Chapter 5 Precedents

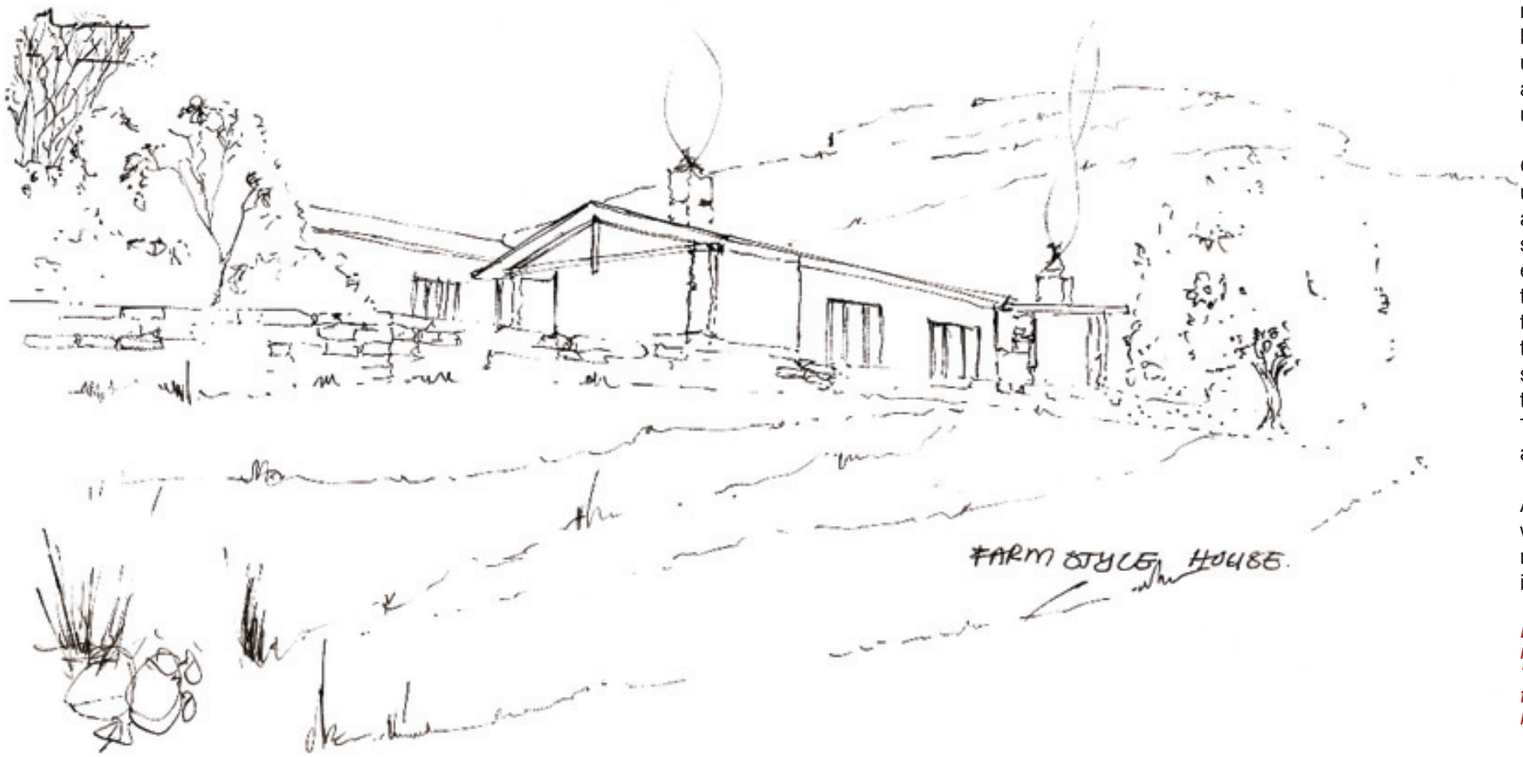
"Since antiquity, man has reacted to his environment, using his faculties to develop techniques and technologies, whether to bake bread or make brick, in such internal psychological balance with nature that humanity historically lived attuned to the environment."
(Hassan Fathy, 1986)

Hassan Fathy describe in his book, *Natural Energy and Vernacular Architecture (1986)*, how the industrial revolution and the subsequent mechanization manipulated design. The new typology of materials created during this paradigm shift excluded the previously artistic expression found in materials. The pressures that are applied by first world countries through interrelationships, on developing countries are causing a social, economic and ecological instability. Artists in developing countries are becoming insufficient in their trade because of loss of valuable knowledge normally passed on verbally from generation to generation. This path of knowledge transfer is slowly eroding since the historical social patterns of these people are being disturbed. The mass of the populations are subsequently organised by these social patterns. It is these masses that have a personal knowledge of how to live in harmony with nature, which resulted in a psychological equilibrium. Usage of the local materials and climate led to economic building methods with internal and external space arrangement according to each community's social prerequisites.

Fig. 5.1.1 Timber rooftrusses

Fig. 5.1.2 Sun lit courtyard

Fig. 5.1.3 Timber structural columns



5.1 Anthony Hudson
Quaker Barns, 2002
Norfolk, England

The project entailed the conversion of two barns, which form part of a complex of farm buildings, into two dwellings. The use of local materials and craftsmanship mixed with a contemporary style assisted in emphasizing the form and details of the original barns. The familiar rectangular double storey, unplastered brick wall surfaces with corrugated pitched roofs and basic agricultural internal usage layout was the main characteristics emphasized (Fig. 5.1.1). This will forms the basis of conceptual departure since the agcricultural context within the development carries a big weight.

The internal design of the two barns differ in that the larger one respects the original structure and bay layout while the smaller barn is more of a hybrid that connects two previously unconnected buildings (Fig. 5.1.2). The use of local materials and the inside reflects and remind us of the previous agricultural usage of these structures (Fig. 5.1.3).

Given the specific climate, it was important to make maximum use of the little (compared to South Africa) natural sun energy and sunlight available (Fig. 5.1.4). Both buildings are facing due south (northern hemisphere) for maximum solar gain. These elevations provide the backdrop for the positioning of the thermal inertia designed elements. The straw bale wall with translucent fibreglass rain screen(Fig. 5.1.5) that allows light to filter into the building are in the same surface as the main structure. Protruding rectangular boxes (Fig. 5.1.6) emphasizes the entrance and provides the main natural light on the inside. These framed boxes give the usual flat and boring barn elevation a refreshing playfulness.

Advanced technologies such as double glassed windows and car window seals (Fig. 5.1.7) were used at window opening sections to make it draught-proof when closed. These also contribute to the insulation properties of the barns, minimizing energy consumption.

Discertation applicability:*The use of local materials will assist in the fullfillment of man's psychological needs. The traditional "barn" will be used as a departure point in the process of architectural form generation. These re-interpreted forms must however reflect and compliment the Venda culture.*

Fig. 5.1.4 Shaded southern facade

Fig.5.1.5 Straw bale wall

Fig. 5.1.6 Protruding rectangular boxes

Fig. 5.1.7 Double glazed sliding window

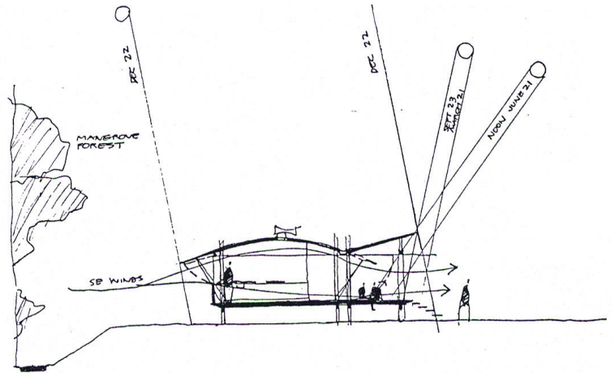


Fig. 5.2.1 Early sketch of climatic potential

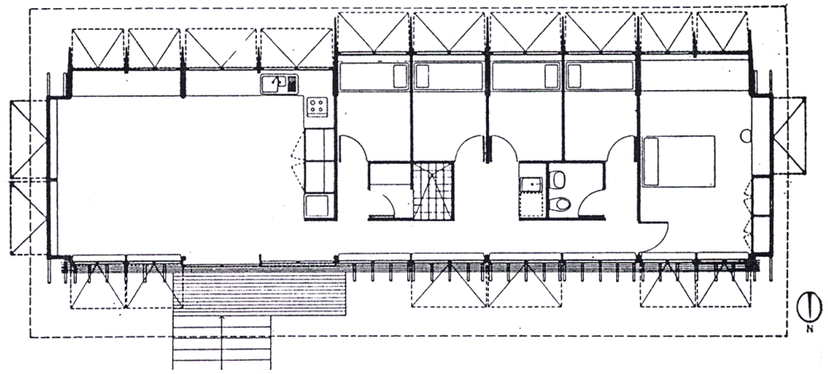
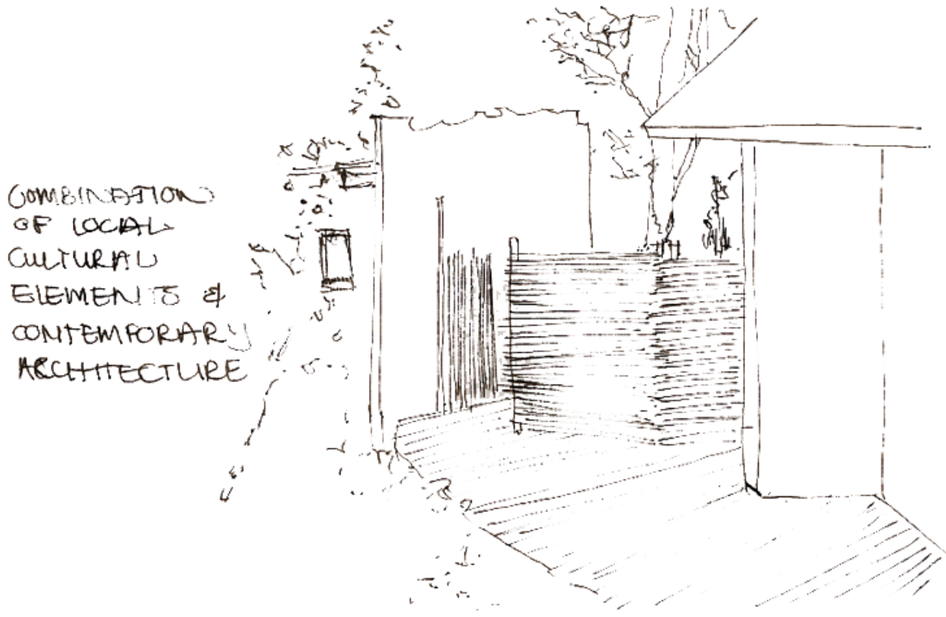


Fig. 5.2.2 Plan of long pavilion



5.2 Glen Murcutt
Alderton House, 1994
Northern Territory, Australia

"When considering a project site, Murcutt produces a site section drawing at least a half mile in either direction, and it must be freehand, espousing the virtue of hand-eye movement and its impact on the creative mind. He respects both the power of the landscape and the wisdom of the indigenous people who have had stewardship over this land for 40 000 years....." (Lindsay Johnston, 2003).

The house was designed for an Aboriginal artist's family, deep in the tropics on the north-west corner of the Gulf of Carpentaria. The site is on a narrow spit, with the beach and sea on the northern side (Fig. 5.2.1). Murcutt uses a variant of his long thin pavilion to address the main prospects and uses natural airflow to cool the interiors (Fig. 5.2.2).

Cyclones of up to 63m/s were one of the main factors that influenced the design. The main structure was made-up of steel portal frames (Fig. 5.2.3) that were bolted to piles sunk deep into the ground. These frames were cladded with marine ply or slatted tallow-wood shutters (Fig. 5.2.4). These cladding panels can be moved from vertical to horizontal positions. These provide the shaded platforms that now connect the inside with the outside. This is a reinterpretation of the Aboriginal shelter made of branches and leaves (Fig. 5.2.5). When the cladding panels are closed it is still possible for the building to breathe. Opening and closing like a plant, the house embodies Murcutt's concept of a flexible shelter that exists in harmony with nature's rhythms. Together with the ventilators on the roof (Venturi's hot air extraction principle) they serve to equalise internal and external pressures in a typhoon (Fig. 5.2.6). Because the structure rests on stilts, air circulates underneath and helps cool the floor (Fig. 5.2.7. Raising the house also helps keep the living space safe from tidal surges.

The design is not a direct copy of the nomadic Aboriginal's shelter but a reinterpretation of three traditions: the Modern movement, the heritage of Aboriginal building, and the Anglo-Indian architecture of the 19th century colonialists. This building sits lightly on the earth, and it responds with increasing gracefulness to locus, ranging from insight of views to the potential of the microclimate for providing ambient energy to cool the interiors.

Discertation applicability: *The arrangement of space in the proposed development will be influenced by climatic factors and the Vendas' social systems.*

Fig. 5.2.3 Steel frame junction point

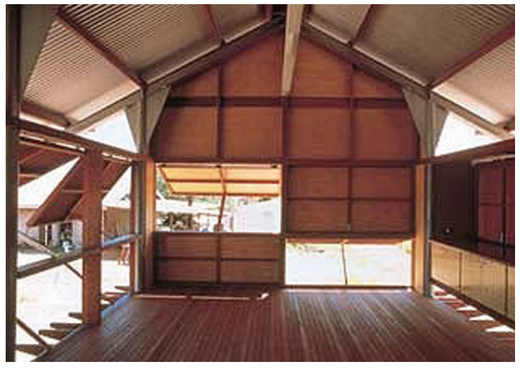


Fig. 5.2.4 Movable cladding panels

Fig. 5.2.5 Aboriginal shelter

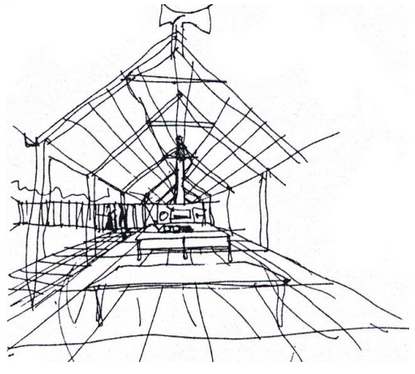


Fig. 5.2.6 Structure & ventilation analysis

Fig. 5.2.7 Floating mass above soil

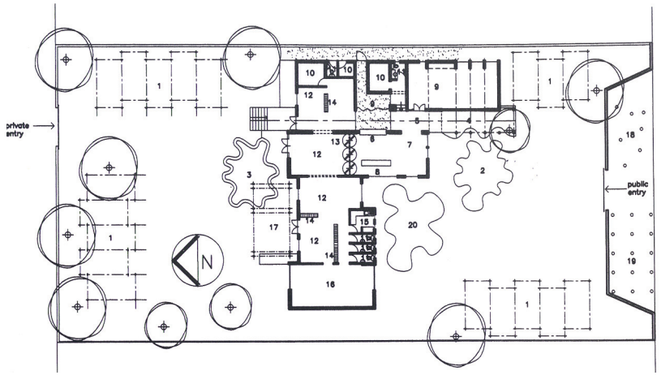


Fig.5.3.1 Plan indicating north south axis through site

Fig. 5.3.2 Permeability from public- to private space

5.3 Kate Otten
Indigo Marketing Offices, 2003
Johannesburg, South Africa

The property in Corlett Drive was well situated but the look of the converted house on the site did not attract the right image for the new marketing company.

The presence of two access points to the site, presented the opportunity for an axis through the site from private to semi-private to public space. Layering starts already at the entrance to the site (Fig. 5.3.1). This dialogue created between public and private is so strong that those on either side of this axis are not directly connected. They can however see through from private to public space and vice versa (Fig. 5.3.2).

The layering of space and the manipulative visibility have been implemented through the whole design. The most public space given is the boardroom. It has been given a high visibility by means of a glass wall and clear-storey windows for maximum natural light (Fig. 5.3.3). The covered colonnaded walkway that leads to the boardroom and reception area adds to the legibility of the building. The reception is a big open-plan space with rotating fin doors on its northern side (Fig. 5.3.4). These doors allow the different degrees of privacy and openness.

Going through to the most private part of the building is the design studios. The layering is also evident in these areas by the manner in which bookshelves are used to screen off ablution facilities (Fig. 5.3.1) and how windows are screened. The bookshelves dividers are made of corrugated plastic that allows light through. This design is a simple, natural solution that makes use of local materials for shading and layering and creates a legible and light structure (Fig. 5.3.6).

Discertation applicability:*Circulation will be regulated by the public and private spaces. Application of local materials will emphasize these spaces which in turn will heighten the legibility of the development as a whole. The organization of the design will be synchronized through the layering of the existing Vendas' social sytems and the specific 'plant' requirements. This layering will not only be done horizontally but vertically as well.*

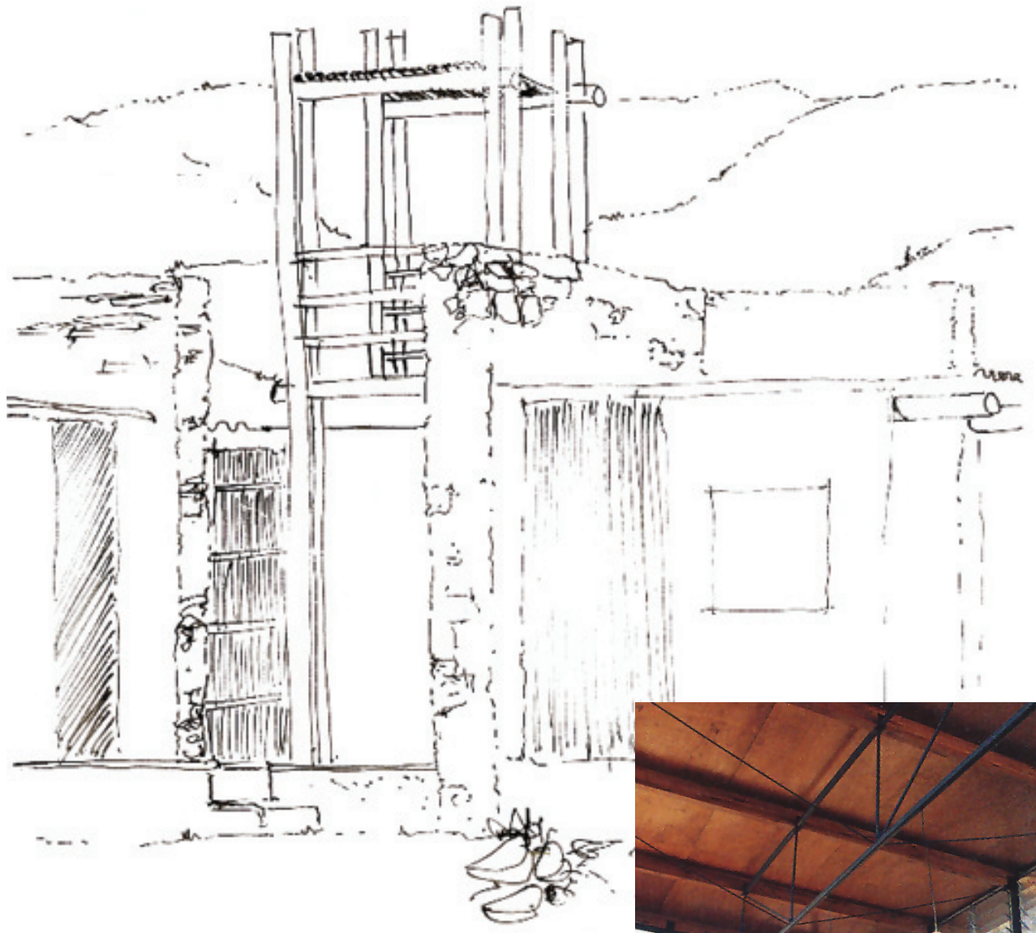


Fig. 5.3.3 Glass wall and clear-storey windows

Fig. 5.3.4 Fin doors

Fig. 5.3.5 Lightweight pergola structure

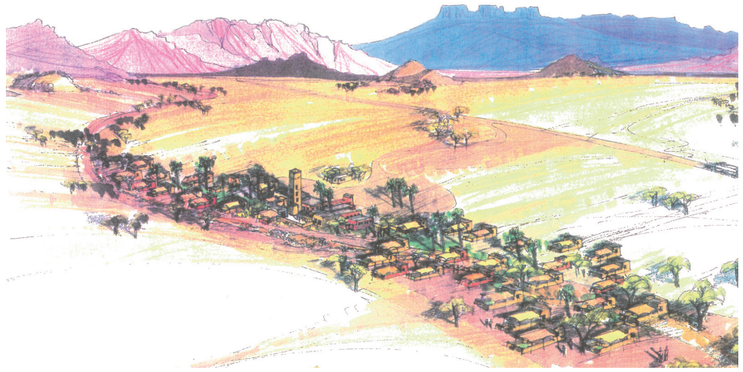


Fig. 5.4.1 Site plan

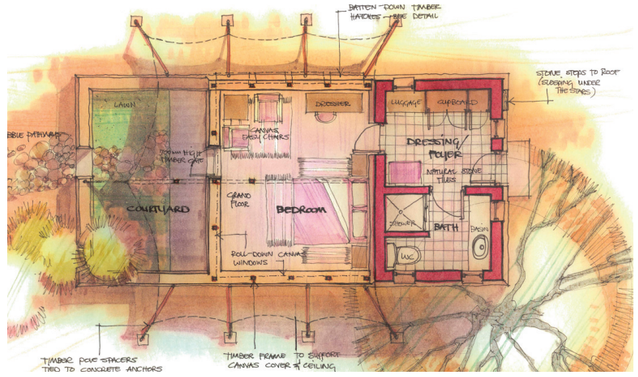


Fig. 5.4.2 Bedroom unit plan

5.4 Niel Crafford
Sossusvlei Karos lodge, 1993
Sesriem, Namib Naukluft Park, Namibië

This project is a mega-luxury resort with 45 rooms in a pristine environment with the most severe climatic conditions possible (Fig. 5.4.1). Hostile conditions include the midday heat and freezing night temperatures. The most destructive being the easterly winds blowing from the Naukluft mountains, with wind speeds of up to 120km/h.

All the passive design principles that the architect applied in this project can be best explained by a detailed investigation of a bedroom unit, “Bedouin abodes” (Fig. 5.4.2). The same principles have been applied to the main complex. The design exposes the visitor to the environment: the tall Naukluft mountains to the east and south, the majestic Namib to the northwest, the ever changing colours that makes this the most photographed natural environment in the world.

The bathrooms are solid brick structures with small windows, which will retain the heat of the sun and transmit it inwards in the cold winter nights. These solid blocks have tapering cavity walls that will assist in the depleted transmission of heat during the hot summer months because no shading device has been implemented to take direct sunlight off these heat stores in summer months (Fig. 5.4.3).

The bedrooms are custom-made canvas structures with a 180 degree view over the desert that cools down quickly in the summer once the sun has set. The canvas windows were fitted with shade-netting panels that act as insect screens which are brought by the northerly winds from the desert. The bedroom areas have been equipped with canvas overhangs to keep direct sunlight off canvas wall panels (Fig. 5.4.4). This canvas shades the internal canvas ceiling and an additional woven shade-net also helped to minimize the suction effect of the strong sandstorm winds on the canvas structure. In winter the sun shines on the low brick walls in order to store energy to be radiated to inside of bedrooms at night time. The low walls built next door in the camp site are copied to protect the inhabitants against desert storms. The east facing walls are higher than the western ones because the winter dust storms are caused by incredibly strong easterly winds (Fig. 5.4.5).

The average rainfall in the area is far below the regional average but when it does rain, it comes as a quick storm. Getting this water off the structures as quickly as possible solved the handling of high volumes of stormwater in a short period. The sizes of outlet pipes on the flat roofs are greater than average in relation to its roof area (Fig. 5.4.6). The gutter that was installed between the canvas roof and brick wall made a perfect joining element between the two materials. The gutter size is also bigger than the norm when in relation to the type of roof and surface area.

Elements of other deserts in Africa were incorporated: the mud houses of Morocco, the tented camps of the nomadic tribes such as the Berbers and Bedouins. These were combined using the thermal properties of each to its highest potential.

Discertation applicability: *Make use of the climatic conditions to achieve the occupant comfort zones which are required. The architectural features will reflect the influence of the local climate. These climate conditions will be most evident in the creation of micro-climates in and around the structures. Local materials have already climatized and by using it in the right manner and composition, these materials are much more competent compared to imported materials. Natural ventilation and sun energy will be used to decrease the impact on the ecological footprint.*

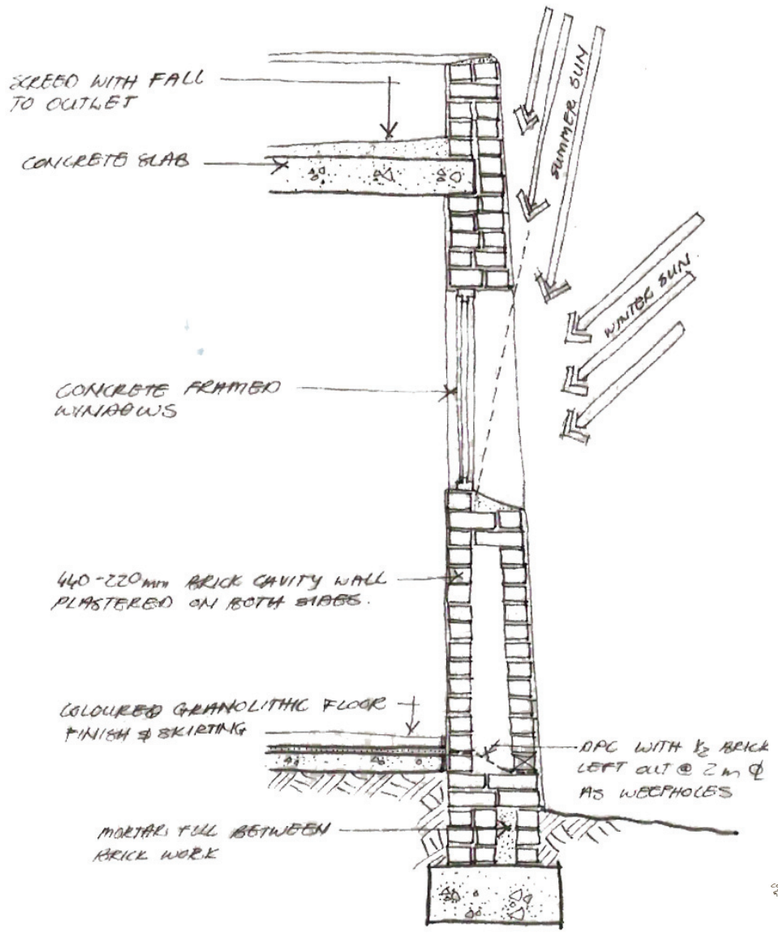


Fig. 5.4.3 Section through brick cavity wall

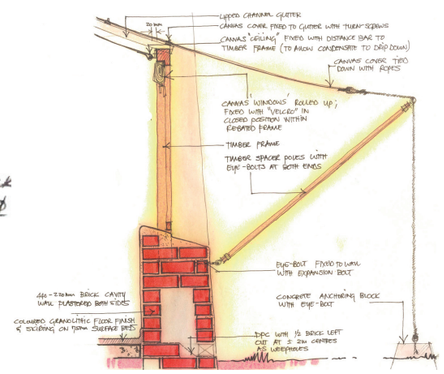


Fig. 5.4.4 Section through canvas & roof

Fig. 5.4.5 North-western view with higher eastern wall

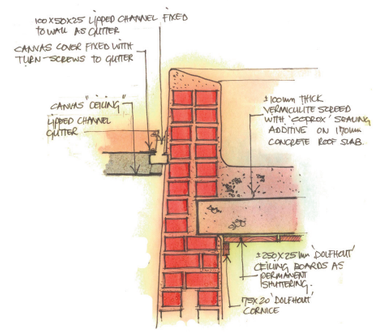


Fig. 5.4.6 Gutter and outlet details

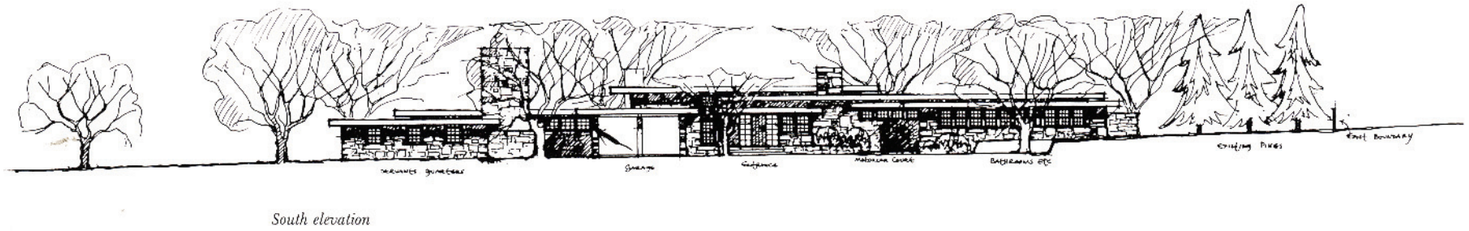


Fig. 5.5.1 South elevation

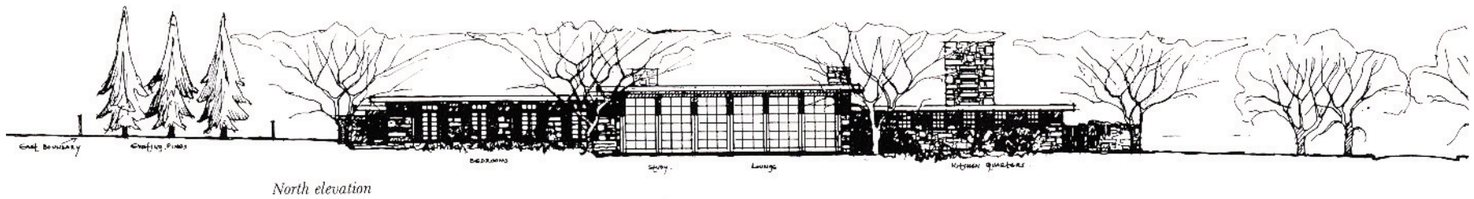


Fig. 5.5.2 North elevation

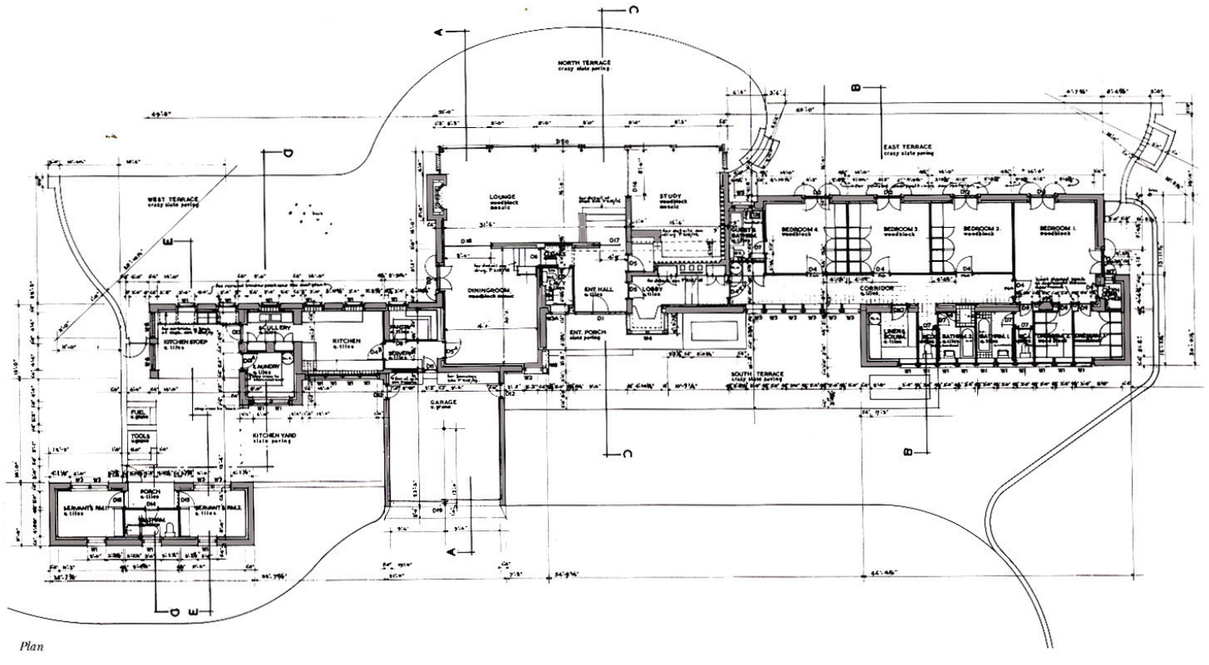


Fig. 5.5.3 Plan

5.5 Norman Eaton
Anderssen house, 1950
Pretoria, South Africa

"For South African architects, the surviving architecture of Norman Eaton is a reminder that buildings can be particular to their country. Eaton's work has that timeless quality which is associated with great architecture....." (Beck, 1985:22)

The Anderssen house was originally designed as a farmhouse (fig. 5.5.1), but sits now in an urban context due to the expansion of Pretoria in recent years. The house is orientated to the north (ideal southern hemisphere orientation) with all living rooms along the northern facade of the building (Fig.5.5.2). The building runs in a rectangular formation from east to west. Separating the semi-public space from the more private space (Fig. 5.5.3). The flat roofs comfortably attaches the building to the African veld.

Pretoria's climate is marked by hot summers and cold winters - extremes on both sides. The large overhangs provide enough shade during the hot months but in the colder months, with the sun angle lower, the sun penetrates the faces to store this energy (Fig. 5.5.4). Through the fly-wheel effect this energy is then radiated at night when it is welcomed during the cold months.

The mansion-like appearance at first glance vanishes after careful examining of the spaces, which are economical and comfortable. The volumes of the spaces stimulate the movement through the building (Fig. 5.5.5). In the lounge, the ceiling lifts up and one descends three stairs to enter the space. The conventionally narrow corridors are replaced with a broad one to facilitate circulation.

The use of local materials, like timber was used for floors, cupboards, doors, windows, ceilings, and fascias. The timber floors reflect the woven grass mats of African huts. The darkened cypress posts and beams and the use of undressed stone in a random pattern also reflects a traditional African building technique. The narrow wall niches in some walls are also an abstraction from African tribal cultures.

Discertation applicability: *The design must adhere to the climatic conditions and the cultural context of the area.*

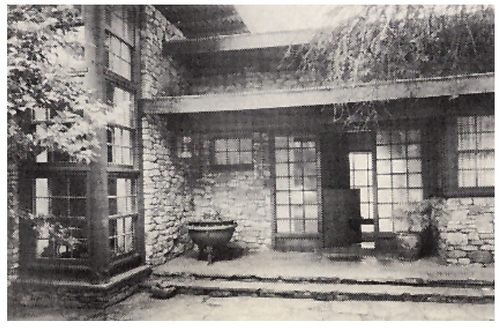


Fig. 5.5.4 Sun angle manipulation

Fig. 5.5.5 Economical space creation

Fig. 5.6.1 "Place of the Wallowing"

Fig. 5.6.2 View from river

5.6 Peter Rich
Bopitikelo Community and Cultural Centre, 2001
North-West Province, South Africa

Bopitikelo - "place of the wallowing"

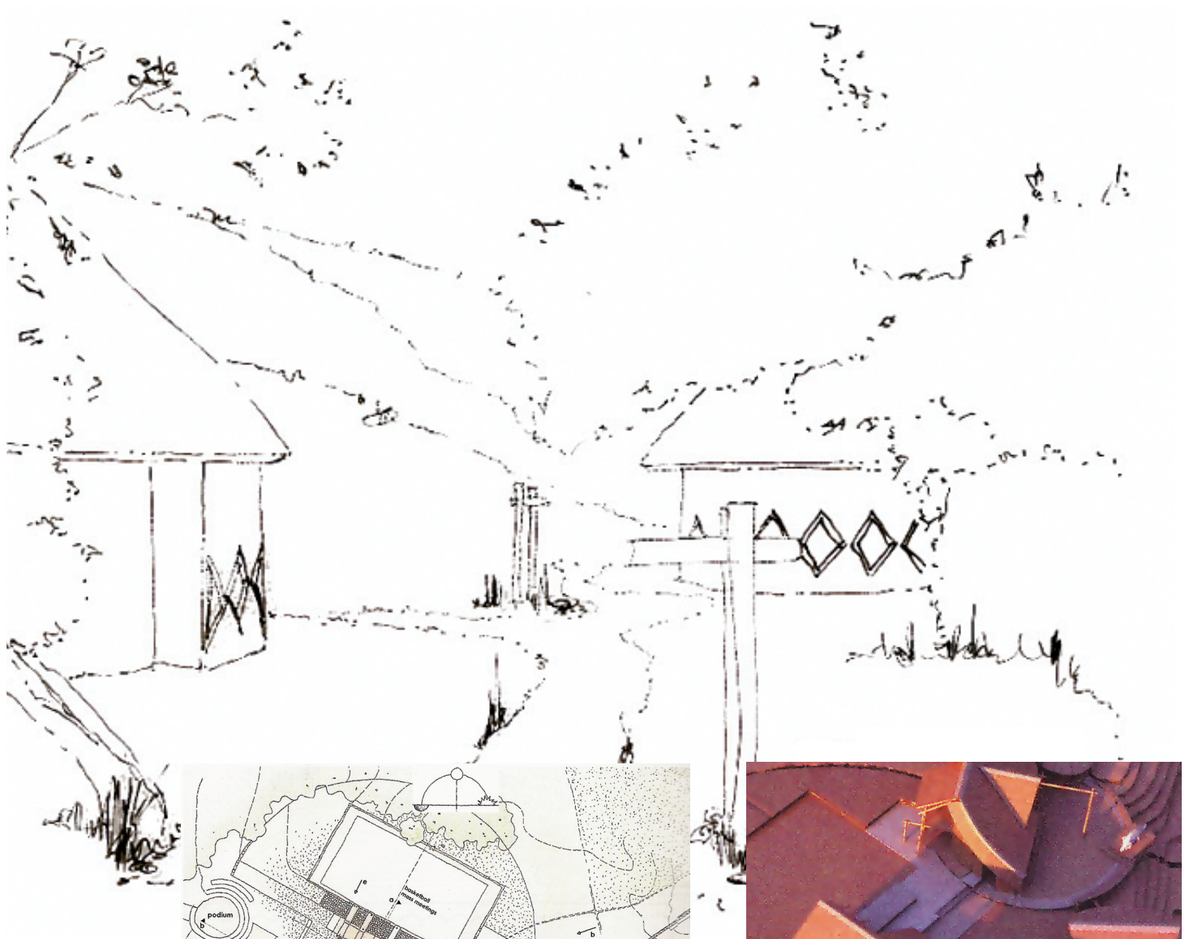
"..... with a minimum of materiality, demonstrates the ability of the architect, through design, to create a cohesive spatial, social and cultural identity." (Van Wyk, 2001:36)

The site was identified as a place where farm animals can drink and where people can rest and interact. This project (Fig. 5.6.1) is an attempt to re-install cultural pride and building tradition in a community that has lost its connections to their origin.

A collection of detached pavilions form the centre of the design (Fig. 5.6.2). Emphasis was also placed on the form of buildings and the spatial relationships between them. The proximity of the river determined the placement of the main building to capture the view of the river (Fig. 5.6.3). The long main thatched building was constructed and proportioned according to the Tswana men's initiation structures (Fig. 5.6.4). The detached pavilions define the outdoor spaces with open-ended, multi-use spaces contrasting with specific, intimate spaces. The spaces between the buildings are treated, as was traditionally done by the Tswana, as very important public spaces (Fig. 5.6.5).

African building traditions are characterised by the use of plant and earth material. Hydraform blocks (soil-cement blocks) are used for enclosure, and soil from the region was used to manufacture these blocks. Traditional thatching was used for the main building. This is a technique that has been used locally for centuries but is slowly disappearing. Local stone from the nearby mountains form paving grids that are filled with granolithic, hand-textured floors. These elements helped to define the changes of level, threshold of entry and movement patterns (Fig. 5.6.6).

Discertation applicability: *Materials that are going to be used will all be locally sourced. Construction methods must be simple in order to use local labour and not imported labour. The materials used in the design will have a huge influence on its occupants. Materials must be used honestly.*



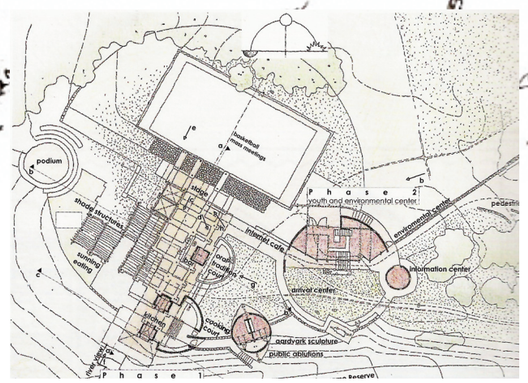


Fig. 5.6.3 Plan: Detached pavilions

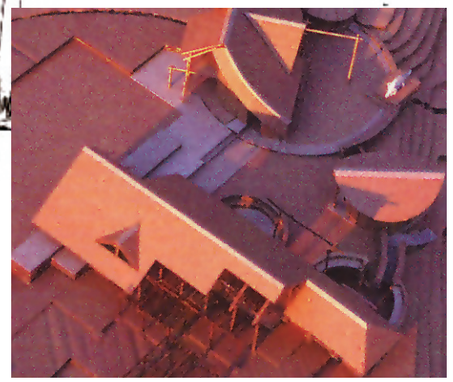


Fig. 5.6.4 Public space relations

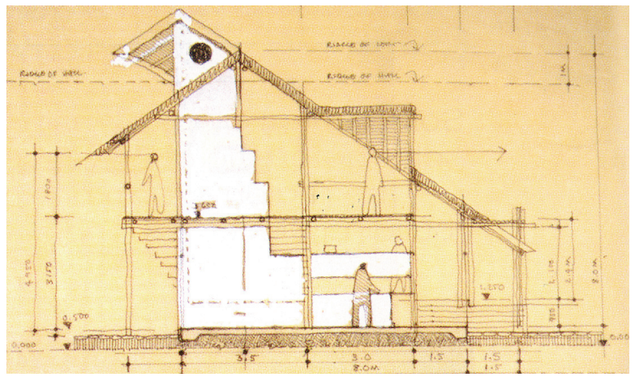


Fig. 5.6.5 Section through main building

Fig. 5.6.6 Defining space boundaries

Fig. 5.7.1 View of Kandalama Hotel

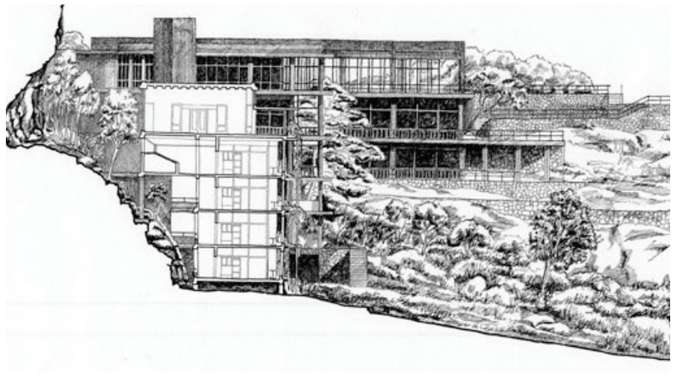


Fig. 5.7.2 Section indicating design with topography

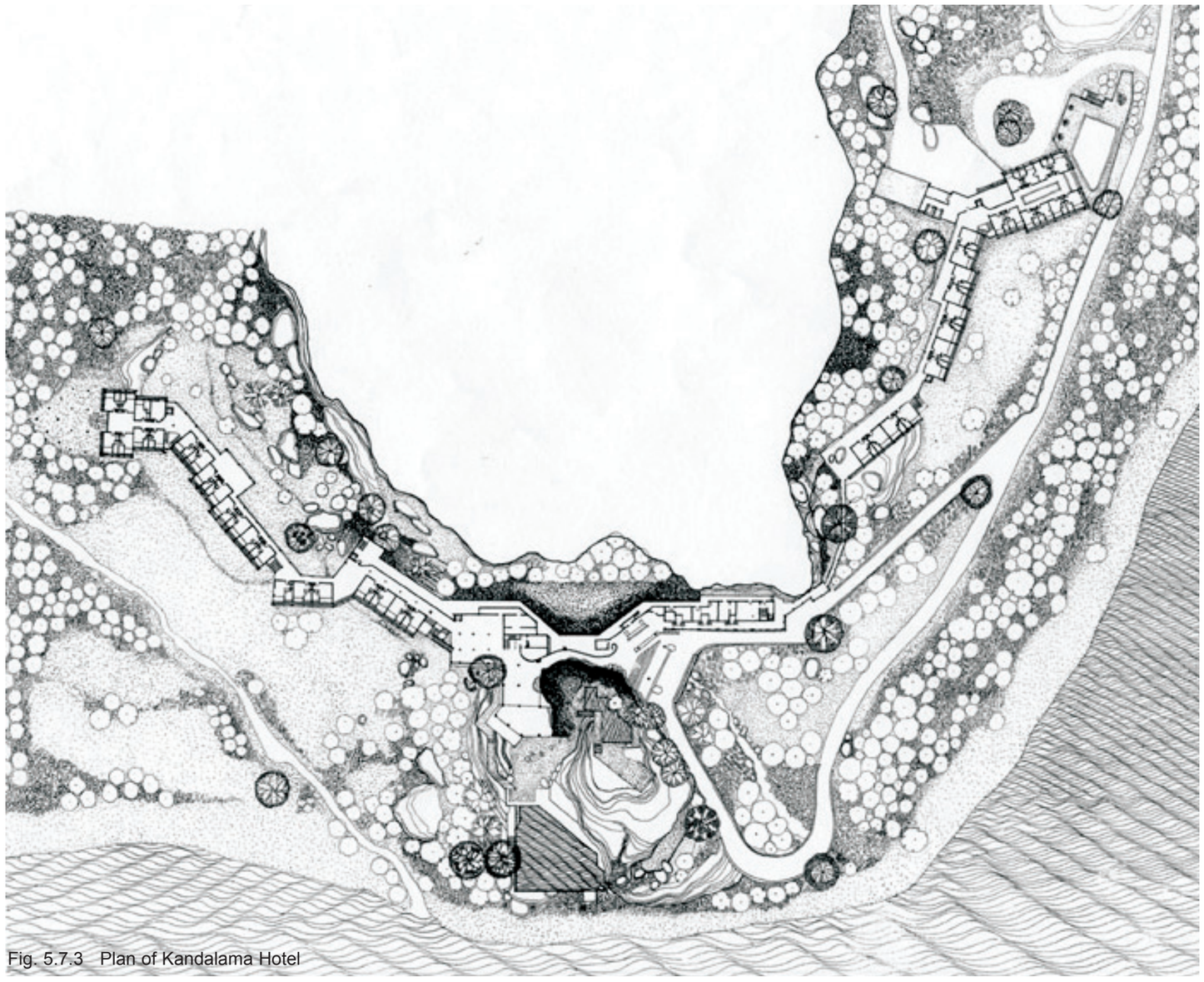


Fig. 5.7.3 Plan of Kandalama Hotel

5.7 Geoffrey Bawa
Kandalama Hotel, 1995
Kandy, Sri Lanka

The hotel is located at the crossroads of different ecological zones harboring a spectrum of wildlife in the heart of a cultural triangle. Initially the development was met with much public debate, as many people living in the relatively pristine and undeveloped region were opposed to any tourism development, as the area is one of the most significant regions of the country in terms of wildlife.

The eco-friendly Kandalama Hotel (Fig. 5.7.1) is designed in a way that compliments and enhances the natural environment, despite its size. The building follows the contours of the hill outcrop and in some cases is elevated on concrete piles allowing for existing habitat to remain (Fig. 5.7.2). Open, concrete hallways span the length of the hotel, providing easy access to amenities while providing the guest with an unprecedented view of the surrounding environment. Kitchen and service facilities are located on the hillside of the building. The concrete structure is shaded by ample wooden overhangs. Daylight design has been applied throughout the building. The concrete roof, which can absorb a large amount of passive solar energy is covered by sod with the intent of growing organic produce and insulating the structure. Main walkways are face the large lakes (Fig. 5.7.3).

The park includes a composting pit, a native tree nursery, the wastewater treatment plant, and an eco-library for employees, guests and local school children. The in-house nursery produces indigenous plants for the reforestation program that operates on the 50-acre property and areas outside. The hotel is designed into and around the surrounding rock outcrops (including pools and patios). A gravel parking area is provided but kept small and is shaded with trees. Some of the materials used in the construction were reclaimed wood products. The minimum amount of paint was used and the design included many natural materials for finishes.

Water shortages in the area were overcome by harvesting rainwater, using low flush toilets, and reusing greywater. Energy usage is decreased by using compact fluorescent lamps in all public areas. The hotel encourages the use of bicycles as transport mode and a bus provides service to travel to town and back. The Eco-Park is also used as an educational tool about the environment for local school groups. Recycling is done into 15 categories and the hotel encourages its suppliers to reuse glass bottles and jars for their products. All the locally grown food is served in the hotel's restaurant. The staff and the community are receiving environmental education that is provided by the hotel management.

Discertation applicability: *An input - output analysis will indicate the resource usage and waste generated from the development. The important resources such as energy, water and waste will be the main generators for systems adopted in the design. By designing with nature, a distinctive architecture evolves. The topography of the site provides the backdrop into which the architectural composition is perceived. .*