Chapter 3 Baseline

"... if someone thinks that wilderness landscapes are inviting, that person is more likely to engage in activities in wild landscapes ..... on the surface, attitudes were not consistent with behaviours. They do however predict a variety of social norms"
(Bell, Fisher, Baum, Greene, 1996)

Generally a positive attitude towards the environment does not ensure that an individual will consistently avoid the overuse of resources. Attitudes and norms can determine behaviour, which in turn can predict obvious behaviours. Today it is normal to express our concerns over the deteriorating environment, but our feelings concerning wetlands and pollution are not as strong as our feelings towards social norms. There is a huge difference between people that react negatively to filthy areas and overuse of resources and getting these people to do something about these issues in order for people to act on these issues, a substantial modification in behaviour needs to take place. Behaviour change is more important than physical technology in effecting solutions. The effectiveness of any physical technology depends on people's behaviour and the manner in which they use the technology.

3.1 The Ecological Footprint

3.1.1 Characterization

The Living Planet Report 2002 was published in June 2002 by the World Wide Fund (WWF). This report measures the human pressure on the earth, and is related to each country and region. The report measures the ecological footprint of the world (1999) and 146 countries whose population exceeds one million, which includes South Africa (Fig. 3.1.1.1). The ecological footprint is "a measure of the amount of the earth's biological productivity that a human population occupies in a given year" (WWF, 2002). This gives a representation of the biological productive land and water areas necessary to produce the resources consumed by a population and disposal of wastes generated.

Ten countries with largest ecological footprint and ten with smallest ecological footprint

Rank	Country	Global ha /person	Rank	Country	Global ha /person
1.	United Arab Emirates	10.13	137.	Vietnam	0.76
2.	USA	9.70	138.	Yemen	0.71
3.	Canada	8.84	139.	Myanmar	0.70
4.	New Zealand	8.68	140.	Guinea-Bissau	0.70
5.	Finland	8.42	141.	Tajikistan	0.66
6.	Norway	7.92	142.	Pakistan	0.64
7.	Kuwait	7.75	143.	Sierra Leone	0.54
8.	Australia	7.58	144.	Bangladesh	0.50
9.	Sweden	6.73	145.	Burundi	0.48
10.	Belgium	6.72	146.	Mozambique	0.47
28.	**South Africa**	**4.02**			

Fig. 3.1.1.1 Ecological Footprint Rating

3.1.2 South Africa's ecological footprint

The measure of a country's ecological footprint consists of six components, namely: the energy footprint, built-up area footprint, forest footprint, grazing land footprint, cropland footprint, and the fishing ground footprint (Fig. 3.1.1.2). The som of these components indicates the total area required to produce the resources that a country consumes has a sustainable energy usage, and allows space for its infrastructure.

3.1.2.1 Energy footprint

This is the area needed to produce the country's energy in a sustainable manner. This footprint comprises fossil fuels, biomass, nuclear energy, and hydro energy. The energy footprint is globally the fastest growing component, increasing by an average of 2.6% per year between 1961 and 1999. South Africa's energy footprint is 2.45 global hectares per person in 1999. More than double the global energy footprint of 1.121 global hectares per person. This component is the largest portion (61%) of South Africa's total ecological footprint.

South Africa's ecological footprint

Ecological footprint	Global ha/person	Biocapacity component	Global ha/person
Energy footprint	2.45	Forest biocapacity	0.56
Built-up area footprint	0.11	Grazing land capacity	0.93
Forest footprint	0.30	Cropland biocapacity	0.60
Grazing land footprint	0.27	Fishing ground biocapacity	0.23
Cropland footprint	0.66		
Fishing groundfootprint	0.22		
Total ecological footprint	**4.02**	**Biocapacity total**	**2.42**
Ecological deficit	**1.60**		

Fig. 3.1.1.2 South Africa's ecological footprint

3.1.2.2 Built-up area footprint

This is the area that is required by a country to accommodate its infrastructure for housing, transportation and industrial production. This footprint's biggest determinant is the population count. The South African built-up area footprint is 0.11 global hectares per person. This component comprises the smallest portion of the total ecological footprint.

3.1.2.3 Forest footprint

The area necessary to produce a country's forest products that they consume. The forest footprint had a growth rate of 50% over the past 38 years. The world and South African footprint are the same at 0.30 global hectares per person. The forest footprint for the average African is 0.23 global hectares, while those of a North American is 1.26 global hectares. There is a 4-fold gap between high and low-income countries.

3.1.2.4 Grazing land footprint

This footprint is related to a country's consumption of meat, dairy, hides, and wool that are produced by livestock that are not crop-fed, but occupy permanent pastures. An 80% increase from 1962 to 1999 in the grazing land footprint came at the expense of forestland. South Africa's footprint (0.27 global ha/person) is again double the global grazing land footprint of 0.12 global hectares per person. A 8-fold difference in the grazing land footprint per person of high and low-income countries is mainly due to the greater amount of meat and dairy products in the diets of higher income populations.

3.1.2.5 Cropland footprint

The cropland footprint is the area required to produce the crops that are consumed by a population. Between 1962 and 1999, the world population almost doubled, but the cropland footprint grew by less than 10%. This can be attributed to improved crop yield by means of increased irrigation and fertilizer use. A cropland footprint of 0.66 global hectares was available per person in South Africa in 1999. Compared to the rest of Africa and Asia (0.40 global ha/person), South Africa's footprint is again higher. In general, developed countries had larger cropland footprints than less developed countries. There is a 3.5-fold difference between these countries.

3.1.2.6 Fishing ground footprint

This is the area needed to produce the fish and seafood products that a country consumes. A rapid growth rate of 2.6% per year occurred between 1962 and 1999. The global fishing footprint (0.14 global ha/person) is half of the South African foot-print being 0.22 global hectares per person. South Africa is ranked 36th out of 146 countries. In this measure the country with the highest figure was Norway with a 2.62 global hectares per person.

3.1.3 Total ecological footprint

According to the Living Planet Report 2002, the South African ecological footprint was 4.02 global hectares per person in 1999. This is almost double the world average of 2.28n global hectares per person. In 1999, South Africa was ranked 28th of the 146 countries for total ecological footprint.

South Africa's biocapacity in 1999 was only 2.42 global hectares per person. This gave a deficit of 1.6 global hectares per person in relation to the ecological footprint. This is an indication of the unsustainable development that is taking place in South Africa. The human consumption is larger than what the biosphere can provide. This ecological deficit can be ascribed to two possibilities. Imported ecological capacity and the depletion of domestic resources. Importation of capacity is legitimate, but not all countries can import. The second deficit happens when resource use and waste generation exceed the domestic capacity. This results in a nation depleting their resources and accumulating their waste in the environment.

3.2 Performance Criteria (Fig. 3.2.1)

3.2.1 Social criteria

Education, health and safety

Educational facilities must be provided for the transfer of information during the construction period and when operational. Access to information on health and safety issues must be easily accessible. All materials used in construction of buildings must have no negative effect on indoor air quality.

Participation

Informal meeting spaces are provided and a sharing of facilities by staff and

visitors will facilitate in the management of the buildings and the local environment

Access to facilities
Staff must be within walking distance of necessary food suppliers and communication facilities. The project must be located in an area that needs an economic boast.

Inclusive environment
All facilities need to be accessible for both disabled and wheelchair users. Visually impaired people will need to be accompanied by an assistant.

Occupant comfort
Adequate day lighting need to be provided to minimize artificial lighting. Natural ventilation is used to keep indoor temperature between 19ºC and 28ºC throughout the year. Framing a natural view for users from their working position will add to their positive attitudes.

3.2.1 Economic criteria

Local Economy
Building methods should have a simple but efficient technology in order for local contractors to be used for construction. It is planned to utilize on site materials for 40% of the total materials used for construction. Maintenance should be incorporated to provide a constant job opportunity for small contractors in the area.

Efficiency
Buildings should be used an average eight-hour working day for minimum of 5 days a week. The buildings need to have access to Internet and telephone facilities. Material and component sizes have to be incorporated into the design to minimize wastage.

Adaptability
Floor to ceiling heights should be no higher the 3000mm with exception of certain building functions, which required larger volumes. Internal spaces need to be flexible for change in building function.

Ongoing costs
Operating costs of facilities need to be as low as possible. To achieve this goal, local manufactures of cleaning agents are used and local entrepreneurs can do maintenance. Monitoring of water, electricity and waste are done monthly.

Capital costs
The local need for employment and training should start at the beginning of the project idea and be carried out through the whole operation. The tender process has to ensure the involvement of local contractors/suppliers. A 40% share of building cost needs to be allocated to sustainable technology. Construction needs to be labour intensive and reuse of existing buildings will contribute to recycling of materials and space.

3.2.3 Environmental criteria

Water
All roof surfaces are to be used for rainwater harvesting. Runoff from paths and roads will be redirected into the natural vegetation. Water efficient taps and cleaning equipment will be specified. All grey water will be collected and recycled for agricultural irrigation.

Energy
Ventilation of buildings will be all natural systems and no mechanical systems will be allowed. No electrical heating will be used in buildings, only heating allowed will be through passive solar design. All light fittings must be high energy efficient and alternative energy sources must be utilized, wherever possible

Waste
Toxic and inorganic will be taken off-site by local entrepreneurs for recycling. All organic waste will be recycled and reused on site. Sewerage will be recycled on site and used as fertilizers. Building material waste must be kept to a minimum during construction.

Site
The allocated site must be in an already disturbed state or the impact on vegetation should be kept to a minimum. Food gardens provide for on site usage by staff and also visitors. All vegetation is kept indigenous and no green lawns planted. Vegetation must be kept as natural as possible.

Material and Components
Materials with high embodied energy must not be used, keep away from alluminium and plastics. Make use of recycled and reused materials and components for construction. The area disturbed by building process must be less than 150% of building area.

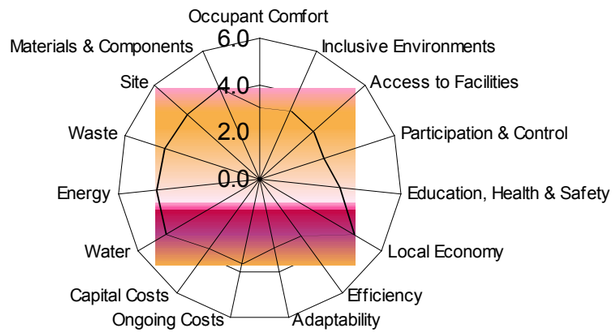

Fig. 3.2.1 Summary of performance criteria