions regarding conservation management and decision making, as well as to monitor and evaluate the progress and impact of these decisions over time. Teams of ecologists, permanent and temporary researchers and specialists work on the field and in-office to assist with this. Ezemvelo also networks with other researchers from tertiary institutions, and from national and provincial government to advance their research.

“Eco-Tourism”

Nature-based tourism, or rather eco-tourism as it is more colloquially known, is a form of tourism that appeals to pristine, biodiverse, natural areas that have been relatively undisturbed by human intervention. The intention of this form of tourism is to combine tourism, conservation and the needs of surrounding local communities in an integral approach in support of each sector. Eco-tourism is essentially then what Tourism KwaZulu-Natal and Ezemvelo are set out to achieve.
CLIMATE CHANGE IN KWAZULU-NATAL

Although understanding the effects climate change on a global level has already been established to a fair degree, the understanding of the effects climate change will have on a local scale such as the province, is a challenging process. There are many uncertainties on the projected changes owing to the complex interactions occurring between the land, the oceans and the atmosphere and the level of technology and skills available to model and predict these outcomes.

However, according to reports from provincial government, the predicted effects of climate change are already taking place. Studies have relied on observed records of temperature changes over time and simulated predictions of future climate projections. This gives local government and policymakers sufficient information to base and inform their decisions. Overall the climatic trends already experienced by the province are consistent with what was projected:

- increasing average annual temperature over the north-eastern, midlands and south coastal regions;
- increasing average annual precipitation
- increasing of extreme and unusual weather patterns;
- increasing of the frequency and intensity of extreme weather-related disaster events, such as storms, tropical cyclones, drought, runaway veld fires and heat waves;
- sea level rise recorded for KZN’s coastal regions has been on average 2.7mm/year for the past 33 years (KZN DAE, 2010; SA Government News Agency, 2011)

The environmental effects of these climatic changes has already resulted in unprecedented impacts such as:
- major flooding and coastal erosion vulnerability of the south-coastal regions due to extreme storms and tidal surges which have altered parts of the KZN coastline;
- warmer temperatures have reduced maize and wheat yields;
- reduced rainfall affects animal production, agriculture, forestry and drinkable and useable water resources for people;
- and drier, arid conditions cause veld fires in the northern regions and upper midlands (KZN DAE, 2010; SA Government News Agency, 2011)
The KwaZulu-Natal province is host to a number of biodiverse, ecosystems. This map of KwaZulu-Natal indicates this rich ecological extent of the province, by indicating areas of unique or significant existence of flora and fauna; wetlands and estuaries; coastlines; prioritised conservation areas; and prioritised biodiversity areas that have been identified by the national Department of Environmental Affairs of the Republic of South Africa. By mapping the ecological extent of KwaZulu-Natal, it is evident that this specific area of the iSimangaliso Wetland Park is deeply layered with ecological richness.

The map also indicates the number of ecologically significant areas in the province that fall within rural areas and are often within or around land managed by tribal authorities; and it is these tribal communities that share a personal, cultural history with this natural landscape, especially in reference to the iSimangaliso Wetland Park.

Fig. 3.7: Ecological Extent of KwaZulu-Natal Map
(Source: EGIS, 2015; GCROS, 2015; created by author)

Fig. 3.6 (opposite): Rough sea conditions during a coastal storm in Durban, 2007 which caused severe damages along the coastline (Chris Bloom, 2007)
A historical background of the iSimangaliso Wetland Park is required to identify deeper meanings of experiencing the site, within our reflective and conscious capabilities, in locating the place within its historical, natural, and socio-cultural context. The historical landscape that the park covers, extends well beyond the borders that delineate the protected area today.

**NATURAL FORMATION OF LANDSCAPE AND ECOLOGY**

The distinctive geographical elements that define the park today arise mainly from two historical geographical processes that occurred in the park area. Initially the region was a submerged marine environment that experienced extreme changes in sea levels that began 140 million years ago, during the Cretaceous era, and this developed the second geographic layer of the natural landscape. About 2 million years ago, the sea level began to recede and the sandy, coastal plain expanded towards the east. Several water bodies remained in the depression regions of the landscape to form the freshwater lakes and estuarine lakes, such as the Lake St. Lucia – the largest of its kind in the world. Natural sedimentation of the floodplains then produced the smaller and shallower lake systems we now see today. As a result from these processes, significant deposits of fossils can be found in the western shores areas and remains of 125 000 year old coral reefs (Taylor, 1991, p.7). Prevailing on-shore wind systems caused the shore sand to be blown inland and become trapped between the rock formations on the shoreline. The sand accumulated over the years and eventually developed into coastal dunes along the shoreline. These dunes created a physical barrier between these inland water bodies and the sea. Rivers systems were able to pass through breaches between these dunes and eventually reach the sea, creating the estuaries such as the St. Lucia estuary and Kosi Bay that now exist today. (St. Lucia SA; Taylor, 1991, p.6)

These ongoing “fluvial, marine and aeolian” processes experienced by the region, together with the geographical location between sub-tropical and tropical African climatic zones, have created a varied natural landscape of the region, which is home to five major interconnected ecology systems that extend over coastal marine areas; the marshy wetlands, swamp and estuary areas; the lake systems; the grassland-savannahs regions & the coastal dune forests. These are inhabited by an incomparable, diverse range of fauna and flora species from the marine, wetland and savannah ecologies. ([IWPA, 2013, UNESCO World Heritage Centre, n.d].)

"The St. Lucia Wetlands Park must be the only place on the globe where the world’s oldest land mammal (the rhinoceros) and the world’s biggest terrestrial mammal (the elephant) share an ecosystem with the world’s oldest fish (the coelacanth) and the world’s biggest marine mammal (the whale)."

Former President Nelson Mandela, August 2001
The five major interconnected eco-systems identified are:

• **The Marine System:** This constitutes of the 280 km coastline along the Indian Ocean coastline of the park and includes off-shore and intertidal zones. It is the southernmost extension of coral reefs in Africa, and the beaches are annual breeding grounds for the endangered leatherback and loggerhead turtles. It also forms part of the migrating routes for whales and dolphins. Most remarkably, the Sodwana Bay area is known for the discovery of the oldest living species in the world, the Coelacanth – a fish formerly believed to be extinct (IWPA, 2008, p. 31).

• **The Eastern Shores/Coastal Dune System:** This includes a network of a 25 000 year old coastal dunes and forested dunes that reach 180m in height (some of the highest in the world); sub-tropical coastal forests; grassy plains; and wetlands (IWPA, 2008, p.31). This ecological system forms a natural barrier along the full length of the reserve between the freshwater systems in the west and the Indian Ocean in the east, and play an integral role in maintaining the water levels of the inland water bodies, especially during the drought periods. The height of the dunes force warm, moist air blowing from the Indian Ocean to rise up, thus inducing precipitation in the area. The dunes also function as a filtering system for water which seeps into the inland water systems. (Taylor, 1991, p.8, 21)

• **The Estuarine & Freshwater Lake System:** The systems include the estuarine systems of Lake St. Lucia and Kosi Bay, and four freshwater lakes, Sibaya, Ngobezeleno, Bhangazi North and Bhangazi South. Lake St. Lucia is the Africa’s largest naturally occurring estuarine lake system, stretching 85 km and is regarded as one of the most complex water networks to have ever been studied. It is inhabited by wildlife such as hippopotami, crocodiles, fish which use the estuary as a nursery ground, and birds – some migrating almost 30 000 km. The estuarine system experiences extreme salinity variations during periods of drought, which affects the ecology of the estuary, and the fauna that inhabit it. However, the ecology systems are able to adapt. During droughts the salinity of the water can be three times more than that of the sea, and can provide an environment suitable to host marine life such as jelly fish, and attract pelicans and flamingos. (IWPA, 2008, p. 31-25)

• **The Mkuze Swamps:** The Mkuze and iMfolozi swamp areas connect to the northern boundary of Lake St. Lucia and were formed by the sedimentation of partly dried up lakes that used to exist. They host the remaining swamp forests of South Africa and have extensive growth of reeds and papyrus. These marsh and swamp systems are essential for the functioning of the connecting estuaries and lakes, by serving as a natural barrier that prevents the over sedimentation of the estuaries and lakes and inhibits them from drying up (Taylor, 1991, p.26-28).

• **The Inland Western Shores System:** These drier regions of the park comprise of savannah, thornveld and sand forest habitats and are located further inland towards the western boundaries to the Lebombo mountain range. They form the oldest landscape of the park and include ancient shoreline terraces that provide evidence of the rising sea levels that occurred during the Cretaceous era. (IWPA, 2008, p. 34)

**Flora and Fauna:** The area protected by the park, supports a diverse species of flora and fauna, including species that are rare, endemic and are considered threatened or endangered. It owes this to the varying ecosystems that interrelate and interact with each other in the area. Some of the animals in the park include the elephant, leopard, black and white rhino, buffalo, cheetah, wild dog, hyena, antelope southern reedbuck and red duxer; and in the marine systems the whale, dolphin, whale sharks, sharks, colour-changing octopi, squid and marine turtles. The park’s wetland and estuary ecosystems alone include about 1200 Nile crocodiles, 800 hippopotamis, 114 fish species and 526 bird species. In regards to flora there about 2173 different species that have been identified thus far (IWPA, 2008, p. 34).
PRESENCE OF MAN:

Historically, the area that the iSimangaliso Wetland Park now protects, has been used and inhabited since the presence of stone-age communities in the Lebombo Mountains, and later iron-age communities in Enkwazini, east of Lake St. Lucia dating from 290AD (IWPA, 2008, p. 21). This was later followed by the southern migration of the Nguni and Tsonga people from the north-eastern coast of southern Africa, where they settled on the eastern shores of Lake St. Lucia somewhere around 1250’s - 1440 (Khuzwayo and Vorwerk, 2006, p.20). These communities developed the deepest relationship to the area, and for hundreds of years used the natural environment and its resources as a means for sustainable, self-depen-dant, resilient and peaceful living. The Zulus occupied areas not far from the Tsonga, who share a history and adopted some of the Zulu cultural traditions and skills. Portuguese explorers were the first European settlers when they landed on the coastline in December 1497, followed by the Dutch in 1670. However the European impact and influences to the area remained minimal and it was only after the British arrival in 1822, that the first explorations by ship via the Mkuze River to Lake St. Lucia took place, and by the 1850’s European presence in the area grew. Up until then, the area remained largely inhabited by the Tsongas and Zulus. (Khuzwayo and Vorwerk, 2006)

Although this land was never occupied by large human settlements or exposed to intense, detrimental land-use disturbances by man, it has experienced a history of events and activities that have threatened the ecology, and irrecoverably damaged the socio-cultural practices and living conditions of the indige-nous communities:

Hunting: The impact of extensive and unrestricted hunting expeditions on the wildlife populations in the area, led to the first measures taken to protect the land due to man’s activities. The European discovery of this area, its inhabitants, and wildlife, enticed hunting expeditions by colonists for game meat, hide, ivory and rhino-horn trade. With each hunting expedition, hundreds of wildlife were killed, and within 50 years of hunting the last elephant in the area was killed. The hunting ‘profession’ was so intensive, that at the time it was the Natal Colony’s main economic source. In 1987, due to the increasing threat of the hunting activities on the wildlife populations, the British established designated protected natural reserves and conservation areas stretching from Hluhluwe to iMfolozi, along with St. Lucia Lake – thereby establishing the first national conservation reserve in South Africa. In 1944 the park extended this to include False Bay into the protected reserve. In the early 1970’s, South Africa signed an international treaty with the International Ramsar Convention to protect the St. Lucia wetlands and surrounding coastline, and to enforce
conservation and sustainable use of wetlands and its resources. The protected regions came to be known as the Greater St. Lucia Wetland and in 1987, land of Eastern Shores State Forest was recovered to be part of the park. Since then, several continued conservation operations and preventative measures and initiatives have been undertaken by the park to ensure environmental protection of the area (St. Lucia SA, n.d.; Williams, 2015).

**Forced Evictions:** In the 1820’s, the British colonised the St. Lucia bay area and apportioned land to settlers and missionaries in the town now known as St. Lucia. The Tsonga people who lived within the St. Lucia wetlands were forcefully evicted from the area, to the northern regions of the reserve, and the Zulus were forced into the southern regions. In the early 1950’s, the area was proclaimed as a national forest by the Apartheid government. By this time the extent of the reserve had expanded significantly, and further evictions were enforced - this time restricting the local indigenous inhabitants to living outside the protected areas. Unfortunately, the apartheid mind set deemed African people incapable of appreciating and protecting nature and were therefore prevented from accessing it. The land that was inherently forged into the identity of the indigenous people, the land that was rich with their history, their spirit and culture was unrightfully denied to them. However, some remained and lived in hiding, peacefully using the land on their own terms, until the late 1980’s when they eventually resisted and claimed for their legitimate right to the land. (Boulay, 2008; Govender, 2015; St. Lucia SA, n.d.)

Since the British colonisation of the St. Lucia area, the town had largely remained dominated and controlled by the white population, who mostly benefitted from the economic and recreational opportunities that the town and park offered. During apartheid and even some years after South Africa’s first democratic elections in 1994, the town had a boom gate and people of colour were denied access into the town, making it difficult for them to find accommodation in the area. Khulu Village, a peri-urban township, was then developed, by the post-apartheid administration, to provide a housing solution for this community to live outside of the conservation territory of the park. However, this forced the community to adapt to conventional, ‘urban’ means of living, which then exposed them to socio-economic challenges, that is still prevalent today. (Boulay, 2008; Govender, 2015; St. Lucia SA, n.d.)

**Pine and blue-gum plantations:** Since the early 1950’s portions of the land adjacent to the park have been used for pine and blue-gum plantations, which consume unsustainable amounts of water which affects the amount of fresh ground water reaching the estuary and lake systems.

**Agriculture:** The effects agricultural activities on the Mfolozi catchment, which has reduced the area of natural wetland systems significantly. From as early as the 1910’s this area has been used for sugar cane farming and several actions have been taken by the farmers to protect their crops. This includes the redirecting and canalization of the Mfolozi River. (IWPA, 2011)
Dredging:
The redirecting of the Mfolozi River floodplain caused the sedimentation of the combined St. Lucia Estuary and caused the Mfolozi River mouth to close. This resulted in the sea and estuary being cut off from each other, preventing continual flushing of the estuary. However, at the time, the farmers were more concerned about the extensive back-flooding that was happening on their low-lying fields. During the early 1950’s, measures were taken to remediate this - a new mouth for the Mfolozi River was made separate from the St. Lucia Estuary and a dredging programme was established to maintain an open mouth system so that the ‘natural processes’ of an estuary could occur. A dredger harbour was built, and concrete retaining walls and dolosse were also used to retain this separation of the estuary and the river. This intrusion to the estuary mouth was at the time considered to have ‘improved’ the functioning of the estuary, and the dredging programme continued for 40 years. (IWPA, 2011; St. Lucia SA, n.d.)

ENVIRONMENTAL-RELATED THREATS

Drought:
During the 1960s the area experienced periods of drought and the open mouth system of the estuary proved to be devastating to the estuary ecologies. Seawater flowed uncontrolled into Lake St. Lucia, the northern rivers ran dry, and the separation from the Mfolozi River meant that the estuary could not benefit from this source of fresh water. Through evaporation and the continued influx of sea water, the salinity of the estuary systems increased to be twice the salinity levels to that of sea water. This caused a number of fish to die, the birds to leave and crocodiles to die from starvation. The salinity also caused a number of shoreline vegetation to die off, which led to the erosion of shorelines, and further sedimentation to the lake. (IWPA, 2011; Williams, 2015)

Floods: The flood in 1982 (caused by tropical cyclone Domonia), brought an unprecedented amount of rain for the region and flooding conditions were experienced by the St. Lucia estuary and surrounding ecosystems. Floods can alter the physical structure and ecological functioning of the estuary and lake systems. Floods are considered vital in flushing out the estuary systems and providing an influx of fresh water. The Domonia flood was so severe that it washed away the dredger, the dolosse and most of the retaining wall at the estuary mouth. As a result of this the Natal Parks Board and later the Ezemvelo KZN Wildlife conservation authorities, who now had full management of the park, decided to abandon the dredger system and opt for a more natural system, however still keeping the two mouths separate to prevent sedimentation of the estuary from the Mfolozi River. (IWPA, 2011)

Recent Years, Current conditions and Future Plans
Since UNESCO recognised the park with World Heritage Status in 1999, the park authority have taken great strides in their conservation efforts in the park. The park has been renamed from the ‘Greater St. Lucia Wetlands’ to the ‘iSimangaliso Wetland Park’ where the administrative, management and conservation of the park is overseen largely by the iSimangaliso Wetland Park Authorities, in joint partnership with Ezemvelo KZN Wildlife. The parties prioritise conservation of the park as their main objective, together with addressing the socio-economic issues experienced by the surrounding local communities through community involvement and the capacity for economic and infrastructural development of the area through tourism, and in recognising these as catalysts towards further conservation in the area.
Since 1999, some of the park authority’s achievements include increasing and improving conservation, community outreach and tourism in the park:

The conservation and natural protection of the park by expanding the park borders to increase protected natural land; the rehabilitation of previously damaged natural areas; reintroducing species of animals such as elephants and lions that once inhabited this area (pre-hunting era); taking drastic measures to protect endangered animals such as the black and white rhino from poaching; reclamation of land from the pine plantations in the hope of rehabilitating this land with indigenous vegetation, restoring the ground water sources and thereby attracting more wildlife; establishing and maintaining regional, national and international networking for scientific research towards ecological conservation in the area. (IWPA, 2014)

Community outreach through the participation of local community in clearing extensive areas from alien vegetation; land reclaims and restitution of the local community members who were previously disadvantaged and forcefully removed from their indigenous land; providing basic conservation and tourism-related training, skills development and entrepreneurship workshops and financial aid for small business enterprises; aiding in job creation; offering education programmes on environmental education for local schools surrounding the park, and offering higher education bursaries to students who are interested in studying courses that are related to hospitality and environmental sciences. (IWPA, 2014)

Increasing Tourism through new tourism related facilities in the park (this has grown by 84% since 2000), in response to the consistent growth in visitor number (IWPA, 2014). The park authorities have upgraded infrastructure; expanded on road networks to increase accessibility into the park, especially across the foreign borders; broadening the tourism sector to include cultural-related experiences and sporting events; and investing towards the proposal of new accommodation and recreation developments in the northern regions of the park. (IWPA, 2014)

In the recent past, the park has been experiencing a drought for a number of years which has reduced the level of water and because boats cannot operate in the low water, it has restricted access to a few areas in the park. The most concerning issue threatening the ecological functions of Lake St. Lucia is that it is experiencing drought challenges similar to those of the 60’s. The reduced water levels have caused the estuary mouth to become completely silted, access to the sea is now closed, and with continued evaporation the salinity of the Lake system has increased. However most recently, the park authorities are in the process of restoring Lake St. Lucia and the Mfolozi mouth system by re-joining them as they were originally and naturally. In this way the estuary will have a source of freshwater and the salinity issues can be minimised. Through research by local and foreign universities have investigated ways in which the expected sedimentation issues from the Mfolozi River can be managed, in the least invasive manner. (IWPA, 2014)

Climate Change:
As discussed, the expected effects of climate change in KZN would at first see the subtropical climate along the coastal regions intensify, with the effect of increased intensity and frequency of extreme weather-related disaster events, such as storms and tropical cyclones, which would consequently cause torrential rains, flooding, high sea conditions, sea surges, and extreme wind conditions. We can then assume that similar conditions to those experienced by the region when Cyclone Domonia and Cyclone Gamede occurred, will increase in their frequency. These events act as precedents for conservationists and developers to base decisions on. Furthermore, the increased ocean temperatures will cause further stress on vulnerable species and ecosystems, especially making them more susceptible to diseases. If changes in climate occur too quickly for the ecosystems and their species to adapt, it is expected that extinctions of species will likely occur (KZN DAE, 2010; SA Government News Agency, 2011).
CONCLUSION:

It is understood that a valued relationship exists between conservation, eco-tourism, and the local communities, that rely greatly on the natural protected areas in KZN and specifically, the iSimangaliso Wetland Park. This relationship has socio-economic benefits and provides for greater protection of the natural resources and ecosystems of these areas. However, the imminent effects of climate change will cause severe threats to the biodiversity and natural resources of these areas, which would subsequently have socio-economic and ecological implications.

The park is a layered landscape, of natural, ecological, socio-cultural and socio-political narratives. The geographical history of the region, tells a narrative of ecological processes adapting over time to climate and tectonic changes – as nature does. However, under the strain of human interference, the ecological functioning of the ecosystems has been severely threatened. This gives emphasis to the disparity between the recent human-nature relationships of the area, and the need for prioritised ecological research, monitoring and conservation action to ensure informed protection of the natural resources and ecosystems.

The indigenous community of the park, who share an inherent cultural identity and narrative with the natural landscape, were unrightfully denied access to their land. As a result of colonial and apartheid policies on segregated town planning, they still reside on the park peripheries, which has exposed them to the socio-economic challenges of conventional, ‘urban’ living.

Despite the detrimental presence of man in the region, humans are still integrally natural beings, and an intervention that is inclusive of human involvement is needed, in order ensure greater protection of the natural environment, as well as to remedy the social injustices and inequalities of the region. The pristine ecological richness and biodiversity of the park provides a suitable site for immersive human-nature interactions for re-affiliation of humanity with nature to occur. Also, the layered history of the region, gives insight to the deeper meanings that the site provides and aids in place-making. An integral conservation, community-based and eco-tourist model, provides clues for a viable and relevant architectural programme, for the region.
Fig. 3.13: 700 year old tradition fishing traps (IWPA, 2014)
IDENTIFYING THE USER GROUPS

It is essential to identify the users of the town and the park, in order to propose an architectural intervention for conservation that appropriately responds to the potential users. By doing so, a relevant and viable architectural programme can be proposed that addresses and integrates the challenges, needs and desires of the users, which makes certain the usability and functionality of this intervention.

“Architecture cannot be understood without the knowledge of the society it serves”
Sir Hugh Maxwell Casson

The town St. Lucia and surrounding area, including the iSimangaliso Wetland Park and surrounding local communities, attracts and supports various user groups. The natural landscape of the park connects the various user groups to its natural resources for a number of needs dependent on the user. The following relevant user groups were identified:

TOURISTS

The iSimangaliso Wetland Park markets itself as an eco-tourism attraction to local and international tourists who desire to experience nature. These tourists vary from the individual visitor; families, groups of friends; business conferences or team building workshops; to organised tour groups; and educational school trips. Successfully a lot of these local tourists return on annual holidays, especially families.

To cater for the tourist market, a lot of the developments that occur in the park relate to tourism, such as accommodation facilities, activities, information centres, retail, tours, trails and even transport networks have been developed to attract the tourism market in St. Lucia and the park. However, St. Lucia and the park’s infrastructure has aged over the years, and an upgrade of public facilities in the area are needed, in order to attract tourists, encourage them to return, stay longer and spend more in the town and park. This contributes to further funding for economic development.
CONSERVATIONISTS AND RESEARCHERS

Research has been contributory in developing best management of the park, with all human activities of the park being subjected to intensive management, research and monitoring. Research is regarded as a vital component in facilitating informed conservation-related decisions, and documented and ongoing research in the park continues to evolve as understanding improves. The human impact relating to the management and functioning of the St. Lucia Estuary mouth has proven in the past to have done more damage than good to the ecosystems. As discussed, the research to find a long-term solution to the hydrological and ecological issues of the estuary has resulted in a solution to restore the estuary and Mfolozi river mouths to its original, natural state, however, continuous monitoring and evaluating of this solution will be needed to ensure the optimum functioning of the estuary.

The park authorities are monitoring the impact of climate change on the park’s natural resources at a macro level. National government research institutions as well as national and international tertiary institutions are interested in investigating and monitoring the effects of climate change on the estuary. Recently, the South African Environmental Observation Network (SAEON), together with the National Research Foundation (NRF), have been investigating the impacts of human-induced global change on eco-systems, which includes both land use impacts and climate change. To detect, monitor and understands these changes, long term research is needed through investigative fieldwork at key location sites. The Lake St. Lucia Estuary has been investigated as a potential location for this research, based on the collective impacts of land use have had and the expected impacts of climate change will have on the estuarine ecosystems. The estuary provides the connections between terrestrial freshwater and marine water and also host a wide range of ecosystem-related issues for study. (SAEON, 2014)

“The restoration and rehabilitation work undertaken in iSimangaliso has gone a long way to improving the resilience of the Park to extreme weather patterns”, says Zaloumis. “However, in the medium to long term managers will increasingly need to develop responses to the conditions that are emerging as a result of changing weather patterns and global warming.”

- Andrew Zaloumis, CEO of iSimangaliso Wetland Park Authority
“Ngihlala phakathi kolwandle kanye nechweba umoya wolwandle uyangivuselela futhi uyangiphilisa” (I live between the sea and the lake and the wind keeps my spirit alive)

- Mshwayisa Tembe, a local villager, age 75
THE LOCAL COMMUNITY

Since 1994 and the transition to democracy, it is evident that the St. Lucia town has seen transformation with the inclusion of the community from Khulu Village to the economic opportunities present, especially in reference to job creation, with even some of the tourist-related infrastructure developed such as the fruit and craft markets, taxi and bus stops, tourist information and tours centres and food outlets, directly benefitting these people. Even in Khulu Village, parts of the township are now exposed to tourists where they can experience a ‘Zulu cultural experience,’ and learn about the history and traditions of the Beng-hazi, Tsonga and Zulu people in the area. However, the surrounding local communities are still marginalized, with high levels of unemployment and poverty. The unemployment levels are especially high for the women and youth of the region. The current administration has offered a lot of undelivered promises to the community, causing the community to feel despondent. (Boulay, 2008).

The local community have a common economic interest to the natural resources of the area, and as a result a lot of the community members are involved in harvesting and trade of natural resources through activities such as local crafts and farming. Unsustainable use of these resources pose a threat to the biodiversity of the park. However, the inclusion of the local community with eco-tourism operations of the park has mutually benefitted both the conservation and sustainable use of the park and the socio-economic conditions of the community. According to Ezemvelo, one salaried member of a local community involved in ecotourism or conservation related operations “can affect between ten and fifteen others in a ripple-effect” (Ezemvelo KZN Wildlife, n.d.).

Khulu Village is disconnected from the Lake St. Lucia estuary itself, and although the park authorities recognise the value that the rural communities have on conservation, encourage and provide several opportunities for the local community to use the park recreationally, the key relationship the people have with the natural area is that of the economic opportunities it now offers. A poignant anecdote for a place that they used to share a deep history with, that mostly now only the elderly remember.
LOCATING A SITE

The town St. Lucia, is situated on the southern borders of the iSimangaliso Wetland Park, and has been chosen as the point of study for this thesis as it is an existing developed area, that is accessible and accommodates the identified aspects of conservation, community and eco-tourism, which are relevant to the park and the proposed project. In this way it is hoped that the proposed project, within this location will also address the needs of the users of the region, whilst promoting conservation of the park, through appropriate and relevant programmes that respond to the identified social, economic and ecological contexts. This would be applicable in the development of the programme, identified user groups of the project, the design and construction of the architecture.

St. Lucia is an enclaved peri-urban town within the iSimangaliso Wetland Park, along its southern borders, and falls under the Mtubatuba municipality in KZN. All water, electricity, sanitation, telecommunications and infrastructure is serviced by the municipality. The area has currently been experiencing periods of drought and consequently there are water shortages. By locating the project within an existing built-up area, the surrounding pristine ecologies are protected and an opportunity exists in rehabilitating and enhancing underdeveloped, 'grey field' areas of the town via the proposed project for economic, recreation, conservation, local community and tourist amenities for the general public.

The proposed conservation centre will be built within the town of St. Lucia, chosen for its physical, economic, social, cultural and environmental aspects. St. Lucia is marketed and developed to be an eco-tourist-orientated, destination town. The proximity of the town to a peri-urban township provides an opportunity to address the socio-economic issues experienced by the local community. The town is located on the southern border of the park and is easily accessible and provides the basic infrastructure needed to accommodate researchers.

Fig. 3.17: Location of St. Lucia in the park (author’s own)
SITE ANALYSIS

ROAD NETWORKS

St. Lucia is a 2.5 hour drive from the City of Durban, and about a 2 hour drive from King Shaka International Airport, making it an ideal tourist destination for local and overseas tourist, as well as reasonably accessible for environmental researchers and students from Durban universities and schools.

The airport’s increasing levels of direct air connectivity with Africa and the world is economically ideal to capitalise on the growing interest in KZN’s emerging economy and travel destinations.

The City of Durban is where the convergence of the two national highways occurs, one of which connects to Richards Bay, and St. Lucia. It is this idea of a connection between highly urbanised areas, and a highly ecologically valued area, that should be developed.

Fig. 3.19 shows the major road networks, tour routes, and key areas of the park. It also shows the nearby game and nature reserves, some of which are privately owned. This indicates that the region is ecologically rich and that the ecological protected areas in the region are not limited to the park itself.
St. Lucia is approximately a 20 minute drive from the town Mtubatuba. The town, although small in size, is the nearest major town to the surrounding industries such as pine, blue-gum and paper plantations, agriculture, and commercial developments.

Residents of St. Lucia and surrounds, use Mtubatuba to access major commercial activities and supplies such as building materials.

St. Lucia has been developed to be tourist orientated, relying heavily on the eco-tourism appeal, with majority of facilities and amenities targeting the tourist market and economy.

Since St Lucia offers many accommodation facilities, it is the arrival point for majority of the tourists, from where they begin to explore the park and its protected areas.

The town falls within the region of the 'Eastern and Western Shores' in the park. This extent was then mapped to understand the tourist amenities within the region.

The map indicates the tourist routes through park, major view points, accommodation areas, recreation and park entrance points.

(Note: The areas left white indicate the grassland/savannah land mass)
SITE CHOICE

Having determined St. Lucia as an appropriate area for the site. The site for the proposed project is located near the estuary mouth, and was selected based on the following site criteria:

- The **phenomenological synergies** of where the estuary and ocean meet, allows for immersive, multi-sensory experiences and close human-nature interactions. The site is approached by a meandering road from the town and the **journey narrative** of the estuary begins even before entering the site.
- The centre for wetland, estuary and marine conservation should ideally be **accessible** and in close proximity to these ecological systems, for **research purposes**. This encourages the researchers to work more intimately with their prioritised research.
- It was identified that there are no **public recreation facilities** that engage closely with the estuary, apart from the existing ski boat club, jetties and a restaurant. By locating the project on this site, it creates a public facility along the estuary, that is not only targeted to tourists, but to the local community as well.
- This means that the **local community** now have an **inclusive public space** that begins to rectify the injustices and inequalities of the past. Not only does the proposed project provide economic opportunities, but it provides recreation and cultural relevance. It allows them to re-claim and access the land and nature that is inherently part of their **cultural identity**, which would motivate greater protection of its natural resources by the community.
- The site is identified to be a **greyfield** site within a **built-up**, peri-urban area. The site is underused and unmaintained. This has resulted in the recreational and economic potential of the site to be misplaced.
- There is **potential to rehabilitate** the site and restore its ecological value through the implementation of the proposed conservation centre, through environmentally sustainable design.
- By developing the site, the restaurant to the east becomes less isolated and included within an overall **town planning framework**. By connecting the site to existing amenities, it is intended that the users extend their journey experience beyond the site and towards the ocean, consolidating an enhanced nature experience and understanding of the site.
Community based
- Siyabonga Craft & Visitors Centre
- Community Craft & Fruit Market
- Youth Education Centre
- ‘Informal’ Vendors - Curios & Crafts
- Conservation based
- Crocodile Centre
- Cape Vidal Entrance Gate to Reserve

Activities
- Ski-Boat Club & Deep Sea Fishing
- Kayak Launch Jetty
- St. Lucia Bowling Club
- Boat Tours
- Informal Picnic & Braai areas - no facilities
- Fishing - some facilities
- Walking Trails/Boardwalks
- Information
- Isimangaliso Wetland Authority Offices
- Information Centre
- Tourist Operators & Services

Accommodation
- Backpackers
- Bed & Breakfast
- Camp Sites
- Hotels
- Self-Catering

Commercial
- Restaurants, Bars or Cafes
- Retail & Grocery stores
- Mixed-Use (Food, Retail, Tour Operators & other Services)

Other
- Post Office
- Police Station
- Church
- Town Hall
- Taxi & Bus Stop
- Public Parking
LAND USE
The land use map indicates how intensely the town relies on tourism. Majority of property facing the estuary, are zoned for accommodation facilities. However, public, recreational and commercial facilities miss an opportunity to engage with the estuary itself, with most of these activities occurring along the main street, facing inward, away from the estuary.

Opportunities for public recreation activities along the estuary, is then limited to the southern peripheries of the town, where informal braaing, fishing and trading occurs. This is where the proposed site is located.

FIGURE GROUND
The figure ground indicates very few facilities that directly engage with the estuary. These are boat jetties, the kayak launch site, the ski boat club and restaurant.

The St. Lucia town itself, has only a few public spaces that offer opportunities to engage with nature. Furthermore, these spaces are targeted only for tourist purposes.
The site is currently neglected. The roads on the site have potholes which is an eye sore, compared to the surrounding nature. Some tourists braai, picnic and fish near the parking areas, but there are only basic public infrastructure that support public use, such as the existing ablutions. With no greater positioning strategy or future plans for this part of the estuary riverfront, the potential and opportunities of this site is missed, which fails to enhance the estuary experience for its current users.

The existing buildings on site are all minor public ablution facilities. They are not necessarily in a good condition; or have heritage value. It is then proposed that they are renovated, repurposed or carefully demolished. The bricks can be re-used in the proposed design.

**'URBAN' CONNECTIONS**

The selected site is in close proximity to existing public facilities to which it could connect to, to form an integrated town framework of the estuary riverfront. This would improve the functioning and viability of the conservation centre, as well as improve the socio-economic opportunities of the town, by creating a new consolidated tourist and public node, that directly engages with the estuary river, connects to the beach and maximizes public access to the existing activities such as nature trails and kayaking.

The adjacent camping facilities accommodates visiting school groups and tourists that would potentially access the conservation centre. It is therefore important that the centre has both an educational and a recreational component, to address these user groups.

The proposed project has an opportunity to connect to the existing kayaking club, the ski-boat club and restaurant, for connectivity along the estuary river. This would then connect the centre to the beach areas, via the existing trails. In this way the user’s journey-experience of the space is extended beyond the site, and the opportunities for diverse experiences with the natural phenomena of the area is promoted.

The aim here is to encourage further exploration of nature beyond the site, and to the surrounding park.
**VEGETATION**

- dense thicket of indigenous trees & shrubs
- estuary saline-river reeds (*Phragmites mauritianus*)
- floodplain grassland (*Echinochloa pyramidalis*, *Eriochloa*, & *Sorghum* species)

**FLOOD LINES**

- average water level
- demoina flood

![Fig. 3.27: Site Mapping of Vegetation (author’s own; aerial image sourced from Google Map Images)](image1)

![Fig. 3.28: Site Mapping of flood lines (author’s own; aerial image sourced from Google Map Images)](image2)
The iSimangaliso Wetland Park has involved the surrounding local communities in an intense alien vegetation removal programme, across the park.

The dense vegetation growth on the site are all indigenous, and have to be protected. The site's existing vegetation provides a habitat for local fauna, provides shade, shields the site from vehicular noise and music from the main road, protects the site from extreme off-shore NE winds and prevents soil erosion.

Locating the proposed centre’s programme and structure, will then have to consider the existing vegetation. A raised structure on stilts will accommodate for tree roots to grow naturally and undisturbed, without compromising the building's stability.

For the Tsonga community, the indigenous trees and plants of the natural landscape hold cultural significance in terms of their beliefs, rituals and cultural symbolism.

For example, the Tsonga believe that their people originated from the river reeds, or nhlanga. A belief that resonates with scientific notion that the surrounding nature, specifically the wetlands and estuaries, are life giving to the surrounding flora and fauna. (Mthethwa, 2015)

When a Tsonga person passes away, a coral tree is planted by the burial site and it is believed that the deceased's spirit then lives within the tree (Mthethwa, 2015). A belief that associates nature with human life, from birth, to death and the perceived after-life. A notion that resonates with the opinion that humanity is nature.

During the Demoina Flood, the Mfolozi catchment experienced a discharge rate three times more that the predicted 100 year flood levels of St. Lucia (IWPA, 2011). Since these flood levels provide a case study for the anticipated extreme changes in weather patterns that climate change will bring, prioritised areas of the proposed building should be at least 1m above the Demoina flood levels.

Extreme storms bringing intense rainfall and strong winds, which can bring a lot of damage to existing infrastructure. Therefore hard infrastructure has to be kept minimum in such a dynamic environment. Light construction is therefore more appropriate.

Fig. 3.29: St. Lucia River Catchment (IWPA, 2011; reproduced by author)
SITE VIEWS

VIEWS FROM ESTUARY MOUTH

Fig. 3.30: Mapping of views (author’s own; aerial image sourced from Google Earth Images)
VIEW A
west view of the site

VIEW B
south-westerly view of the estuary
VIEW C
approach to site from the main access road

VIEW D
view of existing parking from main access road

VIEW E
south-easterly views of the estuary
east views of the site

south-westerly views of the site and estuary
Approach to site

**VIEW I**

Views of the estuary are revealed through gaps between the dense vegetation.

**VIEW J**

Views of the estuary mouth from the site.

**VIEW K**

Views of the estuary mouth from the site.
CLIMATIC CONDITIONS

WIND PATTERNS

Average wind direction are mainly from SW and NNE. Northerly winds, blowing off the warm Agulhas current off the east coast, brings bring rain, in summer, and south-westerly winds bring cold fronts and infrequent rain during spring and early autumn. The topography and dense vegetation on the site, protects it from the high on-shore wind speeds from the north. (IWPA, 2011)

SOLAR ANGLES

ST. LUCIA, KWAZULU-NATAL
28°23'00"S 32°25'00"E

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Summer Solstice: 21 Dec
Azimuth Altitude
111°E 36° 86°E 36° 86°E 36° 99°E 36° 111°E 36°

Equinox: 21 Mar/ Sep
Azimuth Altitude
90°E 25° 75°E 50° 51°E 62° 51°E 50° 75°E 25° 90°E 0

Winter Solstice: 21 June
Azimuth Altitude
- 54°E 33°E 0 33°E 31° 33°E 54°E -

Average temperatures for St. Lucia (Napier, 2000; adapted by author)

AVERAGE TEMPERATURES

St. Lucia experiences a sub-tropical climate which is characterized by high temperatures and high humidity levels. The daily temperature variation is small, and winters are warm. Average summer temperatures are 27 º – 29 º, and can reach a high of 30 º (IWPA, 2011)

AVERAGE RAINFALL

The annual rainfall average for the area is 1200mm, with 60 percent of this precipitation occurring during summer. However, the region is currently experiencing a period of drought, which has caused water shortages for St. Lucia (IWPA, 2011)

PAS S I V E   D E S I G N

Based on the climatic conditions, the following key design principles should be considered for passive design:

Buildings are ideally to be free-standing to allow air movement, and surrounding vegetation should not restrict air flow through internal spaces. Adequate ventilation is needed to remove excess humidity and improve thermal comfort of the occupants. Openings for ventilation should be large and ventilation openings other than windows is preferable.

Narrow floor plans of maximum 12m in width, allow for cross-ventilation and efficient daylighting.

Large eaves, roof overhangs and verandas are effective in shading internal spaces from summer heat and glare. Insulation in walls are not required if they are adequately shaded.

Lightweight construction is applicable for walls and the roof. Ventilated roof with reflective external surface is effective in this climate. Thermal mass, however is not effective in this climatic region. Ground contact brings high temperatures, to radiate through the building. Therefore raised buildings on slopes, permit adequate ventilation and keeps the building cool. (Holm, 1996)
TH E G E N I U S L O C I – S P I R I T O F P L A C E

A moment’s reflection of my own experiential, sensory perceptions of the spiritual synergies of the site.

A major role of architecture involves the conscious design of spaces, based on the architect’s own perception and interpretation of experiencing space within its context, which results in the imaginative manifestation of the designed space. Due to their profession, architects generally have a deeper awareness of space, and it is their role and ability, to develop their perceptions of place and space, in order to guide and enable the potential users to have enhanced perceptions and experiences. Through spatial manipulation and ordering, the architect is able to design architectural spaces that could mediate the user’s experience and memory of the natural environment itself. As the architectural designer for the proposed project, my own interpretations and experiences of place were considered:

The drive from St. Lucia’s main road approaching the site, forks, and leads me away from the urban context, on a road meandering downhill towards the St. Lucia estuary. Trees branch over and stretch across over the road to form a passage of dappled light filtering through the evergreen leaves and branches. The urban context is soon forgotten as the dense thicket of bush and trees hide the surrounding context, crafting a sense of mystery and anticipation of where the road leads to… the road bends and releases me to an open clearing - revealing the first view of estuary, and the site.

Instinctively, I am drawn to the water’s edge and my senses are immediately aroused by a chorus of sounds…the rustle of reeds stirred by the breeze, the water lapping at the river edge as a tourist boat motors slowly past, leaves crunching under my footsteps, dead twigs cracking in the wind, a bird’s call, a hippo grunts … suddenly I hear the deep, thud of my footsteps knocking on the timber boardwalk and I am acutely aware of my existence within this natural expanse.

A clearance among the trees leads you on an old dirt path that guides you to the rest of the site. I feel a sense of wander and curiosity as I explore further. The filtered light through the trees branching over enclose and shade me and suddenly release me to clear skies as I feel the warmth from the sun kiss my skin. At end of the path, a thick canopy of trees stand as defiant figures, rising from the ground and branching out, defining and informing the space that encompasses me. Beyond this space, I am once again released into open, clear space that is defined by the surrounding trees. Here on, I’m free to explore the rest of the site, within and around the trees, and along the water edge of reflecting rippled light…
The conservation of sensitive ecosystems of the iSimangaliso Wetland Park is identified as one of the core strategies for environmental sustainability, and its appropriateness as a site for immersed experiences with nature and the sharing of ecological knowledge for the benefit of the wider communities in South Africa and internationally.

In order for the proposed architectural intervention to be relevant, appropriate, and viable for the context of the site, the site conditions discussed will be the key drivers to inform the thesis design, in terms of addressing the aforementioned social, economic, environmental contextual issues of the chosen site. This would be applicable in the development of the programme, identified user groups, the design and construction of the architecture.

C O N C L U S I O N

“What better way to read the landscape than by walking through it?” — Linda Lappin
“Architecture is fundamentally a public space where people can gather and communicate, think about the history, the lives of human beings, and the world” – Tadao Ando

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DEVELOPING THE BRIEF
As discussed, a deeper sense of environmental conservation is needed by humanity, in order to protect, remediate and prevent damages done to our natural ecosystems, by humanity itself.

Conservation involves re-affiliating humanity with nature, in order for an enhanced awareness and appreciation to develop for the need to protect it by the current generation, for the future generations.

The programme has then been developed in response to the environmental conservation challenges facing the iSimangaliso Wetland Park, that have become apparent through research investigations into the existing conservation efforts of the park, and with consultations with the relevant conservation authorities.

The programme has also been developed in mind of the social, cultural and economic issues identified in the area; and the current initiatives implemented by the wetland authority that aim to address these issues, but are in need of better accommodating facilities.

A concern to provide the following, are needed:
• prioritised conservation research facilities for the ongoing environmental conservation research;
• teaching spaces to accommodate the higher education and school conservation-related programmes facilitated by the wetland authority;
• to create more job and empowerment opportunities for the marginalised local community;
• an upgrade of the tourist facilities in the area to meet the market demand and ensure the area continuous sustainable economic development;
• to determine new tourism marketing strategies for the park;
• and to achieve greater protection of the natural environment of the park.

Conservation is best implemented through prioritised research, and the transfer of knowledge based on this research through education, awareness and participation of the local community and general public. An architectural intervention for a wetland, estuary and marine conservation, for the iSimangaliso Wetland Park, is proposed to provide a medium through which solutions to address these issues can be established, in the form of one facility managed by the park authority.

The facility would be accountable for the promotion, administration, education and research towards wetland and coastal conservation, through the accommodation of: research facilities for researchers in the area; informative educational programmes for school and visiting tourists; and programmes that encourage nature-based tourism (eco-tourism).

The centre would assist in the poor economic status of the surrounding community through infrastructure, skills development training, education and employment opportunities through the construction and functioning of the facility.

The architecture would be contextually appropriate and environmentally sensitive to the site and surrounding nature, and practice environmentally sustainable design, construction and systems in order to minimise its impact on the earth.

Furthermore, the centre would encourage enhanced human-nature interactions through phenomenological, immersed experiences with nature, through programme and architectural design.
In order for conservation to occur, three influencing and relevant aspects to the area, were identified and prioritised, these are:

- wetland, estuary and marine conservation research;
- the local community;
- and nature-based tourism.

The notion of ‘synergy’ was adopted to envision a programme that aimed to integrate these components to collaborate in a manner that would facilitate the needs of each component, within a multi-purposed, mutually beneficial exchange by the relevant user groups, where architecture was the interface and mediator for this exchange, through which conservation occurred. The architectural programme would provide a spatial solution that hybridizes the institutional functions associated with research and education, with that of community infrastructure and eco-tourist attractions. Furthermore, the architectural intervention is intended to be a precedent and catalyst for further environmentally, social, and economic development and transformation of the local area, as well as nationally and globally.

The concept of ‘synergy’ was inspired by the symbiotic manner in which nature and its ecosystems function within themselves, with each other and within the global environment.

Fig. 4.1: Synergy Concept Strategy (author’s own)
The research facilities accommodate for both long-term and short-term researchers and higher education students, to work independently and collaboratively across inter-disciplinary studies, which prioritise research for wetland, estuary and marine conservation.

Existing research facilities at the park are basic, outdated, and are only accessible to Ezemvelo staff. Access to the acquired research database is publicly unavailable due to limited resources. The proposed research facilities then provide the park a designated research building, that allows for the easy dissemination of acquired knowledge.

As discussed, quantitative research methodologies are integral for making informed conservation-related decisions, policy-making and management. However, qualitative methodologies provide alternative information that is more relatable for the ordinary public to perceive, and to respond by individually taking environmentally sustainable action. Therefore, the proposed research facility accommodates for both forms of research, within an immersive environment of nature.

The IWPA currently supports almost 70 higher education students from the local community, who are studying tertiary courses relating to environmental sciences. These students are offered financial support through bursaries, and academic and mentorship support. However, there are no practical experience opportunities or internships, for the students to participate directly with the conservation-related research of the park, and to learn from the experienced researchers in the field (Govender, 2015). The proposed programme then provides a platform for integrated, practical learning for these students, who will have access to research facilities.

The IWPA currently offers environmental education programmes to 150 local schools surrounding the park - most of which do have adequate natural science classrooms. These programmes are incorporated into the learning syllabus and the aim is to provide access to the park for the learners and to provide physical interactive learning experiences with the natural environment. The park however, does not have any designated learning facilities to accommodate these programmes.

**SCHEDULE OF AREAS:**

**PRIVATE**
- DRY LABORATORY - 130 m²
- WET LABORATORY - 150 m²
- AQUARIA & DISSECTION SPACE - 95 m²
- COLLABORATIVE RESEARCH SPACE - 165 m²
- DISCUSSION SPACES (x2) - 15 m² each
- PERMANENT RESEARCH SPACE - 75 m²
- RESEARCH & ADMIN OFFICES (x4) - 12 m²
- ELECTRONIC LIBRARY - 20 m²
- BOARD ROOM (x2) - 20 m²
- RECEPTION AREA - 25 m²
- KITCHENETTE (X3) - 10 m²
- RESEARCH ABLUTIONS - 32 m²
- CENTRE ADMINISTRATION OFFICES - 100 m²
- STAFF LOUNGE & RECEPTION - 50 m²

**PUBLIC**
- SEMINAR/MULTIPURPOSE SPACE - 160 m²
- CLASSROOM LABORATORY - 110 m²
- OUTDOOR CLASSROOM - 70 m²
- PUBLIC ABLUTIONS - 35 m²
Transfer of knowledge of wetland, estuary and marine conservation research through exhibition pavilions that open to the surrounding nature. The seminar/multipurpose spaces within the research facilities and auditorium will also be publicly accessible to tourists for seminars and audio/visual exhibitions.

Tourism provides opportunities for employment, job creation, and skills development for the local community members. Apart from typical activities such as guided tours, informal trade stalls and cultural entertainment, the following are considered:

The traditional craft skills of the local women can be promoted through the selling of curios for the local tourists, workshop craft-making activities, and larger sale distribution for commercial retail. In this way, the existing traditional skills are used for sustainable, job creation.

The traditional fishing traditions of the Tembe in Kosi Bay has inspired the programme for a sustainable seafood restaurant that supports the local fisherman. The restaurant is to be owned and managed by local community members, using traditional-inspired cooking recipes.

An organic restaurant with a hydroponics facade garden, demonstrates alternative, sustainable agricultural methods using water and food preparation. The restaurant will also be locally-owned and managed.

Community's cultural history and relationship with the natural environment provides opportunities for their personal experiences and connections to nature, to be narrated to the visiting tourists. Through this, their voice is heard and they are recognised and appreciated as a culture, and their relationship with the surrounding nature is re-affirmed and embedded. The tourists' personal experiences and understanding of the place is then enhanced through empathy and self-reflection of the cultural narratives told. Therefore, both public and intimate spaces for dialogue and expression is accommodated.

Employment and training will be provided through the construction and operations of the building, for example, sustainable building techniques, restaurant staff and maintenance staff.

Cultural and recreational tourist attraction activities such as temporary and permanent outdoor gallery spaces, recreation tourist activities, eco-walkways, braai and fishing areas, guided trails and drives, tree houses, a fire pit and contemplative spaces are also accommodated.

**SCHEDULE OF AREAS:**

<table>
<thead>
<tr>
<th>INFORMATION/RECEPTION</th>
<th>50 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIFT STORE</td>
<td>25 m²</td>
</tr>
<tr>
<td>AUDITORIUM</td>
<td>140 m²</td>
</tr>
<tr>
<td>ORGANIC CAFE</td>
<td>130 m²</td>
</tr>
<tr>
<td>SUSTAINABLE SEAFOOD RESTAURANT</td>
<td>300 m²</td>
</tr>
<tr>
<td>RESTAURANT OPEN-DINING AREA</td>
<td>150 m²</td>
</tr>
<tr>
<td>RIVER LOUNGE</td>
<td>80 m²</td>
</tr>
<tr>
<td>JUICE BAR</td>
<td>12 m²</td>
</tr>
<tr>
<td>PUBLIC ABLUTIONS</td>
<td>60 m²</td>
</tr>
<tr>
<td>EXHIBITION SPACES</td>
<td>250 m²</td>
</tr>
<tr>
<td>ARTS &amp; CRAFTS WORKSHOP</td>
<td>100 m²</td>
</tr>
</tbody>
</table>
The proposed centre for wetland, estuary and marine conservation is considered to be relevant and viable, by supporting the environmental, economic and social needs of the iSimangaliso Wetland Park through the programmatic functions and suitability of the site selection of the proposed project.

However, determining the potential managerial, organisational, operational, implementation and financial viability of the proposed project are also essential, to attest to the project’s capability for success.

**F I N A N C I A L   C O N S I D E R A T I O N S**

Several financial considerations need to be made with regards to the design, construction, implementation and sustained operations of the project. The following aspects need to be considered in terms of the project’s design for the financial impact it will have on the building’s implementation, environmental impact and long term operations:

**SITE CHOICE**

**Existing Infrastructure:** The site was chosen to be in the town of St. Lucia, due to its accessibility and existing infrastructure and services, which makes the building development more economically feasible by reducing expenditure for the implementation and operations of the building. However, some infrastructural developments and services are under strain and alternative systems need to be implemented at specific costs. ([More information on building systems in chapter 6 – Design, under Technical Resolution].)

**Property ownership:** The site is within the town St. Lucia, under the jurisdiction of the iSimangaliso Wetland Park Authority. This avoids finances for purchasing a property, land transfer fees, transfer duties and the subsequent legal costs and administration involved.

**SUSTAINABLE METHODS & TECHNOLOGIES:**

St. Lucia is a distance from major towns and industrial developments, which makes the procurement of materials and application of advanced construction technologies challenging. Especially when one considers the costs and affordability involved, which depends on the availability; accessibility; available skilled knowledge and labour; and delivery cost for materials. The intended environmentally sensitive and sustainable nature of the project design, includes sustainable passive design approaches that allows for simple and affordable construction technologies and design systems to be implemented. This will provide cheaper operational costs and encourage affordable, locally available and accessible materials to be procured. The common materials and construction methods applied in the existing architecture of the town and surrounding areas, will provide clues as to what materials and community-based building techniques are available locally. Furthermore these materials, technical details, and passive building systems applied should provide durability and minimum maintenance, which will allow for minimum operational and maintenance costs. ([More information on materials and building systems can be found in chapter 6 – Design].)
SKILLED AND UNSKILLED LABOUR:
The procurement of the construction work force and skilled labour could prove to be challenging. Research into existing skills of the local labour force will be required to determine feasible design and construction solutions that would also provide employment for the local community. In addition, community members can be trained with basic construction skills and methods, by skilled and experienced construction labourers, to provide cheaper local labour. The cost of training will have to be factored into the financial considerations, however the cost benefit to the community once the project has been completed should be taken into consideration.

FUNCTIONALITY:
The proposed facility has to be economically, a sustainable financial model, with a commercial and professional functionality to it. The income generated through the operations of the facility, such as through lease agreements, would recover the operational expenses of the facility. In this way, the facility functions independently and the financial resources of the park authority, can be reserved for other conservation developments.

ORGANISATION
The iSimangaliso Wetland Park is managed by the iSimangaliso Wetland Park Authority (IWPA), who essentially oversees every research project conducted within the park; are involved with marketing, facility and infrastructural upgrades associated with tourism; socio-economic empowerment of local community; and naturally, environmental conservation and protection of the park. The proposed project then cannot feasibly function without the approval and involvement of the authority, and they will have to form part of the proposed organisation.

An understanding of how this authority is constituted and operates is then essential. To determine the overall organisation, a further understanding on similar projects in the park, that were considered relevant to the proposed project, was done for precedent research.

Existing projects in park involved involvement from both the public and private sectors, and so it is assumed that that the organisation for the proposed facility will function in a similar manner:

PUBLIC SECTOR
The Ezemvelo KZN Wildlife, is a government organisation tasked with maintaining conservation of protected nature reserves in KZN, constituted under the KZN Nature Conservation Management Act of 1999. Ezemvelo manages conservation and eco-tourism across KwaZulu-Natal, and is largely responsible for the iSimangaliso Wetland Park, in an administrative agreement with the iSimangaliso Wetland Park Authorities. Ezemvelo has extended its work to be more relevant to surrounding communities living by the parks - primarily through job creation and sustainable natural resource harvesting. Ezemvelo has also substantially invested in repositioning ecotourism for provincial growth and development, and where possible, reinvest to sustain biodiversity conservation activities.” (Ezemvelo KZN Wildlife)
The iSimangaliso Wetland Park Authority (IWPA), is a parastatal organisation that reports directly to national government. Their primary mandate is to oversee the management, conservation and preservation of the World Heritage values of the iSimangaliso Wetland Park. They are also mandated to see to the provision of economic benefits for local people living around the park through “eco-tourism, entrepreneurship, capacity building, training and skills development” of the local community and infrastructural development (iSimangaliso Wetland Park, 2013).

PRIVATE SECTOR
Local NGO’s that aim to provide socio-economic upliftment to women and youth in rural areas, will facilitate the empowerment of the local community in terms of training, basic business and artisanal skills development, capacity building, micro-financing and entrepreneurship. They would empower the women and youth to acquire business opportunities within the facility and could also assist in the construction, operations and maintenance of the facility.

The ongoing administrative collaboration between Ezemvelo and the iSimangaliso Wetland Park Authority will form the main organisation body that will manage and occupy the facility.
IMPLEMENTATION

PROJECTED BUILDING & DEVELOPMENT COSTS
The total projected development costs includes: land development costs (professional services), land servicing costs (civil works), construction costs (professional services; construction work – building, site works, utilities) and marketing costs (advertising and promotional material).

These costs are based on the proposed schedule of programme; the approximate building cost rates (ZAR) per building area (m²) for typical building typologies in South Africa - as per the last quarter of 2014 (Brümmer, 2013; Hill Du Bois cc, 2014); and includes other relevant and necessary development costs. These building cost rates will be an indicative nature, as they are dependent upon a number of estimated assumptions.

The land is already under the jurisdiction and management of the park authorities, and the existing buildings on site have already acquired the water, electrical, telecommunications utilities and civil works such as roadworks. Therefore, no costs in regards to this will be required.

Based on the above, and compared to development costs for similar construction projects that were assessed in the precedent research, I then assume that the projected buildings cost to be: R 25,500 000.

PHASING
The project will be divided into two phases:
Phase 1: Includes the development of the conservation centre and necessary external works.
Phase 2: Includes the ancillary supporting facilities additional landscaping of the boardwalk trails; sculpture gardens; wildlife hides; and land rehabilitation.

This will allow for Phase 1 to be occupied whilst Phase 2 begins construction. The money then financed for Phase 2 will be acquired through Phase 1 of the conservation centre, by generating income through its tourist, research and educational operations and additional donations and funding by the relevant research partners.

LABOUR
A local contractor will be procured through an open tender process. The subcontractors will be needed were accuracy and high level of skills is needed for specialised construction. The contractor will in addition, be required to liaise with the client who will employ local community members for unskilled labour, who will require training for the construction work. Through this process, the project aims to develop the skills of local artisans and other marginalized, unemployed community members so that they can use these skills for other job opportunities.

ADDITIONAL CONSULTING SERVICES
Local community participation will be needed in terms of consultation for developing the design brief; for the design development; training with regards to, and involvement in the construction work; and training required for employment opportunities at the facility itself.

ESTIMATED TIME FRAME
Estimated Design Time Frame: 18 Months
Estimated Construction Time Frame: 24 Months
TOTAL ESTIMATED TIME FRAME: 42 Months

FUNDING MECHANISMS:
Funding will be managed by staff from the park authorities, appointed permanently at the facility, to manage, administer, and allocate the funding and handle other financial concerns. The determined sources of funding for the project are:

Initial capital funding for project implementation: IWPA received a recent budget from the national treasury of R250 million, allocated for the redevelopment and upgrade of conservation, community-based, and eco-tourism related infrastructure (Govender, 2015). Funding for the proposed project, can then be allocated from this budget.
Funding for continuous operations of the facility:

**Independent income generation** from the numerable economic ventures available within the facility such as rent received from the restaurant, bar, research offices; entrance fees; the eco-gift store sales; tour fees from guided eco-walks and informative talks; boat rides; exhibition hire/lease; auditorium hire; school educational programme packages; and student and research programmes with collaborative partners.

A major income opportunity is possible through lease agreement between the park authority and the National Research Fund (NRF). The NRF will fund the ongoing long-term research, and possibly lease the research facilities from the park authorities. *(More information on the NRF can be found in chapter 2 – Site).*

**Donations and Sponsorship Funding** from local private businesses, will enable them to fulfil their directive for environmental conservation and local community empowerment and who will also have the incentive to fulfil this social and environmental responsibilities to promote a good public image; provide further marketing of their businesses and of course; for the tax deduction incentives.

**PROFESSIONAL ORGANISATION**
A consortium board of directors will be formed of representatives from parties involved of the public and private sectors to manage the project, delegate funds and to communicate all the stages and processes in a formal and organised manner. The professional team for the implementation of the project will be selected and managed by the board of directors.

![Fig. 4.5 Organogram of Project Organisation (by author)](image-url)
FEASIBILITY & VIABILITY

MARKET INVESTIGATIONS

Through research of the architectural precedents of similar projects, the tourist, education and research opportunities that these facilities offer have ensured the longevity of successful business operations, by creating several income generating prospects and support via its multiple exchanges. Research was done into the following sectors:

Tourism: St. Lucia is marketed and developed to be a tourist-orientated destination, due to its accessible location within a national heritage site. Ezemvelo, IWPA and the KZN Tourism authorities, have seen a renewed interest in updating its facilities and this offers an opportunity to target the tourist market and benefit from economic developments in the area. Currently there are no existing facilities of a similar nature in St. Lucia, apart from the Crocodile Conservation Centre. The tourism sector is potentially the biggest economic driver of the project in terms of its viability and feasibility.

Research: St. Lucia’s location is accessibly feasible and popular for researchers from Ezemvelo, SAE-ON, and KZN tertiary institutions, to conduct environmental research in the area. There are currently 148 research projects in the park. However, no research facilities are available.

Education: St. Lucia is popular for educational and team leadership school trips. The existing camping accommodation in the town, provides an opportunity for the proposed facility to liaise and partner with the camping facilitators and schools for their educational curriculum.

Local Community: According to the South African National Census of 2011, the eco-tourism sector in one of the leading contributors to the employment sector of the Mtubatuba municipality. The majority of the population is young and dependent, however the youth unemployment rate is 46.9%. This shows the viability and need for the eco-tourism sector to provide more employment opportunities in the area, and indicates the feasibility for the project in terms of human resources. The Isimangaliso Authority has adopted government’s BEE policies and prospective new tourism enterprises in the park are required to include local communities as mandatory equity partners in their operations, and as service-providers in their procurement plans. The gender majority of the population in Mtubatuba are women, and the involvement of women empowerment NGO’s for rural areas are relevant (Statistics South Africa, 2011).

CONCLUSION

The project addresses the key issues concerning Ezemvelo and IWPA, as mandated by the policies implemented by provincial government.

These key issues of these mandates are to ensure: continuous environmental conservation; on-going marketing of the region for eco-tourism; economic support and infrastructural development of the area; and to take advantage of the above sectors to involve local community participation, to encourage empowerment, financial independence and self-sufficiency through skills development, entrepreneurship and job creation.

The proposed project addresses each of these issues, and will be likely supported and funded by these authorities. Local businesses will be obliged to support this initiative, due to their social and environmental responsibilities, and public image. Furthermore, the facility itself cannot solely rely on external funding. The commercial component of the facility is an investment opportunity for the park authority to generate income and recover the expenses incurred through its general operations and to provide further capital to use towards conservation. The continuous source of income will bring financial stability and self-sufficiency for the continuous operations of the facility. The proposed project is therefore financially viable.
precedent studies
An analysis of local and international architectural precedents

“There exists within every space, something that appeals to emotion and something that else that appeals to reason.” – Paul Frankl
The Jean-Marie Tjibaou Cultural Centre pays recognition to the indigenous Kanak culture of New Caledonia. The Kanak people had been removed from their natural land and habitat during French colonisation, and the proposed centre had to then reflect the assertion of the Kanak identity and cultural heritage. The centre was built to attract tourists, researchers, and most importantly the Kanak people.

An understanding of Kanak culture, history, beliefs and relationship with nature were needed by the architects as part of design process. The site choice being rooted in an area where the Kanak civilisation once inhabited, is immersed within nature and has a strong emphasis on the natural context of the site which is surrounded by trees, dense vegetation and water around the peninsula site. The architectural design adapts and abstracts the local traditional building methods and natural materials with that of the benefits of contemporary materials and technology, to design an architecture that is relevant and responds to the cultural context and natural landscape.

The structural, architectural and social functionality of the vernacular Kanak ‘hut’ and ‘village’ typology was interpreted as a precedent to inform a modern adaptation. 10 modern ‘hut’ pavilions of varying heights were symbolically arranged in 3 cluster layouts that were interconnected by indigenous landscaped pathways. The inspired village clustering of the buildings, created strong connections to natural context and the semi-circular layout defined open communal spaces in between the buildings. The first village cluster comprised of exhibition spaces, an open air performance theatre, an auditorium; the second cluster comprised of research areas, administration offices, a conference room and a library; and the last cluster accommodated cultural studios for music, dance, painting and sculptures. (RPBW, n.d.)
Careful design and detailing have produced efficient passive, solar control and ventilation systems for the buildings, which are strategically orientated to benefit from the prevailing winds and to prevent heat gain. The winds influenced the form and façade design, giving functional relevance in addition to the cultural references. The double façade system with strategically designed openings allow air flow from the prevailing winds which made circulation of air in between the slatted timber and into internal spaces to be permissible. Air flow is controlled via adjustable louvres. The use of stack ventilation applies convection principles and allows for the warmer air in internal spaces to rise and escape through thermal chimney.

There has been debates over the appropriateness of project for the Kanak people, in reference to the large scale of the buildings compared to the Kanak vernacular; the use of convenient, prefabricated, modern materials and technologies that are used mostly in replace of the locally available and traditional natural materials; and whether the spiritual essence experienced in their vernacular architecture is lost through the architects abstractions and adaptations.

Modern materials such as glass, laminated wood, concrete, aluminium, steel and modern light technologies were used with natural traditional materials such as wood, stone, coral and tree bark.

Fig. 5.3: Concept sketch shows curved ribbed section in early design stages (RPBW, 1998)

Fig. 5.4: Section (RPBW, 1998)

Section indicates the ventilation principles used, and the curved ribbed section. Building height relates to the surrounding trees.

Fig. 5.5: Modern detailing (RPBW, 1998)

Fig. 5.6: Modern detailing (RPBW, 1998)

Fig. 5.7: Building seems to dematerialise and blend into the sky and natural landscape (RPBW, 1998)
KEY PRINCIPLES:

- Using vernacular architecture to draw cultural references to develop a relevant, modern architectural interpretation.
- Use of sustainable passive ventilation and solar control systems.
- Immersing architecture in natural and socio-cultural context for placemaking.
- Clustering of buildings to form an experiential narrative of place and culture, and to draw connections to the natural landscape.
- Use of ‘light’ materiality to invoke a sense of time and temporality.
OR TAMBO ENVIRONMENTAL & NARRATIVE CENTRE
Architects: Odyssey Architects & Newtown Landscape Architects

Location: Benoni, Johannesburg, South Africa
Date of Completion: 2013

The OR Tambo Environmental & Narrative Centre is a multipurpose facility that is dedicated to the legacy of the anti-apartheid activist Oliver Tambo. The facility forms part of a wetland rehabilitation and bio-remediation initiative for the Leeupan and Esselen Pan wetlands, which had been severely damaged by the surrounding communities’ unsustainable use and mistreatment of the land, as well as the acid mine drainage which had made parts of the land inhospitable. The centre accommodates a narrative centre, an environmental education centre, arts and crafts facilities, recreation facilities, administration offices for the Ekurhuleni council, an outdoor amphitheatre, a solar farm, landscaped gardens and a caretaker’s residence (Momberg, 2012).

The environmental centre includes three pavilions of similar architectural language that is characterised by steel columns and straw bale walls plastered in a cow dung and mud. The architects used local materials; local skills; and a combination of traditional and modern construction techniques to develop an architecture that is sustainable and would allow the local community members to be employed during the construction process, and more importantly, were practical for them to apply later.
The locality of the site to the local community aids community development by providing useable public spaces and facilities; educational facilities and programmes; job creation; skills development; opportunities for small businesses; promotion of tourism; and demonstrating environmental responsibility and sustainable practices. The participation and involvement of the community in all stages of the design and implementation of the project, helps the community gain a sense of ownership for the project, and encourages the continued protection and respect for the surrounding natural environment.

The use of natural materials offers texture, earthiness, tangibility and warmth. However, the steel structural elements used for its durability and recyclability, are perceived as heavy and industrial, in contrast to the natural setting. The adobe/straw bale construction can also be perceived as heavy, masonry forms that impose and distracts from the natural landscape.

A better execution of connecting architecture and nature is evident when parts of the building are built into the slope, preserving unobstructed views of the pan and extending the landscape through the use of roof gardens, creating public courtyards and seamlessly merging architecture with land morphology. The use of landscape design using indigenous plants helps connect the architecture and blend the immediate context to the larger park and wetland area.

**SUSTAINABLE CONSTRUCTION & SYSTEMS**

- **Wall structure:** adobe bricks, rammed earth and straw bale construction, trombe walls
- **Wall surfaces:** cow dung and mud
- **Floor surfaces:** cob earth floor
- **Natural daylighting:** solar tubes
- **Natural ventilation:** operable ducts
- **Natural thermal comfort control (cooling and heating):** geo-thermic earth tube technology (underground heat exchanger), roof gardens assist with cooling
- **Water supply:** rainwater and sub-surface water harvesting, greywater recycling
- **Sewerage treatment:** Bio-gas digester
- **Energy generation:** solar farm and methane gas harvested from bio-gas digester
- **Solar shading:** angled balconies, roof overhangs
- **Landscaping:** Indigenous planting

Fig. 5.13 (left): Gum poles resemble wetland reeds (author’s own)

Fig. 5.14: The sensitive placement of buildings within nature (author’s own)
KEY PRINCIPLES:

- The use of traditional methods of construction for a modern architectural design and for developing passive sustainable systems.
- Use of traditional skills and unskilled labour from local community.
- The understanding of historical relevance, ecological and cultural context to develop a combined, integral programme, towards education and environmental rehabilitation for a public space.
- Use of natural elements to blend architecture and natural context.
NELSON MANDELA MUSEUM PAVILIONS

Architects: Cohen & Judin Architects | TCN Architects

Location: Mvezo & Qunu, Eastern Cape, South Africa
Date of Completion: 2000

The Nelson Mandela Museum is an educational, tourist attraction that consists of a series of community spaces and pavilions, at three interrelated sites that memorializes the birthplace and early childhood of former South African president, Nelson Mandela. The museum addresses the basic needs of the marginalized, local community by encouraging infrastructural and socio-economic development by providing water-supply points, shade, short-time employment and skills development for the local women during the construction process, and attracting tourism into the area.

The pavilion at Qunu accommodates a community multipurpose hall and gathering space, and pavilion at Mvezo accommodates an open-air information/visual display space and a small office.

The architectural design of the pavilions demonstrates sensitivity to the local community and surrounding landscape: the industrial steelwork and profiled metal roof detailing, chosen specifically for its durability, are balanced by the braced timber construction and rural, vernacular materials of stonework, rough timber floor boards and wattle lattice screens; the mono-pitch architecture of the pavilions reflects the contextual buildings of surrounding rural communities; and the simple architectural forms, tectonics, minimal impact design, and the simple, locally-sourced natural materials create a modest and honest structure within the rural context.

The open, transparent feel and simplicity of the pavilions gives emphasise to the surrounding natural, rural context - an emphasis on place, and not on the architecture itself. In this way a greater sense of awareness on the profound meaning of the place is experienced. The transfer of information on the legacy of the place is perceived with a deeper understanding, within the actual place itself. The conventional typology of a museum where history, information and artefacts are displayed, often removed from context is reconceptualised. Here, the narrative of the legacy of the place that is being expressed, perceived and understood is within its context.

Fig. 5.19: South-West Elevation of Mvezo Pavilion (Phaidon, 2001)
The pavilions engage with the phenomenological stimulants of the site: the sound of the wind blowing through the timber screens stimulate the aural senses (Fraser, 2009) and the varying architectural manipulations of shade, shadows and filtered light, create a layered expression of space through degrees of enclosure and materiality, and engage the users’ sensory (phenomenological) perceptions of understanding the space and place.

KEY PRINCIPLES:
- Sensitivity to community and natural landscape.
- Using a series of building pavilions to emphasise meaning of space and place.
- Simple architectural pavilions, give emphasise to the surrounding natural context and immerse the users in space. This heightens their awareness of experiencing the space and forging deeper connections to the place.
- Expanding the brief to address issues concerning the local community.
- Phenomenological response to the senses in architectural design.
- Layered expression of space through changing levels, degrees of enclosure and materiality.
The Badjao, are a nomadic tribe that have been living along the coastal regions of Southeast Asia without a state, nationality, western influences or stable infrastructure for thousands of years. According to the article ‘5 Architectural Secrets of the Badjao: 21st Century Sea People,’ by J. Jacobson, the following lessons can be learnt from the Badjao:

- **Collective participation in architecture**
  The architectural profession is focussed on the individual – it is requested by ‘the client’ and designed by ‘the architect.’ However, the Badjao show how communal participation can inform architectural design and processes. The Badjao are culturally, a supportive and sharing community, who rely on each other for constructing their homes. Their homes are structurally supported on stilts that are cautiously placed between coastal rocks and coral formations. This is a communal process to prevent harm, in respect to the natural ecologies below. Should other homes be damaged through a natural event, surrounding Badjao will part with spare materials from their own homes, to strengthen and secure the damaged homes. (Jacobson, 2015)

- **Adaptability in architecture**
  Similar to how nature adapts to its environment, the above highlights the adaptability of the Badjao architecture to the natural forces it is exposed to. The Badjao are “flexible in their very nature” and demonstrate a way of living in which humans adapt to their surroundings and apply this principle to architecture. Adaptability in architecture can be achieved if the surrounding ecological, social and cultural variables are considered. (ibid)

- **Environmental cognisance in architecture**
  Having based their way of life with nature’s elements, the Badjao are open minded about adapting their lifestyle in response to these natural forces. For example, when the Indian Ocean earthquake and tsunami hit Southeast Asia in 2004, many of the Badjao responded by simply adjusting by moving to areas that were not severely affected. (ibid)
• Fragility in architecture
Conventional architecture is built to be durable, permanent, and fortified against the forces of nature. Should a natural disaster occur, there is the risk of infrastructure failing and further harm being done. The Badjao are directly immersed and exposed to the unpredictability and turmoil of the sea, and this has influenced their design and construction approach to be of simplicity, fragility and temporality. As Jacobson, eloquently states “When every home and bridge is built with the goal of eventually becoming parts to fortify other bridges and homes, then there really isn’t ever any truly failed infrastructure.” (ibid)

• Sense of place in architecture
The Badjao are fully immersed in nature and its elements, and so a natural, open way of life is ingrained within them. The concept of time is understood not by hours or dates on a calendar, but by the sea tides, even memories are remembered by how high the sea level was on that day (ibid). It is through this intense interactions with nature that the Badjao are inherently conscious of the deeper layers of meanings and information that nature offers. It is this kind of understanding that can provide architects, the tools to design more experiential and meaningful designs in nature.

Homes are built using found driftwood and discarded debris found along the coastal areas around Southeast Asia. It is a sustainable act of using found and unwanted materials, which are repurposed into their structures. (ibid)

Perhaps the notions of Badjao are romantic ideals for contemporary, urban architecture, but they are lessons, that should inspire deeper conceptual thinking for developing simple architecture that responds to nature in a more experiential, sustainable and adaptive approach.
The Qunli Stormwater Wetland Park is an urban wetland rehabilitation strategy. It functions as an urban storm water collection, attenuation, and filtration scheme, as a solution to protecting the ecological processes of an existing wetland. The recent urban development surrounding the wetland had disrupted the water sources leading to it, causing the wetland to dry up. This initiative then sustains the existing wetland, by providing a continuous water source from the storm water. Furthermore, the urban wetland park provides new recreational and biophilic experiences for its urban location and its users. (Archdaily, 2015)

One of the core strategies was to protect and leave the natural systems and processes of the wetland to function undisturbed at the centre of the park, and to create a surrounding buffer zone between the wetland and urban context. It is within the buffer zone that the related storm water processes and treatment occurs. (ibid)

On the ground, a network of paths, platforms, and seated areas connect the users to be immersed in the nature experience and for close human-nature interactions to be encouraged. Above, skywalks connect to platforms, pavilions and viewing towers, to allow the users to experience the wetland from above and to extend their views. Raised skywalks also accommodate for the natural ecosystems below to still function. (ibid)
Use of light, natural materials such as timber, which has an earthy texture, aesthetic and sound, enhances the nature experience. Use of simple timber detailing and light architecture, ensures that the architecture and landscape structures do not distract from the natural experience. The focus of the user then remains with nature.

Connecting and diverging pathways allow for a varied individual experience, where users determine their own personal journey through the landscape, creating deeper and personal memories and associations to the place.

**KEY PRINCIPLES:**

- Pathways and platforms allow for intimate human-nature interactions, through an immersed experience.
- Raised skywalks and viewing towers allow for extended views and broadens the users’ understanding and perception of the place.
- Light, simple architecture of natural materials enhance sensorial experiences and holds the user’s attention on nature.
- The use of varied, interconnecting and diverging routes to enhance personal journey-experiences of the place.
"We borrow from nature, the space upon which we build" -Tadao Ando
DESIGN CONCEPT

“A real architectural experience...is approached, confronted, encountered...it’s related to one’s body...” - Steven Holl

The theoretical underpinnings of this research have emphasised phenomenology as an underlining approach for enhanced human-nature experiences and interactions, in order to re-affiliate humanity’s deep-rootedness with nature. The notion of ‘journey’ was emphasised as a means of constructing a series of multi-sensory, experiential narratives for the ‘traveller,’ in order to interpret deeper meanings and perceptions of place, thus provoking personal connections and associations to the place and nature.

The concept of journey was then explored to influence and inform the design decisions of the proposed project. My personal experiences, perceptions and impressions of the site and surrounding nature, was used as a guide for ordering the site and architecture. The synergies of the natural phenomena experienced were analysed, to determine the spatial possibilities of experiencing the landscape through an explorative journey-narrative of the site through architecture. Since the site was within a tourist-destination, the concept of journey was considered appropriate, by extending the journey experience of the traveller and other users.

APPLICATION OF THESE PRINCIPLES TO THE SITE

An existing excavation on site formed a narrow approach that led from the existing parking and along the estuary banks, which were partially concealed by a dense growth of shrubs and trees. Glimpses of the estuary through gaps between the vegetation, tease the traveller of their perceived destination. The approach eventually leads to open land defined by strikingly tall, indigenous trees branching over. This existing language was developed and enhanced to form the pedestrian journey approach to the site, leading to the entrance of the public reception building.

ABSTRACTING THE LANDSCAPE

St. Lucia Estuary

Abstractions of St. Lucia Estuary as ‘Journey’

Developing the Concept
A dense growth of indigenous trees exist on the site, which had to be protected for their ecological value. The trees create a remarkable presence on the site that suggest spatial qualities - defining, encompassing, concealing and revealing space; creating thresholds; framing views; and informing movement along the site, with moments of constriction and release. The trees suggest gesture and interpenetration of space.

The next stage of conceptualising the design was to interpret the language the trees created, to form spatial possibilities of experiencing the landscape through a physical journey. This aided in formalising a spatial ordering and meandering movement patterns throughout the site, and determining ‘vacant’ areas and peripheries, where building forms could be possibly be located.

The next stage of conceptualising the design, mapped the views and sight lines of the estuary and ocean, that are revealed and framed by the trees, in order to determine the spatial possibilities of experiencing the landscape through a visual journey. This aided in developing a design that enticed the user through spaces, by revealing and encountering different views of the estuary.
Exploratory models of the abstractions
Using these abstractions, and considering the defined principles of journey, the early sketch designs explored the placement of buildings along the selected site.

The design process involved overlaying the abstractions and distilling interpretations to form rational design responses. The initial sketch design had programme confined to areas that had been disturbed by man, however the design failed to have all crucial programmes interact with the natural phenomenas of the site eg. the estuary river.

Conceptual design sketches

Building programmes placed beside or along the primary circulation paths, makes these programmes ‘optional’ to the journey experience. There is a chance that interactions with these spaces then become missed by the user.

Initial sketch design model

Building programmes integrated into the circulation, directs users through the architecture and exposes them to the programme inside. Architecture forms part of the journey narrative of the site and surrounding nature.
Design process sketches

This stage of the sketch design explored integrating the programmes interaction with the estuary, via a hybridised pavilion and pier typology.
**NATURAL IMPRESSIONS**

A further abstraction, and sensory exploration of nature and the larger site context formed part of the design process, in form of a sculptural collage. The aim was open to interpretation.

Initially the collage followed the site mapping imprinted onto the base (a literal impression), whereby a ‘sense’ of the type of plants used, were inspired by personal impressions, perceptions and memory of the site. Eventually, this transformed into a free interpretation of a sculptural design language of the landscape being formed, and understanding of the site. The sculptural and spatial qualities explored could be translated and inspired into an architectural language and impression.

**MAPPING OF WATER**

Water is natural element that sustains and hosts life. The St. Lucia Estuary owes its existence, and rich biodiversity to the presence of water, in the form of the rivers, wetlands, estuaries and the ocean. These water systems and presence of human-areas were mapped, which formed the base for the sculptural collage.
Locating Buildings parallel to View Sight Lines

Buildings are located in an axis along the identified view sight lines. In this way, architecture reveals, leads and entices movement by spatializing the views. The ‘building’ becomes the interface for nature and the encountered experiences, and develops the journey narrative of the site, for the experiencer.

Permeable Construction and Design

A light, permeable construction of the pavilion typology, frames views, emphasises the surrounding nature and is a sensitive response to natural environment. The permeability of the pavilion allows for the elements of nature, such as wind, sounds, light and smells to be perceived. In a way, the architecture ‘frames’ these moments of the natural phenomena.

Pavilion/ Pier Typology

A hybridised pavilion/pier typology allows for the structure of the architecture to interact with the different edge conditions and thresholds of land, reed beds and surrounding estuary water. This allows for enhanced immersive experiences as the user moves through these.

Irregular Placement of Buildings

By using an irregular planning scheme of the buildings and spaces, an organic informality of the building groups is created. This freedom of planning allows for the building placement to be informed by the contextual. The series of buildings form sequential encounters that form that journey-narrative of the site.

Passive Design

The permeability of the architecture allows for passive design principles to be used. In terms of design, this then means that the architectural design is informed by the natural elements and surrounding context such as wind patterns, solar angles, shade and rain.

Revealing Architecture

Using the same principle of revealing views of nature through architecture - architecture is revealed through nature. The tree-lined approach to the site, releases and reveals the user to an open, receiving space. Since the buildings are nestled between existing trees, the trees then reveal architecture as the user moves through the site.
View of Exhibition Platform
1. Upgraded visitor’s and staff parking
2. Bait station for fishing
3. Boat Launch
4. Renovated existing structure for visitor drop-off zone shelter
5. Upgraded existing ablutions
6. Braai & picnic facilities
7. Jetty
8. Informal trading stalls
9. Approach to the conservation centre
10. Existing building renovated into a maintenance facility
11. Contemplation floating platforms
12. Administration & visitor reception building, with auditorium
13. Exhibition pavilion
14. Art & craft workshop
15. Contemplation spaces
16. Tree house view points & weather observation
17. Restaurants
18. Research & education facilities
19. Mangrove water treatment & exhibition
20. Research private parking and access
21. Access to existing public facilities, activities & beach
22. Existing ski-boat club & restaurant
1. Approach to building
2. Circulation with pergola above
3. Reception / tour bookings
4. Eco-gift store & main entrance
5. Juice bar
6. Outdoor sculpture exhibition
7. Exhibition/ gallery pavilion
8. Circulation to estuary viewpoint platforms
9. Administration offices (boardroom, kitchenette & staff lounge)
10. Auditorium
11. Administration staff & public ablutions
12. Arts & crafts workshop
13. Central public courtyard with seated areas
14. Existing Building - Maintenance Facilities
View of Exhibition Platform - A Hybradised Pavilion / Pier typology
1. Public ablutions
2. Sustainable seafood restaurant
3. Organic restaurant
4. River lounge
5. Central courtyard /cultural performance space
6. Fire pit
7. Hydroponics garden east-facade
8. Raised timber boardwalk
9. Contemplation Spaces

Fire Pit

Approach to Restaurant
Indoor-Outdoor relationship of the restaurant
Indoor-Outdoor relationship of the restaurant
RESEARCH & EDUCATION FACILITIES

External view of seminar/multipurpose room

Ground Floor
1. Outdoor classroom
2. Seminar / multipurpose space
3. Public ablutions
4. Classroom laboratory
5. Wet laboratory
6. Aquaria & dissection spaces
7. External circulation to estuary access & viewpoints
8. Mangrove water treatment & exhibition

First Floor
9. Open plan permanent research offices
   (with boardroom, kitchenette & reception area)
10. e-resource library
11. Researcher’s ablutions
12. Dry laboratory
13. Open plan collaborative research space
   (with kitchenette, & discussion spaces)
14. Outdoor balcony
15. External circulation
AERIAL OF RESTAURANT
Main Public Entrance-Approach to the Building
MATERIALITY

A material palette was developed, based on contextual appropriateness and availability, indigenous vernacular architecture, cultural relevance, local community skills and crafts, environmental sustainability and protection, and the phenomenological character of the materials (texture, tectonics, reflection, sounds, natural warmth, colour, weathering).

Materiality contextualises place and aids in constructing a journey narrative of the place.

A layering of materials and textures, will enhance the qualities of lightness vs heaviness, solidity vs permeability, and smoothness vs roughness. A contrasted layering is inspired by the layering of qualities found in the surrounding nature of the site.
TIMBER
natural | context | sustainability | tactility | weathering

Saligna (Eucalyptus Blue Gum) is locally grown in plantations along the borders of the park. It is a non-indigenous tree that extensively grown in these regions of KZN. The trees consume large quantities of water which effects the water levels of the nearby rivers and streams. The timber is durable, fairly rot resistant and has good exterior resistance. The timber darkens to a rich brown colour when exposed to natural light. The timber is a common building material in the St. Lucia context.

Laminated timber from a local supplier in Kwambonambi, will be used only where long spans are needed to have open, uninterrupted internal spaces, such as in the research building. The material is prefabricated and cut. Its high strength allows for great spanning distances, with less use of material. It is therefore economically and sustainably resource efficient. It is hard wearing to external forces and does not require additional finishing. Quick assembly on site means that the impact on site through construction activities is minimum. The material has a fire resistance comparable to steel and concrete and repurposes ‘disgarded’ timber in its composition.

BRICKS
context | sustainability | tactility | sense of time

The existing buildings on the site are to be carefully demolished, and the bricks repurposed for the proposed project. The aged bricks gives a sense of time, and relates to the surrounding contextual buildings, as it is a common building material in St. Lucia. The brick reads as a heavy, solid, roughly textured material, used to contrast and give emphasis to the light, open timber materiality of the proposed design, as well as the pristineness of the surrounding nature.

STEEL
Steel is a high strength, durable material that can be re-used. The assembly of steel allows for it to be easily de-constructed and adapted to be re-purposed later - an attribute that resonates with the notions of adaptation and re-building of the Badjao community. The material has low maintenance costs and can be treated to be exposed to marine, saline conditions such as those of the St. Lucia estuary. The material can pre-fabricated and assembled relatively quickly on site, meaning the impact of construction on the site is minimum. Steel will be used in foundation footing details of columns exposed to the estuary water.
TECHNICAL RESOLUTION

The technical developments of the proposed design, focussed on economic, environmental and social sustainability, sensitivity to nature and protection of the ecological systems, local craft skills and building techniques, and the phenomenological aspects of enhancing the indoor-outdoor relationships and responsiveness of the architecture to the surrounding nature of the site.

BUILDING STRUCTURE

The building is raised on stilts, the advantages of this are:

• The building ‘ouches the earth lightly’ since its impact on the earth is mini-
mised through a reduced footprint.
• It protects the ecological functioning of the ground below and the natural
  systems, organisms and processes that interact with it.
• It allows for the natural flow of water in times of torrential rain.
• The close proximity of the buildings to the surround trees, means that the
  tree roots can grow freely below without compromising the building’s struc-
ture.
• It raises the building above the flood lines of the estuary and potential dam-
  ages that could occur.
• It raises the buildings to take full advantage of the views of the estuary and
  surrounding nature.
• It respects and adapts to the natural undulations of the topography of the
  site (no earthworks are required).
• It protects the building from termites, borers, vermin and organisms.
• Values items such as equipment, specimen samples, and research data in
  the research facilities are protected from potential flooding.
• It allows for the building programmes to interact with the estuary water.

STRIP SECTION - RESTAURANT | 1:25

69 x 220 mm PAR saligna beam to be bolted between 69 x 144mm PAR
saligna columns
69 x 144mm PAR saligna double column
50 x 200mm saligna joist tapered for weather proofing and paraplegic
access
38 x 100 saligna struts at 600 centres
64 x 140 IPE steel I-Section to be welded to 10 x 215 x 300 mm
galvanised steel base plate. Base plate to be bolted to concrete
footings.

38 x 114 mm saligna common rafter
at max. 760 centres
38 x 114 mm saligna tie beam
(roof truss to engineers detail)
32 Ø timber laths nailed to 38 x 38 mm
brandelet at 600 centres
double glazed sliding aluminium
doors
saligna louvre sun shading
64 x 120 mm IPE steel I-section to be welded to 10 x 215 x 250 mm galvanised steel base plate. Base plate to be bolted to concrete footing.

44 x 300 mm PAR adjustable saligna laminated timber louvres, fixed to galvanised mild steel mounting strip, painted 'charcoal grey' in colour.

69 x 144 mm PAR saligna double column to be bolted onto saligna joists and 64 x 140 mm galvanised IPE steel I-section.

38 x 100 mm saligna struts at 600 centres.

22 x 96 mm PAR saligna decking to be nailed onto saligna joists and struts.

50 x 150 mm saligna joist, treated.

All timber to be treated with an organic sealant - a waterborne Borate-based preservative with fire retardent additive.

69 x 194 mm PAR saligna beam to be bolted between 69 x 144 mm PAR saligna double column.

69 x 194 mm PAR saligna double column to be bolted onto saligna joists and 64 x 120 mm galvanised IPE steel I-section.

360 x 360 mm reinforced insitu concrete footing to engineer's detail.

420 x 420 mm reinforced insitu concrete footing to engineer's detail.

Solar photovoltaic panels screwed onto saligna adjustable louvres.

69 X 194 mm PAR saligna beam to be bolted between 69 x 144 mm PAR saligna double column.

Recycled bricks from demolished existing buildings.

420 x 420 mm reinforced insitu concrete footing to engineer's detail.

360 x 360 mm reinforced insitu concrete footing to engineer's detail.

64 x 120 mm IPE steel I-section to be welded to 10 x 215 x 250 mm galvanised steel base plate. Base plate to be bolted to concrete footing.

All steel to be painted with 1 x coat red lead undercoat, 1 x coat primer, and 2 x coats matt 'charcoal grey' enamel.
**Detail a | 1:10 - double glazing sliding door & timber louvre solar shading**

- **69 x 220 PAR saligna beam** supporting glazing frames and solar shading tracks, fixed to 69 x 108 PAR saligna columns and faced with 32 x 220 saligna cladding via 25 x 38 mm battens
- **double glazed sliding aluminium doors**, powder coated and painted ‘charcoal grey’
- **32 x 44 mm PAR saligna framing** attached to sliding folding hinges within galvanised steel sliding track fixed between 69 x 108 PAR saligna columns
- **13 x 94 mm PAR saligna louvres** sun shading fixed to 32 x 44 mm PAR saligna framing
- All saligna timber to be treated with an organic sealant - a waterborne Borate-based preservative with fire retardent additive.

**Detail b | 1:10 - adjustable pergola plan**

- **69 x 194mm PAR saligna beam** to be bolted between 69 x 144mm PAR saligna double column, treated with an organic sealant - a waterborne Borate-based preservative with fire retardent additive.
- **44 x 300 mm PAR saligna framing** attached to sliding folding hinges within galvanised steel sliding track fixed between 69 x 108 PAR saligna columns
- **13 x 94 mm PAR saligna louvres** sun shading fixed to 32 x 44 mm PAR saligna framing
- **double glazed sliding aluminium doors**, powder coated and painted ‘charcoal grey’
- **22 x 100mm saligna decking**
- **flooring to receive sliding doors and solar shading tracks**
- **22 x 100mm tongue and groove saligna timber flooring**
- **50 x 200 mm saligna joist tapered for weather proofing and paraplegic access**
- **38 x 100 saligna struts at 600 centres**
- **axle**
- **bearing block**
- **polyurethane bushing**
- **galvanised steel mounting strip, painted ‘charcoal grey’ in colour**
- **stainless steel driving rod and mounting bolt, painted ‘charcoal grey’**
stainless steel driving rod, painted 'charcoal grey'
solar photovoltaic panels screwed onto adjustable saligna louvres
solar photovoltaic panels fitted on solar shading, harvest solar energy for electrical energy

mounting bolt
galvanised steel mounting strip

44 x 300 mm PAR saligna laminated timber louvres, treated with an organic sealant - a waterborne Borate-based preservative with fire retardent additive.

adjustable solar shading allows users to adjust shading to thermal comfort levels

69 x 194mm PAR saligna beam to be bolted between 69 x 144mm PAR saligna double column, treated with an organic sealant - a waterborne Borate-based preservative with fire retardent additive.
300mm rammed earth wall constructed in 180mm layers on 300mm reinforced footing with reinforcing mild steel started bars

minimum 300mm topsoil on compacted earth fill for indigenous planting

torched waterproofing to concrete footing on planted face of the wall

150Ø agricultural drain with 100Ø drainex pipe with stone all around wrapped in bidum cloth

Lighting installed to illuminate walkway at night

300mm reinforced concrete footing with cast in situ lighting groove detail and drip joint to fall to planter bed

permeable paving constructed from 50 x 100mm recycled paving bricks on on compacted earth fill.

Planter bed for indigenous planting along the walkway

50 x 144 mm saligna column and beam structure bolted to 15 x 75mm x 200mm steel plate, welded to 15 x 200mm steel base plate

38 x 38mm saligna battens
Southern Elevation of Restaurant
upcycled soft-drink plastic bottles collected by local women, to form the core of the floating platform. It is incased in a treated saligna timber frame structure.

22 x 100 mm tongue and groove timber decking, nailed to 150 x 50mm saligna beams at 600mm centres.

The structure gives rigidity to the platform and weight for balance.

40 x 80mm square steel grating welded to 40 x 40mm marine grade steel square post grid prevents people from falling in, and allows for reeds to grow through, creating an immersive experience with nature.

A protective boundary of timber laths are collected by local women, laths are rammed into the earth, and secured by locally crafted rope. Boundary protects users from falling in the water, and from dangerous wildlife.

Locally crafted rope net fixed to the underside of the timber structure.

It secures the bottles and allows for algae to attach - which attracts fish.
The floating platform allows for the user to experience the buoyancy and rhythm of the water. A closer interaction with water allows for the sounds, smells and aura of nature to be experienced.

The protective boundary around the platform is made from natural timber laths rammed into the mud, and secured by rope made by local women using traditional craft techniques. The laths are found around the site or surrounding areas, or harvested from blue gum plantations nearby. It is left untreated and natural, so that it would weather naturally, and algae can attach and attract fish. The fluctuating water levels mark the laths giving an essence of time and nature adapting ‘architecture’. When it does decay or break, its simply replaced. This follows the principle similar to that of the Badjao community, of community participation, adaptation and flexibility towards nature’s elements.

The design of the protective lath boundary, is inspired by the traditional fishing traps of the Tsonga people in Kosi Bay, that is made from sticks, brushwood and rope. It encompasses the experiencer in a space that is contemplative and immersed in nature.

**A CONTEMPLATIVE FLOATING PLATFORM | 1: 20**

For intimate human-nature interactions and immersive experiences in nature.

The floating platform allows for the user to experience the buoyancy and rhythm of the water. A closer interaction with water allows for the sounds, smells and aura of nature to be experienced.

The protective boundary around the platform is made from natural timber laths rammed into the mud, and secured by rope made by local women using traditional craft techniques. The laths are found around the site or surrounding areas, or harvested from blue gum plantations nearby. It is left untreated and natural, so that it would weather naturally, and algae can attach and attract fish. The fluctuating water levels mark the laths giving an essence of time and nature adapting ‘architecture’. When it does decay or break, its simply replaced. This follows the principle similar to that of the Badjao community, of community participation, adaptation and flexibility towards nature’s elements.

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Gum Pole and Concrete Footing Connection Detail  |  1:10

125mm Ø timber gumpole column, to be double treated with CCA and Creosote and bolted to base plate

gumpole wrapped in PVC liner sheets and secured with high strength composite polymer strap and buckle system

50 x 8 mm marine grade steel plate welded to base plate

170 Ø x 8mm thick marine grade steel base plate, welded to circular hollow section

80 Ø marine grade steel circular hollow section, welded to 200 x 8mm marine grade steel base plate. Base plate to be bolted to concrete footing

Precast concrete footing

- designed to be disassembled so materials can be recycled or easily replaced
- PVC wrap further protects the durability of the gumpole, from decay caused by marine and estuarine conditions and organisms. It also prevents the toxicity of the chemically treated gumpole, from leaching into the estuarine eco-system.

SUSTAINABLE SYSTEMS

As discussed, the building design and technical detailing, uses the principles of passive design for **natural ventilation**, **daylighting** and **solar shading** of the internal spaces of the buildings. In this way the building responds to the natural elements of the site (wind patterns and solar movement), allows for the phenomena of nature to inform the architecture and the internal spatial ambience. This enhances the user’s perception and experience of the surrounding nature, while at the same time being an environmental and economically sustainable system, that assists in the thermal comforts of its users in the hot, humid climate of St. Lucia. Apart from this, the following sustainable systems were also applied in the proposed project:

**Solar energy:**

In light of the current unstable supply of electricity from the national electricity supplier, and to reduce the project’s reliance on the national grid, solar photovoltaic panels are installed on the building roofs and horizontal solar shading devices. The buildings are orientated to face a northerly direction, which is ideal for solar energy harvesting.

**Water treatment systems:**

Through the use of onsite-waste water treatment and rainwater capture, the project aims to reduce its dependence on the St. Lucia municipal water supply, especially since water shortages is sometimes an issue for the town.

Since the area is currently experiencing a drought, salt water from the estuary can be desalinated through reverse osmosis equipment. Reverse osmosis can have a dual function with marine and estuarine aquaria, and human use, through filtration of the saline water.

Despite the current drought, provisions for rainwater harvesting are accommodated. Rainwater is collected from stormwater run-off from the roof, and is stored in rainwater tanks, which is then pumped to use as greywater for toilet flushing and landscape use.

Inspired by the natural filtration systems that exist in the estuary wetlands, a mangrove sewage treatment pond is used to treat the sewage with a combined septic tank system.
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