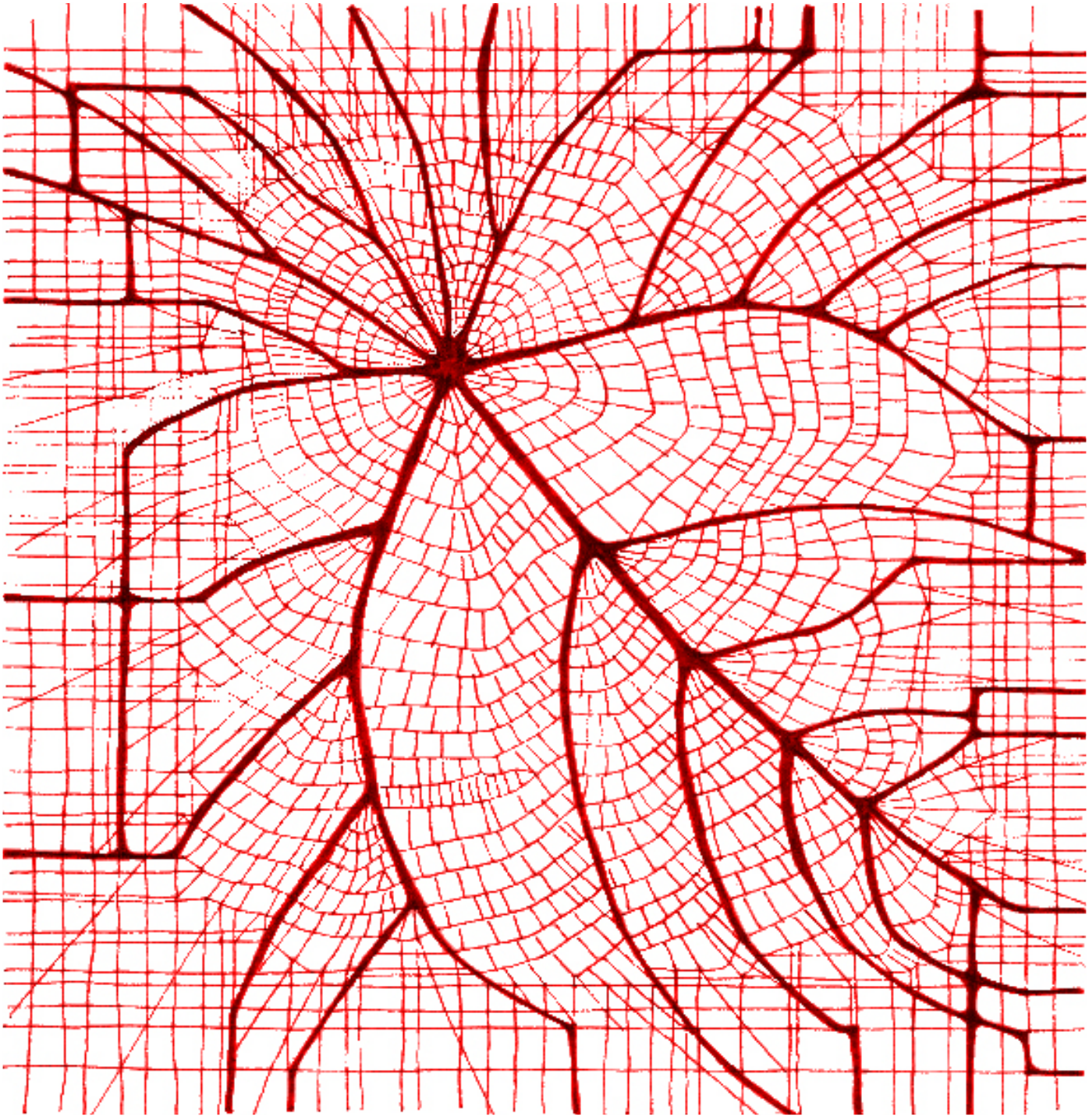
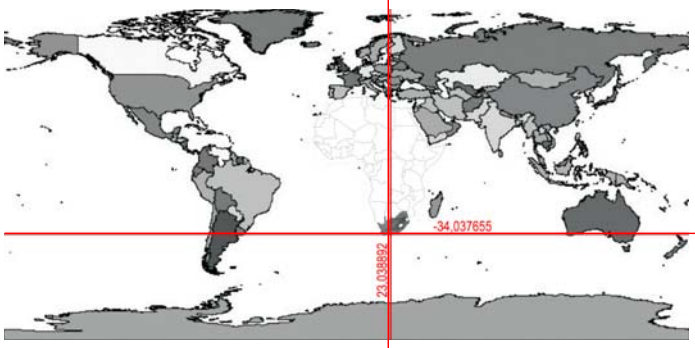


chapter 3
context analysis

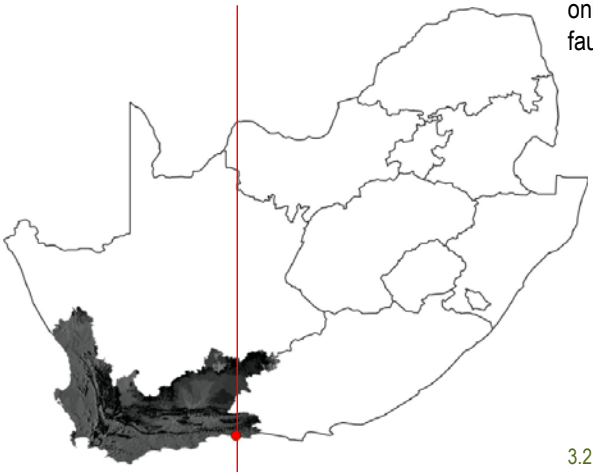
3.1.GENERAL CONTEXT DESCRIPTION



3.1. World map (Enpat 2002 & edited Howard 2005)

3.1.1. MACRO-SCALE: SOUTH AFRICA

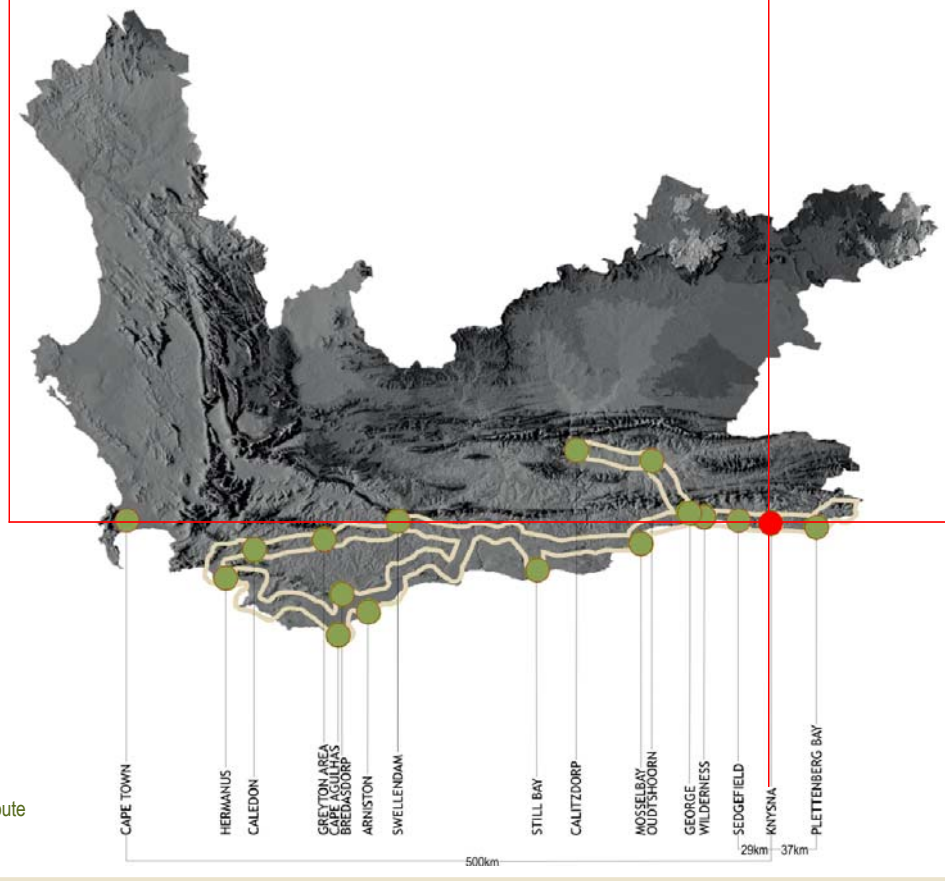
Designing within the South African environment is an exciting challenge with a diversity of factors which influence proposed interventions. Principles of the 1996 South African Constitution that are important themes of this thesis are the belief that South Africa belongs to all who live in it and that we are united in our diversity, and that we are to heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights. (Constitution of the Republic of South Africa, 1996)



3.2. South Africa (Howard 2005) and Western Cape (Enpat 2002)

3.1.2. MESO-SCALE: WESTERN CAPE & GARDEN ROUTE

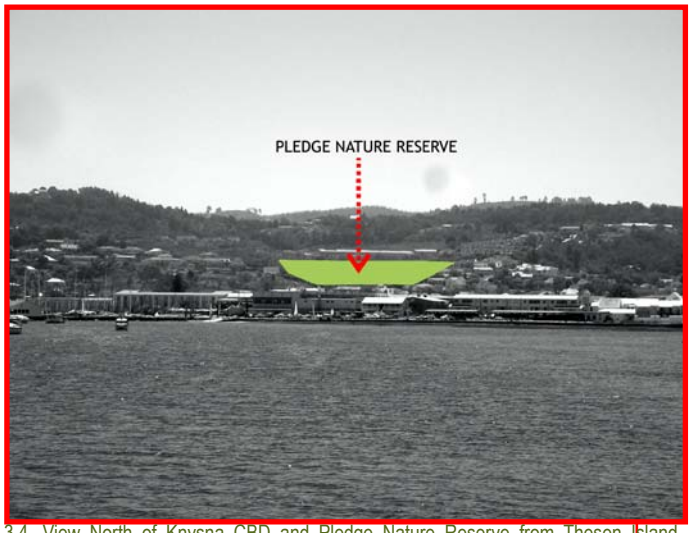
The Western Cape is characterized by a varied landscape with mountain ranges, coastal scenery, wine farms, unique floral kingdoms, and rural towns, to bustling metropolitan areas like Cape Town. (Vermeulen 1999) The province is divided into ten tourism regions, each with its own particular and unique character. One of these districts is the Garden Route, situated on a narrow coastal plain and stretching eastward from Heidelberg to the Tsitsikamma Forest and the Storms River. This area has great aesthetic value and is characterized by evergreen forests, the only natural lakes area in South Africa, long beaches and a diversity of fauna and flora. (Van Wijk 2000)



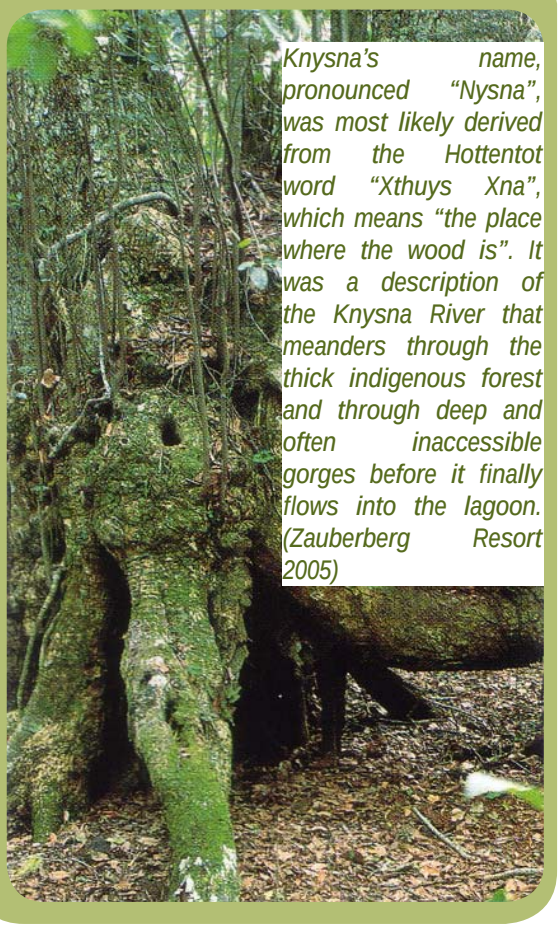
3.3. Western Cape (Enpat 2002) and Garden Route (Howard 2005)

3.1.3. MICRO-SCALE: KNYSNA

Knysna is referred to as the 'jewel of the Garden Route' and is embraced by the Outeniqua Mountains to the north and the 21 hectare Knysna Estuary of the Knysna River, and Indian Ocean, to the South. The Heads act as a striking gateway to Knysna, guarding the narrow inlet to the estuary. (Vermeulen 1999)



3.4. View North of Knysna CBD and Pledge Nature Reserve from Thesen Island (Howard 2005)



Knysna's name, pronounced "Nysna", was most likely derived from the Hottentot word "Xthuys Xna", which means "the place where the wood is". It was a description of the Knysna River that meanders through the thick indigenous forest and through deep and often inaccessible gorges before it finally flows into the lagoon. (Zauberberg Resort 2005)

3.5. A stinkwood coppicing (Nell 2005)

3.6. Knysna aerial photograph (Knysna Municipality 2000) and location of Pledge Nature Reserve (Howard 2005)

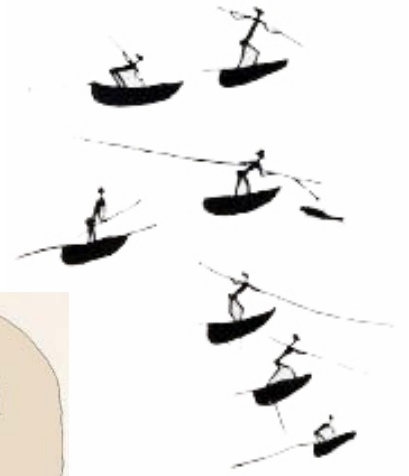
3.1.3.1. KNYSNA HISTORIC CONTEXT

The hunter-gatherer-herder communities of southern Africa inhabited the Garden Route area from the Stone Age time. The herders referred to themselves as Khoinkhoin, 'men of men', the stem Khoi is a better term to name the herders, and the herders themselves spoke of the hunters as San. (Inskeep 1978:87)

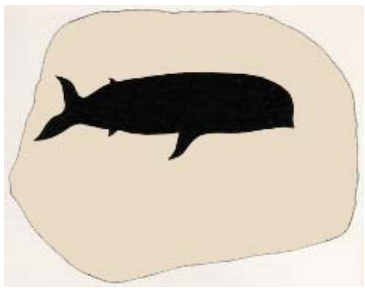
The languages of the hunters and herders incorporated a number of 'clicks' which made the tongue sound so foreign to many of the early travellers that they must often have doubted whether it was a language at all. (Inskeep 1978:86) The Khoi named a local river in the area by a word that sounded like 'Knysna' to the early Europeans. Scholars offer several translations of this Khoi term, 'place of wood, fern leaves, or, simply referring to the steep sandstone cliffs today called 'The Heads'. (Zauberberg Resort 2005)

Man as a hunter lived in the landscape like any other animal; he drew sustenance from it and returned a little to it including, in due course, himself. He cannot properly be understood except in relation to the environment in which he lived. (Inskeep 1978:16) He lived in absolute harmony with nature, only using resources when necessary. Man as the herder did manipulate and modify his environment, but his scope for doing so was limited by what nature provided (Inskeep 1978:16); therefore he also lived in harmony with his environment and his takings did not exceed his basic requirements for survival. Both groups were able to obtain enough nourishment for their support without destroying that on which they depended. These human social groups were able to survive because they achieved a state of equilibrium within their environment. (Inskeep 1978:104)

3.7. A sketch done by Samuel Daniel in 1851 of Bushmen armed for an hunting expedition (Wilson & Thompson 1982)



3.8. Khoi-San painting of fishermen (Inskeep 1978)

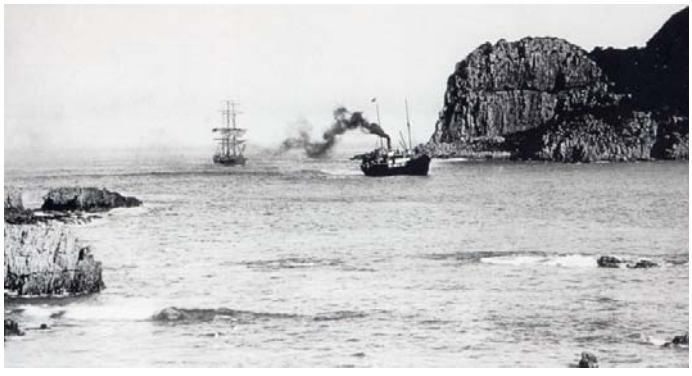


3.9. A Khoi-San painting of a whale on a water-worn block of stone (approximately 300mm long) from a coastal cave near Knysna (Inskeep 1978)

The 18th Century saw the destruction of this equilibrium with the settlement of Dutch colonialists. The Khoi-San scattered under this intrusion and were displaced to the less pleasant and unwanted remoteness of the Kalahari. (Inskeep 1978:86) The Dutch settlers went about annexing land in this beautifully lush area, and created farms around the available resources.

The natural forests near Cape Town were all but denuded by timber demands for ships and wagons by the 1770's, and a keen interest in Knysna's forest timber supplies developed. The timber trade also attracted many farmers as it provided a more reliable form of income. By the end of the 18th Century there were about twelve dwellings between George and Knysna. At this time George Callander was sent to investigate the possibility of shipping timber from Outeniqualand. He was the first European to settle at the Knysna Heads. (Nell 2005)

In 1804 George Rex, a timber merchant and the presumed bastard child of King George III and a Quaker named Sarah Lightfoot (Phantom Forest Eco Reserve 2005), purchased the farm Melkhoutkraal, effectively taking ownership of all the land surrounding the lagoon. (Tiscover AG 2005) This leading landowner, timber dealer and agriculturist was described as the 'Founder and Proprietor' of Knysna on his gravestone and it was largely due to his persistent representations that the Knysna Estuary was opened as a harbour in 1817. (Ukubona Development 2005) Naval and commercial ships brought supplies into the area and later timber was shipped out of the area. Hundreds of ships used the port of Knysna between 1817 and 1954, after which it was deproclaimed. (Nell 2005)



3.10. The SS Agnar tows an unknown sailing ship into Knysna Harbour in 1910. The first ship to enter the Heads, the Emu, struck a submerged rock on 11 February 1817 (Nell 2005)

3.11. Knysna Main Road in 1933 (Nell 2005)

3.12. Gold miners in the 1880's (Nell 2005)

3.13. The bridge over the Knysna River was completed in 1895, but was later washed away during a flood (Nell 2005)

3.14. Master Road builder Thomas Bain completed 24 passes in his career, including the Prince Alfred's Pass, built from Knysna to Avontuur (near Uniondale between 1860 and 1867). Among other major roads and passes he built were the old road that links George to Knysna (1867-1882) (Nell 2005), the old road between Knysna and Humansdorp, the Bloukrans and Storms River passes (1879-1885), the road through Baviaanskloof (1880-1890) and the Swartberg Pass (1883-1887) (Nell 2005)

In 1870 Arnt Leonard Thesen and his family moved from Norway to Knysna and set up the first trading store and counting house. A gold nugget was found by James Hooper in a river bed on his farm Ruigtevlei in 1876, and due to its significance the authorities made a grant for further prospecting. 1881 saw the settlements of Melville and Newhaven united to form the town of Knysna. (Tiscover AG 2005)

In the 1880's George Parkes, an industrialist from England purchased over 3,400 hectares of Knysna forest to provide a source of wood for his factory which was producing edge tools. He established the first primitive sawmill in the forest and a mill conveniently situated in the centre of Knysna. (Tiscover AG 2005)

In 1885 the search for gold recommenced in the Karatara River after years of postponement and this proved to be a successful venture. Many fortune seekers descended on the Millwood Area over the next 10 years, until it ceased to be a lucrative operation. (Tiscover AG 2005) In 1904 Charles Wilhelm Thesen bought Paarden Island, part of the Melkhoutkraal Estate, and began processing timber on the island (now Thesen Island) in 1922. (Tiscover AG 2005)

For 200 years woodcutters eked out an existence in the forests. Many built wood and corrugated iron shelters up in trees near their working places at the time, as a precaution against elephants. By 1900 there were about 1400 woodcutters. The forests were closed in 1939 to protect them from being completely denuded and the Woodcutter Annuity Act was passed, entitling the woodcutters to be pensioned off. (Nell 2005)

Following the 1994 elections, Knysna, like the rest of the country, experienced socio-cultural rejuvenation. The Knysna community became more diverse due to the increased migration of the Xhosa culture to the Western Cape from the Eastern Cape. Although these individuals moved into this area, there was no strong economy to support them, but this is improving as time passes, especially with the great building boom which seems to be never-ending.

The building boom has direct and problematic impacts on the natural environment of the region, as the urban sprawl of informal townships, as well as high-value residences, negatively affects the preservation of this environment's ecological character.

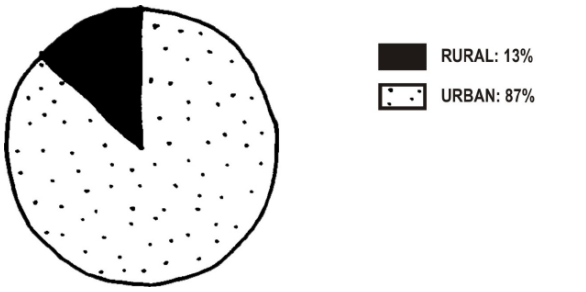
Yet again we are reminded that the three environments, socio-cultural, economic and ecological, are closely connected and have an over each other.

History should guide us in making decisions about present and future development. We should learn from previous mistakes, and successes with reference to the built environment, and the way in which humans approached the landscape in which they lived and worked.

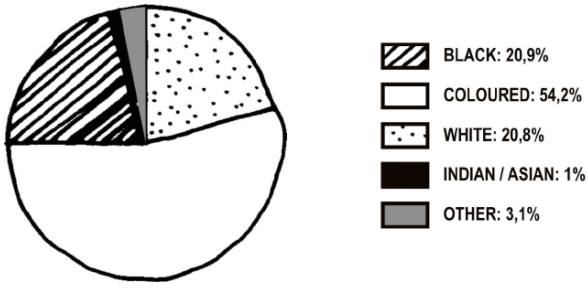
3.2. SOCIO-CULTURAL ENVIRONMENT

3.2.1. POPULATION STRUCTURE

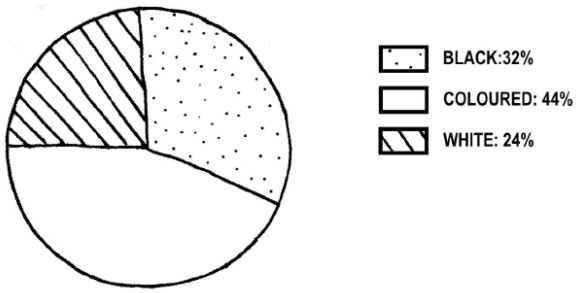
South Africa's population was estimated to be 46.6 million in the Mid-year population estimates 2004 (Statistics South Africa 2004), with approximately half of the population living in urban areas, while the rest live in the non-urban, rural areas of the country. (Vermeulen 1999) The population growth rate is 1.9%, and although this has been declining steadily over the last few years, the total population will continue to increase. The government's Reconstruction and Development Programme aims for 2.1% fertility by 2010, 1.9% population growth, and stabilisation of the population at 80 million by 2100. (DEAT 1999)



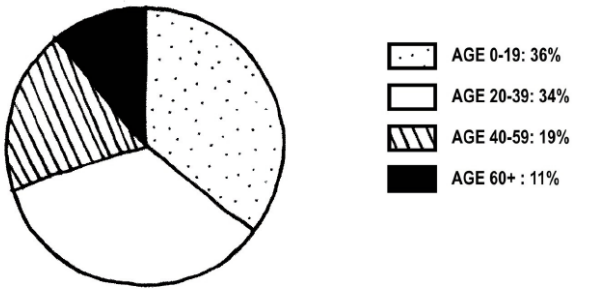
3.15. Western Cape Province population location (Vermeulen 1999)



3.16. Western Cape Province population groups (Vermeulen 1999)



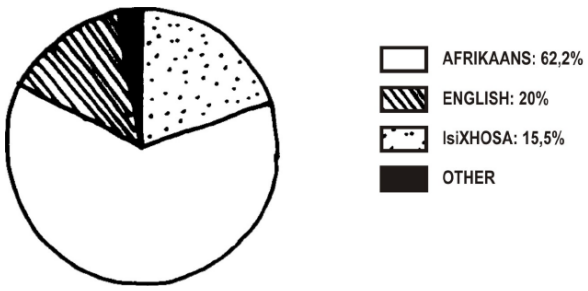
3.17. Knysna population groups (South African Statistics Council 2001)



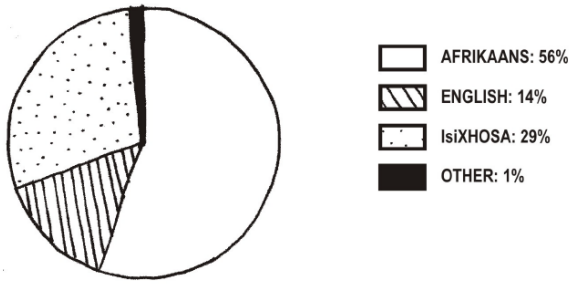
3.18. Knysna age groups (South African Statistics Council 2001)

3.2.2. LANGUAGES

Of South Africa's eleven official languages the principle languages of the Western Cape are Afrikaans, English and isiXhosa (Vermeulen 1999) In Knysna the majority of the population's first language is Afrikaans, spoken primarily by the Coloured and White inhabitants, followed by isiXhosa, spoken primarily by the Black inhabitants, and then English which is spoken primarily by the White inhabitants. (South African Statistics Council 2001)



3.19. Western Cape Province languages (Vermeulen 1999)



3.20. Knysna languages (South African Statistics Council 2001)

3.2.3. RELIGION

No government restrictions exist with regards to religion in South Africa. The Christian faith is predominant in South Africa while traditional African beliefs remain important, especially in rural areas. The Hindu and Islam beliefs are equal amongst mainly the Asian communities, with the Islamic community growing rapidly. (Burger 2004)

3.21. The original Anglican Church in Main Road which was the first church to be built in Knysna (1849-1855) (Howard 2005)

3.22. The Holy Trinity Church at Belvidere, consecrated on 5 October 1855. (Howard 2005)

3.2.4. CULTURE

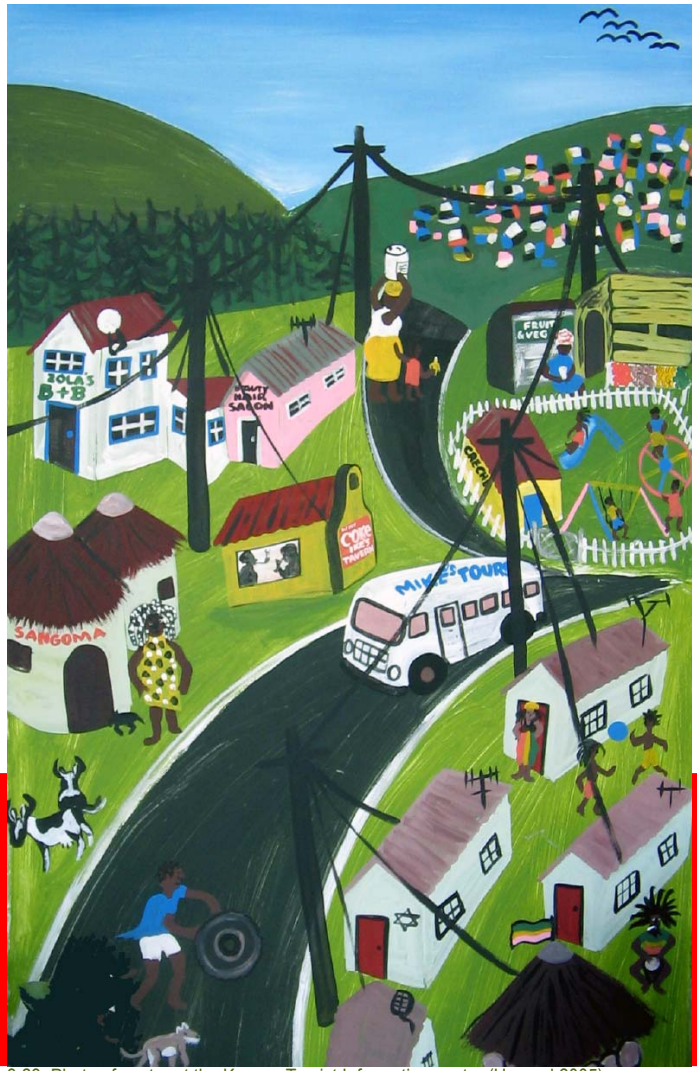
The cultural landscape of South Africa consists of a fascinating mix with African, Eastern and Western influences reflected in most areas of society. (Vermeulen 1999) According to The Constitution of South Africa everyone has the right to freedom of expression, which includes freedom of artistic creativity. (Constitution of the Republic of South Africa, 1996: Section 16.1.c)

The aim of the Cultural Industries Growth Strategy, established by the Department of Arts and Culture and the Department of Trade and Industry, is to enhance the potential of South African cultural industries to contribute to job and wealth creation. The key recommendations were: (Burger 2004)

1. developing education and training opportunities
2. increasing local and international demand for cultural products
3. encouraging the industries to work together
4. generating information
5. continuing to raise the profile of the cultural industries in the media and in government departments

3.24. Photo taken of a signboard of cultural events in the Knysna Tourist Information centre (Howard 2005)

Due to its great scenic beauty, Knysna has become a natural drawcard for aspiring artists, sculptors and photographers. Many professional artists have also settled in the town (lucrative trade of local and overseas clients). The Knysna Arts Festival is held annually towards spring, attracting budding artists from all over the country. At least four permanent art galleries are found in Knysna, and another four arts and crafts markets are held in and near the town on a weekly basis – an indication of the supply and demand of arts and crafts in Knysna. (Nell 2005)



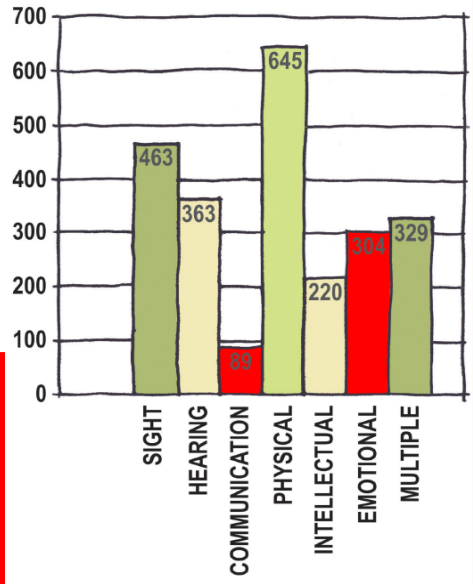
3.23. Photo of poster at the Knysna Tourist Information centre (Howard 2005)

The community of Knysna is viewed as vibrant, active and eccentric, and it is believed that it is culturally pro-active and healthy. Although a number of cultural and social groups exist within this region, a definite lack of community integration is experienced and the town is still characterised by a certain degree of separatism and racial disdain. An attempt should be made to unite the community to create better relationships and inter-cultural understanding and acceptance.

3.2.6. DISABILITIES

According to the 2001 Census approximately 5% of the recorded community of Knysna has a disability of some kind. It is important to take this portion of the community into consideration during planning and design phases.

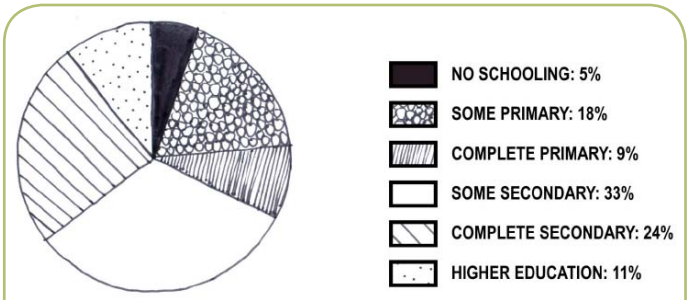
25. Take disabled persons into regard at all times of the project progress (Imagebank & edited Howard 2005)



3.26. Persons with disabilities in Knysna (South African Statistics Council 2001 & Howard 2005)

3.2.7. EDUCATION

According to The Constitution of South Africa everyone has the right to a basic education, including adult basic education; and to further education, which the state, through reasonable measures, must make progressively available and accessible. (Constitution of the Republic of South Africa, 1996: Section 29.1.a,b), and everyone has the right to establish and maintain, at their own expense, independent educational institutions that do not discriminate on the basis of race; are registered with the state; and maintain standards that are not inferior to standards at comparable public educational institutions. (Constitution of the Republic of South Africa, 1996: Section 29.3.a,b,c)

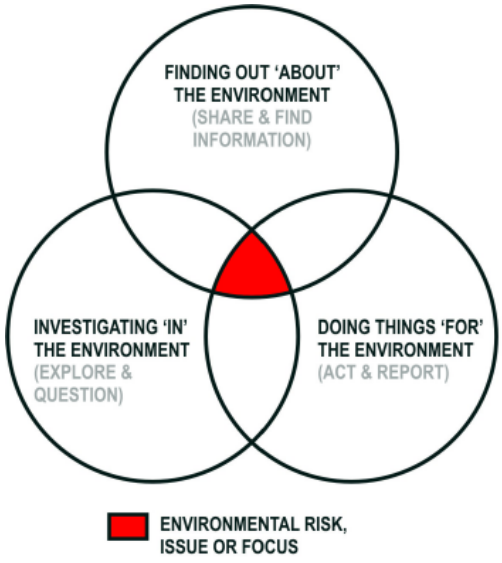


3.29. Knysna education statistics (South African Statistics Council 2001)

The last eleven years has seen a great growth in the number of schools and the size of the schools in the Knysna region. Still a lack of education amongst the community is a powerful social problem, and should be approached within the development framework.

Environmental education has become an increasingly important facet of the South African Educational System and is being integrated into a number of facets of learning. Within our changing global circumstances it is essential that children, as well as adults, are exposed to the various facets of our socio-cultural, economical and ecological environments. An increased knowledge of the environment we live in will aid in awareness, responsibility and therefore improve sustainable living.

Environmental education processes have much in common with outcomes-based education. Both encourage active learning in local environments and the developing of skills, understanding and values in real-life contexts. Cross-curricular learning has always been a feature of envrionmental education processes. Similarly, Curriculum 2005 encourages teachers to make links between Learning Areas. The Education Department, in collaboration with the Departments of Environmental Affairs and Tourism (DEAT) and Water Affairs and Forestry (DWAF), is developing a National Environmental Education Programme (NEEP) to promote environmental learning in schools. The NEEP Active Learning Environment model (below) shows how education processes 'in, about and for' the environment can encourage active learning. (BEEP 2000)



3.27. The NEEP Active Learning Environment model (BEEP 2000 & edited Howard 2005)


3.30. Art work by a Grade 4 student (BEEP 2000)

3.28. Painted walls at Knysna Primary School (Howard 2005)

3.2.8. SPORT AND RECREATION

The result of cooperation between Recreation South Africa, the South African National Recreation Council and the SRSA is the development of the South African National Games and Leisure Activities (SANGALA) Programme. The programme was launched in February 1996 to involve South Africans in healthy recreational activities in the nation-building process. (Burger 2004)

SANGALA consists of the following: (Burger 2004)

1. Community: Targeting the broad community without any differentiation in age or status
2. Training: Specialising in the training of community recreational leaders
3. Corporate: Aimed at middle and senior management in both the private and public sectors
4. Senior: Encourages physical activity among seniorcitizens. More than 200 000 senior citizens participate annually in this project
5. Street: A life-skills project for homeless children
6. RecRehab: A project for the rehabilitation of youth and women in prisons, and trains leaders to present recreational activities in prison

Prominent recreation in Knysna is generally associated with the active tourist industry. Fishing, boating, exploring, snorkelling and scuba-diving, birding, hiking and playing golf are some of the popular recreational activities of this town. A part of the annual Oyster Festivel (July) in Knysna includes sporting events and competitions such as angling, cycling and mountain bike tours, bowling, golf days, fun runs, marathons, cross-country and the street mile, canoe races, and the outdoor adventure exposition.

Sports and recreation areas in Knysna include:

1. The school sports grounds which are well-used and maintained
2. The Knysna sports grounds which are poorly maintained and not well-used due to lack of accessibility
3. A well-utilised sports field in the northern black suburb
4. Lagoon walkway which has moderate use, with safety and security as an issue
5. Pledge Nature Reserve which, due to its lack of accessibility and the safety issue, is not well-utilised

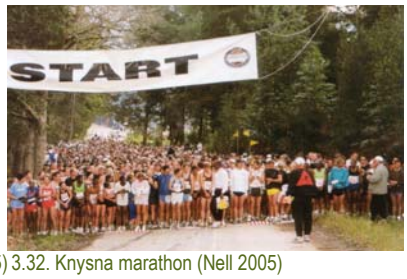
Knysna has no park or open space system in which the community can gather for informal recreation which is not primarily driven by tourism and economic gain.

3.34. Sports grounds at Knysna Primary School (Howard 2005)

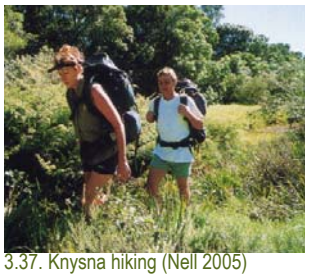
3.35. Sports field in the Northern township suburb of Knysna (Howard 2005)

3.36. Poorly maintained and inaccessible Knysna sports grounds (Howard 2005)

3.31. Oyster Festival sign (Nell 2005)

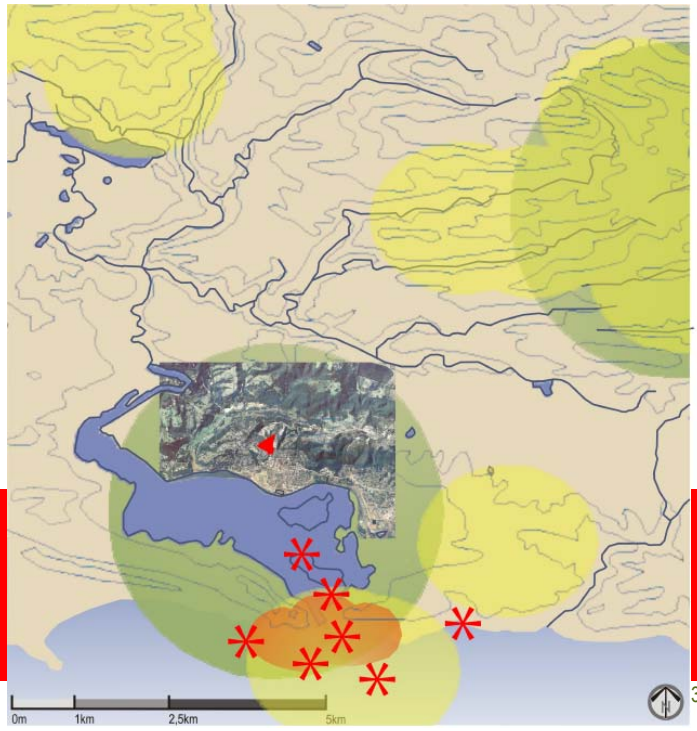


3.32. Knysna marathon (Nell 2005)



3.37. Knysna hiking (Nell 2005)

3.38. Recreational, tourist boat trips (Nell 2005)



3.33. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)

3.3. ECONOMIC ENVIRONMENT

3.3.1. MACRO SCALE GENERAL OVERVIEW

The economy of South Africa was originally built on natural resources, with mining and agriculture the mainstays of the Gross Domestic Product. Recently, however, there has been a shift from production towards manufacturing. (DEAT 1999) The recently completed South African National Land Cover Data Set estimates the largest land use to be agriculture (86% mostly natural veld with about 12% cultivated). Urban and industrial land uses comprise 1.4%, forestry comprises 1.5%, and conserved areas 6%. As at 1996, there were 422 protected areas, made up of national parks and provincial reserves with a total area of 6.7 million ha (Kumleben et al. 1998). If the large Kruger National Park and Kalahari Gemsbok Parks are excluded, only 4 % of the surface area of South Africa is formally protected. (DEAT 1999)

3.3.1.1. EMPLOYMENT AND SKILLS DEVELOPMENT

Employment and skills development continue to be high on the Government's agenda. In June 2003, at the Growth and Development Summit, government, business, trade unions and community leaders agreed on a range of programmes and initiatives designated to create jobs, reduce unemployment and further boost skills development. (Burger 2004)

3.3.1.2. EXPANDED PUBLIC WORKS PROGRAMME

The aim of the EPWP will be to facilitate and create employment opportunities for the poor and vulnerable, through integrated and co-ordinated labour-intensive approaches to government infrastructure delivery and service provision. (Burger 2004)
The objectives of the EPWP are: (Burger 2004)
1.Job creation
2.Poverty alleviation
3.Investment in social and economic infrastructure
4.Human resource development through the training of participants

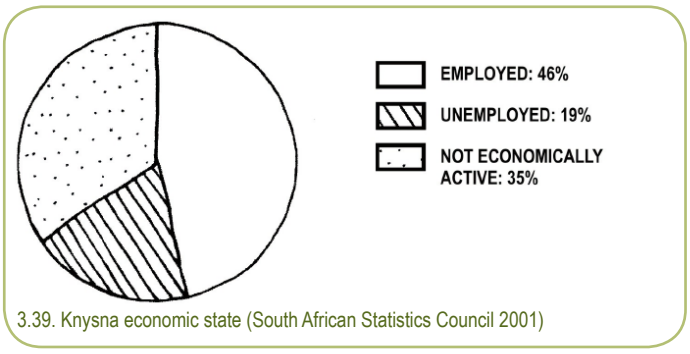
3.3.2. MESO SCALE GENERAL OVERVIEW

Unemployment has become a critical problem in the Garden Route region as the farming and forestry industries no longer support the growing population of poorer communities as they used to. The lack of jobs has been exacerbated in recent years by a steady influx of 'immigrants' looking for work. Although there is a widespread belief that these newcomers are from Malawi, Zimbabwe and Mozambique, the reality is that the vast majority come from Fort Beaufort, Humansdorp and other Eastern Cape towns whose depressed economies also offer few opportunities for work. (Vacation Technician 2005)

3.3.3. MICRO SCALE GENERAL OVERVIEW

Knysna has grown from a little coastal village to a fully fledged developed town with almost every conceivable amenity. Businesses have boomed and the town has a firmly established industrial sector, a local brewery and a yacht factory. In the wake of its development, golf courses, bed-and-breakfast establishments and various tourist-related businesses have mushroomed. Construction businesses are booming and the price of real estate is soaring in a hitherto unknown sense of prosperity as one development after another gives rise to yet another suburb and more employment. Due to its proximity to the indigenous forest, Knysna has some of the finest wooden furniture manufactured from stinkwood, yellowwood and other timber. Where its economy was once almost entirely tourist-related, Knysna now has a far more permanent, solid economy to carry it through the year. (Nell 2005)

Even though the economy has boomed to such an extent more than half of the community is still unemployed or economically inactive. Due to this economic stagnancy issues of homelessness, poverty and other related effects are evident



3.39. Knysna economic state (South African Statistics Council 2001)

3.40. The active tourism industry in Knysna is represented in this image (Howard 2005)

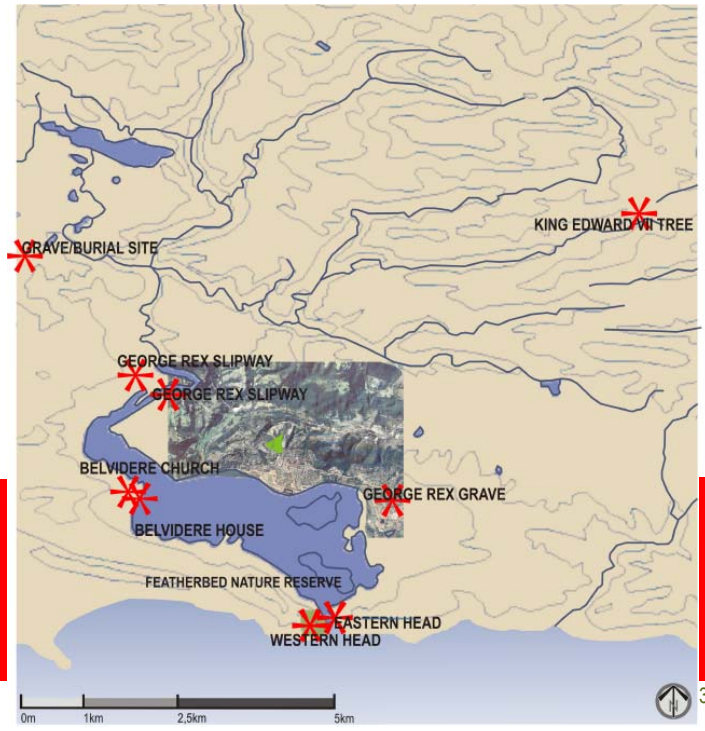

3.41. Homeless individual in Anglican Church grounds (Howard 2005)

3.3.4. TOURISM

South Africa is one of the fastest-growing tourism destinations in the world, with 6,4 million tourists visiting the country during 2002. Overseas arrivals increased by 20,1% (just over 1,8 million people) during 2002. (Burger 2004) An increasingly popular segment of the South African tourism industry is Eco-tourism, as it unlocks the natural and cultural assets of the environment to the visitor, and generates foreign exchange for the promotion and conservation of the country's ecological resources. Eco-tourism includes bird-watching, nature photography, hiking and mountaineering, visits to cultural heritage villages and site of San rock art. (Vermeulen 1999) Cultural tourism is another fast growing form of tourism, estimated at approximately 10% growth per annum. The SATOUR survey in 1997 showed that 21% of overseas visitors were interested in South Africa's cultural attractions, these attractions composed of 42% historical sites, 38% museum or art gallery, 27% cultural village and 17% theatre. (Vermeulen 1999)

Tourism is the most viable industry for the Garden Route and should be stimulated as much as is environmentally acceptable. A well-preserved natural environment forms the backbone of this tourism industry and therefore to secure its future, there is a need to maintain this environment. It is essential that the development of this industry involves employers and employees from within local communities, therefore aiding in the improvement of the region's economic state. (Vacation Technician 2005)

3.42. The Kaaimans railway bridge which is a popular image of the Garden Route Tourism region (Howard 2005)



LEGEND: KNYSNA REGION CULTURAL & HERITAGE SITES

- CULTURAL SITE
- ECOLOGICAL HERITAGE SITE
- PLEDGE NATURE RESERVE
- 100M CONTOURS

3.43. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)

Come the season, and more specifically December, Knysna bursts at its seams, more than doubling its population for three weeks. The main road through town was not designed for the traffic at this time of year, and congestion is a daily issue. It is a time of insanity for many. Some business turnovers quadruple, while others shut down for the season. Expenditures soar in the brief season and many locals stay out of town due to the inevitable traffic jams as the masses descend upon Knysna. There is a brief respite over Christmas, then momentary madness over the New Year and almost exactly one week later, the sudden, relative silence of the new year that Knysna is about to face. (Nell 2005)

3.44. Knysna voted as most popular town for two years (Nell 2005)

Tourist attractions of Knysna include festivals such as the Oyster festival which is an event of sport and leisure in July and the Pink Lourie festival which is a gay festival in May, visits to beaches such as Buffels Bay, Goukamma, Brenton-on-Sea, Noetzie, Bollard's Bay, scuba or snorkelling at the Heads, cruises on the lagoon, visits to Nature reserves (Featherbed Nature Reserve), adventure centres, cultural visits to memorial sites like Georege Rex's Gravesite, churches and art galleries. (Nell 2005)

3.4. ECOLOGICAL ENVIRONMENT

3.4.1. GENERAL INFORMATION

According to The Constitution of South Africa everyone has the right to an environment that is not harmful to their health or well-being; (Constitution of the Republic of South Africa, 1996: Section 24.a) and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. (Constitution of the Republic of South Africa, 1996: Section 24.b:i,ii,iii)

MacDonald states that virtually all ecosystems in South Africa have been modified or transformed by human activities. These transformations and modifications include areas placed under cultivation for commercial crops or subsistence agriculture; overstocking, overgrazing and poor land-use management; deforestation for commercial timber production; the invasive spread of alien plants; urbanization and settlements; the impoundment of rivers; mining; transportation; industrialisation and subsistence and commercial harvesting of indigenous plant products. (DEAT 1999)

The Garden Route is literally being loved to death by an ongoing influx of home-owners, all of whom hope that the development will cease once they have secured their bit of paradise, and it is noted that some towns are just a generation away from being overcome by environmental problems usually associated with big cities, namely water shortages, the mushrooming effect of informal settlements, poor water quality and loss of natural open space. Rapidly expanding development projects include golf course estates, new residential suburbs, commercial areas as well as informal 'townships', and even though these townships do not waste as much water as the golf courses or create as much rubbish as the richer suburbs, they still place a tremendous amount of pressure on the environment. (Vacation Technician 2005)

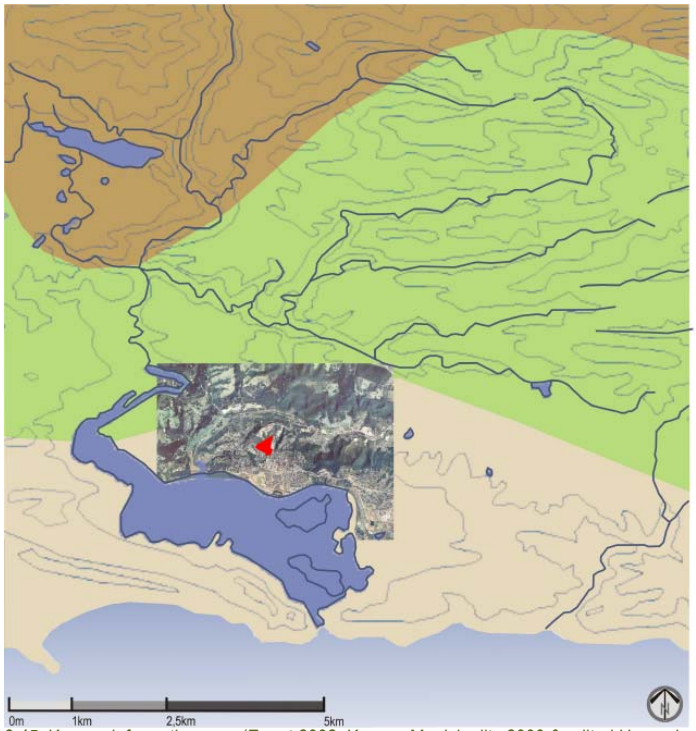
3.46. Sketch of 'The Heads' by Adelai Hodgson (Allanson et al 1993)

3.4.2. ABIOTIC CHARACTER

3.4.2.1. TOPOGRAPHY

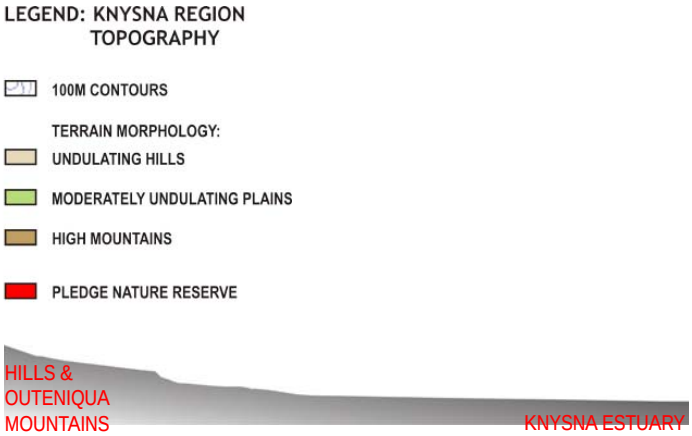
South Africa has an area of 1 219 090 km² with a coastline of approximately 3000 km, and is characterized by three broad topographical regions, namely the narrow coastal strip, the large inland plateau and the escarpment (impressive mountain ranges and hills, dominated by the Drakensberg Range). (Vermeulen 1999)

Knysna's altitude stretches from 0-150m above sea level. Knysna is composed of a variety of landforms, ranging from gentle slopes to cliff structures such as the well known 'Heads'. The Western Head is largely undeveloped (Featherbed Nature Reserve) and the Eastern Head is predominantly developed by luxury houses.



3.45. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)

3.47. View of Knysna 'Heads' (Howard 2005)



3.48. Typical section through Knysna - topographical variation (Howard 2005)

3.4.2.2. GEOLOGY

The diversity and richness of mineral deposits of South Africa (including coal, iron, copper, gold, platinum) were the catalyst for European colonisation, and economic development. Although these are distributed across the country, the most economically important deposits (gold, coal and platinum) are found in Gauteng Province, which is now the most populous, and affluent area. (DEAT 1999)

The Knysna Heads, cliffs and hills to the east are part of the Table Mountain rock formation and consist of immense portions of medium- to coarse-grained sandstone, which is an important class of sedimentary rock, consisting of consolidated deposits of predominantly sand-sized, quartz-rich grains, cemented by various materials, including silica and calcium carbonate. (Nell 2005)

The oldest rocks in region, Precambrian (2500 – 4600 million years ago), occur near the Outeniquas, and consist mainly of twisted bands of schist, phyllites and feldspathic quartzite typical of the Kaaimans Formation. (Nell 2005) To the west the formations merge with gneissic granite. (Nell 2005) Along the coast a number of instances of a Pleistocene sequence of high littoral terraces (ancient shoreline) can be found at altitudes ranging from only 5m to 60m above sea level. The oldest of these is the pro-Formosa shoreline, which is situated between 57m to 63m above sea level at the base of the Brakkloof Formation. Next in the sequence a 30m shoreline predominates in a number of places, particularly at Robberg. Along the eastern side of the Knysna estuary are traces of another shoreline about 15m to 20m above present day levels. Yet another ancient shoreline is discernible on an erosional bench on the western side of the estuary 4m to 6m above present day levels. (Nell 2005)

3.4.2.3. SOIL

South African soils are generally thin and moderately fertile. This has contributed to agricultural development, although some areas are marginal, and suffering from degradation and soil erosion. (DEAT 1999)

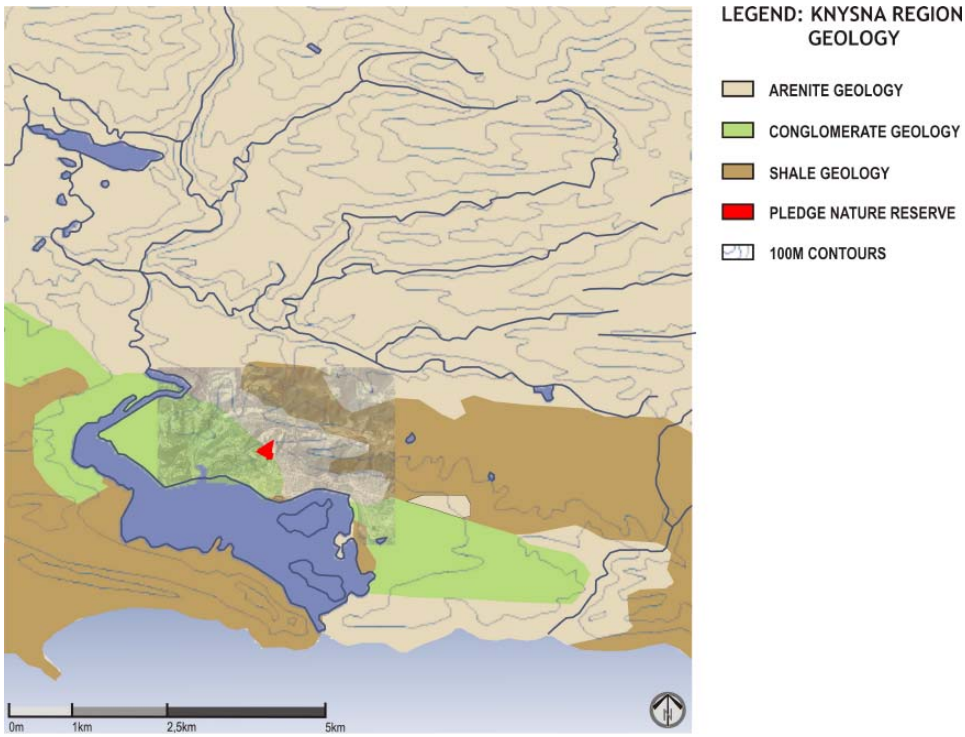
Three distinctive soil categories have been distinguished in the Knysna region:

1. Youthful, shallow, azonal soils with partially developed horizons
2. Brown and grey soils formed under present conditions
3. Palaeosols – ancient relics from the past that include laterites, a red clay formed by rock decay

Soils are generally acidic, with a pH between 4,5 and 5,5. Azonal soils occur on all steep slopes, on recent dunes and particularly in wetlands. They are sandy in texture and relatively shallow, with a maximum depth of 30m. Part of the wetlands where layers of silt have repeatedly laid down have developed deep, dark, organic-rich soils. The young brown and grey soils presently being formed are most abundant on the forested areas of the foothills. (Nell 2005)

3.50. Natural rock arch (Nell 2005)

At the heads and near Keurboomstrand (east of Plettenberg Bay), Spectacular arches and caverns have been carved into the sandstone formations by wave and wind erosion over millions of years. Many of these arches and caves provided shelter to Strandlopers who lived on what they could collect from the shores in ancient times. (Nell 2005)



3.49. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)

3.4.2.4. HYDROLOGY

The most limiting natural resource of South Africa is water. Most of the major rivers have been dammed or have water abstraction schemes in place, in order to supply industry, agriculture, and domestic users. The government is committed to supplying all South Africans with 20-30 litres of clean water per day, increasing to 50-60 litres within 5 years. However, currently 16 million people do not have access to clean drinking water. (DEAT 1999)

The catchment area of Knysna, the freshwater environment, with all its rivers, lakes and streams, which are fed by rain, lies within the Cape fold mountainbelt, with its extended faults and vast east to west corrugations. The locality of the town is believed to be part of a drowned valley that silted up. (Nell 2005)

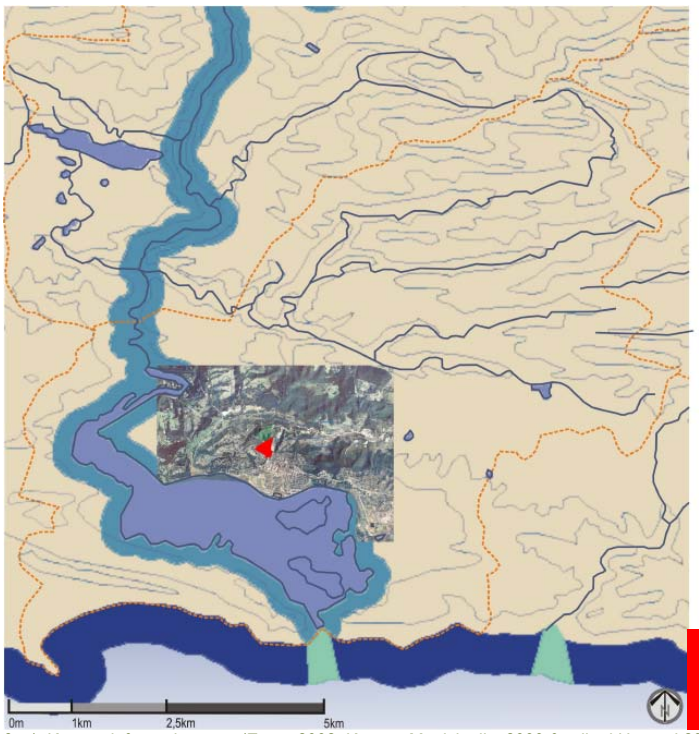
The estuary is seen as the heart of Knysna and tides rise and fall with an average of 1,7m, therefore flooding the estuary area. The S-shaped lagoon has an extent of up to 3,2km wide and 12km long. (Nell 2005) It comprises about 1827 hectares of some of the finest wetlands in the country and is home to a wide variety of fish and crustacean species which are unique to this area. (Nell 2005) The main tributary of fresh water is from the Knysna River which is fed by a number of tributaries which include the Swartkops, Steenbras, Gouna, Rooi-els, Lelievlei, Witels, Palmiet, Dwars, Kruis, Oubos and Lawnwood Rivers, while some streams enter the estuary directly, including Hornlee, Hunter's Home, Ouplaas, Salt River, Eastford, Westford and Brenton Streams. (Nell 2005)

Today the estuary is relatively clear, as is the river, though peat-stained from vast vegetation patches and humus upstream in the indigenous forests and exotic plantations; this also affects the clarity of the upper reaches of the lagoon. Once every 10 to 12 years, particularly heavy showers in the catchment area cause the river to flood its banks and stain the whole estuary brown. The salinity levels of the estuary vary from area to area, tide to tide, and season to season and can range from zero parts per thousand to hypersaline conditions of 36,7 parts per thousand. (Nell 2005)

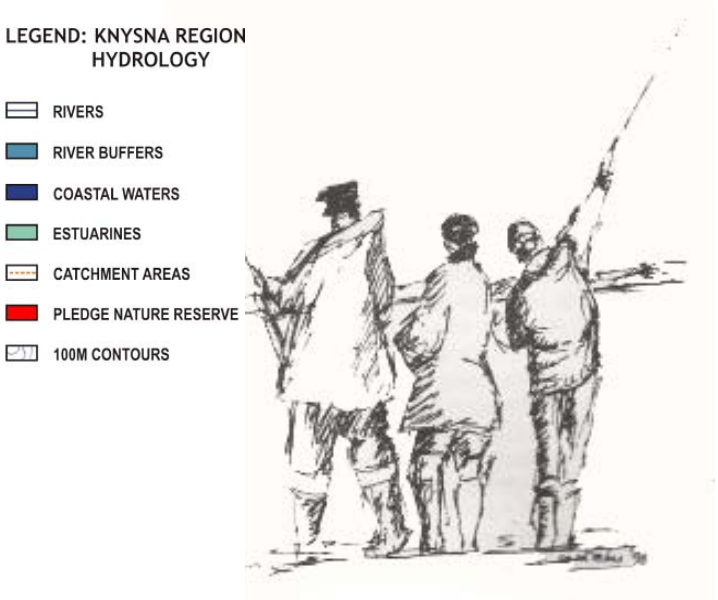
The catchment area of the Knysna River comprises 315 square km, and the Knysna estuary basin spans approximately 400 square km. The Knysna river has its origins high up in the Outeniqua Mountains, where the average rainfall exceeds 1000mm per annum. (Nell 2005)

Human functions of recreation, tourism and commercialism occur on and around this water body. The sheer volume of human activity, namely boating, bait collection and fishing on the lagoon puts extreme pressure on the environment. This natural feature is threatened by pollution and silting, removal of water for agriculture, industry and for the town's fresh water requirements. (Vermeulen 1999) The estuary is home to the Pansy Shell, the Knysna Seahorse and more than 200 fish species.

3.52. The Knysna estuary has numerous functions within the socio-cultural, economic and ecological communities (Howard 2005)



3.51. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)



3.53. Sketch of Fishermen at Knysna estuary by Adelai Hodgson (Allanson et al 1993)

3.4.2.5. CLIMATIC INFORMATION

The climate in South Africa is typically warm and dry, with winter temperatures rarely falling below 0°C, and summer maxima frequently above 35°C. The average annual rainfall is approximately 500mm (considerably less than the world average of 860mm). Most of the central and eastern parts of the country enjoy summer rainfall, whilst the western side of the country is the winter rainfall region. (DEAT 1999)

CLIMATIC AND ATMOSPHERIC CHANGE

According to the State of the Environment Report, South Africa is sensitive to climatic changes, and contributed about 1,2% to global warming in 1990. (Burger 2004) The levels of sulphur dioxide, nitric oxide and ozone are, on average, within the accepted South African guidelines for human health and the prevention of direct ecosystem damage. The Report states that there are, however, occasions, especially in the major urban areas, when the concentrations of sulphur dioxide, nitric oxide, ozone and smoke particles could lead to further health problems in people who have respiratory problems. According to the Report, susceptible terrestrial and freshwater ecosystems are likely to show the adverse effects of acid deposition in a few decades if the current emission rates of sulphur dioxide and nitric oxide continue or increase. The Department is operating three climatic change projects, namely:

1. Cities for Climate Protection:

To help local governments identify and implement actions that meet their objectives, as well as address global climate change. (Burger 2004)

2. Demonstration Projects Linking Climate Change and Sustainable Development:

Various institutions, including educational institutions, private, and non-profit organisations implement a number of projects on behalf of the Department countrywide. These projects include the promotion of eco-villages in urban and rural areas; rural energisation; renewable energy technology; community-based greening and waste recycling; low-tech energy solutions such as thermally efficient and renewable-energy solutions in housing; clean transport systems; carbon sequestration and conservation; and industrial energy efficiency. (Burger 2004)

3. Climate Change, Public Awareness and Education:

The objective of this project is to increase public awareness of global climate change in South Africa, and to assist government in its efforts to educate students on the importance of such change within the country. (Burger 2004)

3.54. Wind direction indicator outside the Knysna Angling Club at the estuary (Howard 2005)

Knysna has a temperate climate with rain occuring throughout the year, with the heaviest falls in the winter months between May and September. The annual rainfall, mainly orographic, ranges from 500mm to 1200mm. Temperatures range from an average of 25˚C in summer and 19˚C in winter. Sporadic snowfalls occur on the higher Outeniqua peaks. Berg winds occur during winter and cold fronts during spring and autumn contribute further to a very equable climate. (Vermeulen 1999) The temperature of the water in the lagoon in summer averages 18˚C and occasionally a large body of cold water averaging only 10˚C may move towards Knysna due to the dynamics of the Agulhas current, driving some marine species to seek refuge in the estuary. (Nell 2005)

Knysna's microclimate is not greatly affected by the urban fabric. With structures having a maximum height of three storeys (Knysna building regulation to prevent view disturbances), and therefore not causing severe shade and wind tunnelling. Areas close to the estuary are cooler due to cool breezes from the water-body. Heavy urban vehicular traffic does cause a certain amount of discomfort in the town, especially in the busy roads like Main Road and Waterfront Drive, which host many trucks and buses. The town's layout has been guided by the view of the estuary, and most of the homes and tourist-focused commercial facilities have a southern orientation therefore resulting in inefficient use of sunlight energy. Knysna is also located on the southern aspect of the Outeniqua hills, therefore being shaded by the topography. The town consists of a high percentage of hard surfaces (paved, tarred roads and pavements, roofs) which results in excessive stormwater which is currently carried away in undergrounds pipes. These hard surfaces also absorb great amounts of heat from the sun, thus resulting in increased urban warmth.

3.4.3. BIOTIC CHARACTER

3.4.3.1. FLORA

South Africa enjoys the third-highest level of biodiversity in the world. The remarkable richness of its biodiversity is largely the result of the mix of tropical Mediterranean and temperate climates and habitats occurring in the country. Some 18 000 vascular plant species occur within the boundaries of the country, of which 80% occur nowhere else. (Burger 2004)

The national tree of South Africa, the Real Yellowwood (*Podocarpus latifolius*) (Burger 2004), is indigenous to the Knysna forests.

3.55. Images of the Podocarpus latifolius (Palgrave 2000)

The easiest way to describe the country's natural heritage is on the basis of a systematic classification of regions, or biomes. A biome can be defined as a broad ecological unit representing a major life zone, which extends over a large area, and contains relatively uniform plant and animal life closely connected with environmental conditions, especially climate. (Burger 2004) South Africa hosts seven biomes and is one of six countries in the world with an entire plant kingdom within its national confines; known as the Cape Floral Region (CFR). (Burger 2004) The CFR is located at the southern tip of the African continent and is one of the world's most biologically interesting ecosystems and an epicenter of diversity and endemism. The defined area of the floral region is less than 90,000 square kilometres, yet it contains the highest density of plant species in the world, exceeding that of many tropical rainforest systems. Nearly 70% of the plant species and 20% of the genera here are endemic. (C.A.P.E. 2004)

The rich biodiversity of the CFR is due to an extensive and complex array of habitat types derived from topographical and climatic diversity in the region's rugged mountains, fertile lowlands, semi-arid shrublands, and coastal dunes. (C.A.P.E. 2004)

Unfortunately, biodiversity in the CFR is under threat due to the spread of invasive alien species, land-use transformation due to agriculture and urbanisation, unsustainable harvesting and poor land-use planning. Underlying causes for this current decrease in biodiversity in the region include: (C.A.P.E. 2004)

1. Lack of capacity and poor co-ordination between bodies responsible for the management of natural resources
2. Lack of awareness of the importance of biodiversity and the impacts of urgent measures to meet the basic needs of society

The Biomes represented by the Cape Floristic Region:

Fynbos Biome

The fynbos biome is one of the six accepted floral kingdoms of the world. This region covers only 0,04% of the land surface of the globe. Fynbos is the name given to a group of evergreen plants with small, hard leaves (such as those in the Erica family). It is made up mainly of three groups of plants, namely the proteas, the heathers and the restios, and incorporates a diversity of plant species (more than 8 500 kinds, over 6 000 of which are endemic). The biome also contains flowering plants, now regarded as garden plants, such as freesia, tritonia, sparaxis and many others. Protected areas cover 13,6% of the fynbos biome and include the Cape Peninsula and Agulhas National Parks. (Burger 2004) Dispersal of seeds often only occur during times of fire, ants also act as seed dispersers. (Vermeulen 1999)

Forest Biome

South Africa has few forests. The only forests of significance are the Knysna and Tsitsikamma forests in the Western and Eastern Cape, respectively. Other reasonably large forest patches that are officially protected are in the high-rainfall areas of the eastern escarpment, and on the eastern seaboard. Forest giants such as yellowwood (Podocarpus spp.), ironwood (Olea capensis) and lemonwood (Xymalos monospora) dominate. The indigenous forests are a magical world of ferns and lichens. (Burger 2004)

Thicket Biome

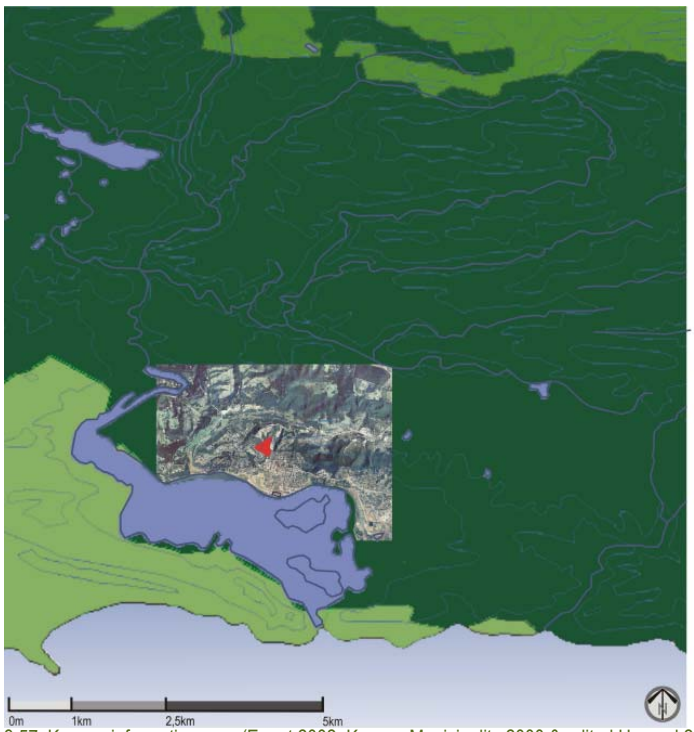
Subtropical thicket ranges from closed shrubland to low forest, dominated by evergreen succulent trees, shrubs and vines. It is often impenetrable and has little herbaceous cover. Roughly 20% of the species in the thicket biome are endemic to the biome. (Burger 2004)

The Knysna flora region is made up of:
Fynbos, coastal (scrub forest and coastal fynbos) and forest vegetation:

FOCUS ON THE KNYSNA FOREST

The Knysna Forest is one of the greatest natural heritages of South Africa and today measures some 80,000 hectares in size. (Ukubona Development 2005) Botanists have classified the Knysna forests into six different types: dry scrub, dry high, medium moist, moist high, wet high and wet scrub forests. The type of forest is determined by numerous factors, such as climate, soil type, rainfall and topography. A vast number of species of trees and shrubs, ferns and mosses, and fungi and wild flowers conglomerate over layers of sandstone and quartzite to form the glorious indigenous forests along the Garden Route. (Nell 2005) Examples of Knysna forest trees include the Yellowwood, Stinkwood, Blackwood, White Alder, Ironwood and the Hard Pear. (Ukubona Development 2005)

3.56. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)



3.57. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)

Ferns are abundant, notably the seven-week fern (Rumohra adiantiformis) which grows in large numbers, while numerous other species occur near streams, on rotting logs, in trees, under trees, along roadsides, in full sun, in dappled sun, part shade, full shade and deep shade. (Nell 2005)

Many fungi species occur, among which are bracket fungi, often seen growing on the stems of trees or the bark of decomposing trunks. They attack living trees, their spores entering the bark through wounds caused by wind damage and injuries inflicted by animals, birds and insects. The spores cause heart rot and hollow the tree out from the inside. An apparently healthy tree might be terminal with heart rot, and only after felling it would a woodcutter discover his labour had been in vain. (Nell 2005)

3.58. A selection of low growing vegetation species found in the Knysna forest (Nell 2005 & Howard 2005)

The Knysna lily (Cyrtanthus elatus), also known as the George lily, still occurs in damp parts of the forests and mountains. This beautiful plant has become increasingly rare due to human and animal predation. The leaves are strap-shaped and have glossy green sheen, with six to ten brilliant scarlet funnel-shaped flowers blooming between December and February. The pink George lily (a variety of the scarlet Knysna/ George lily) was once prolific along the old Knysna/George road, but sadly has also been reduced and is on the verge of extinction in the forests. (Nell 2005)

Alien threats

Alien trees species like the Hakea, Australian Acacias and Pines pose a threat to the indigenous vegetation of Knysna. (Vermeulen 1999)

3.4.3.2. FAUNA

In addition to South Africa's extraordinarily varied plant life, a wealth of animal life exists in the region. The country hosts an estimated 5,8% of the total mammal species in the world, 8% of bird species, 4,6% of the global diversity of reptile species, 16% of the total number of marine fish species, and 5,5% of the world's classified insect species. In terms of the number of mammal, bird, reptile and amphibian species which occur in this country only, South Africa is the 24th-richest country in the world and the fifth-richest in Africa. Marine life is similarly diverse, partly as a result of the extreme contrast between the water masses on the east and west coasts. Three water masses, the cold Benguela Current, the warm Agulhas Current and oceanic water make the region one of the most oceanographically heterogeneous in the world. According to the White Paper on the Conservation and Sustainable Use of the Biological Diversity, over 10 000 plant and animal species, almost 15% of the coastal species known worldwide, are found in South African waters, with about 12% of these occurring nowhere else. (Burger 2004)

The Fynbos Biome Habitat

The biome is not very rich in bird and mammal life, but does include the grysbok, the geometric tortoise, the Cape sugar-bird and the protea seed-eater, which are endemic to the area. The mountains are the habitat of the leopard, baboon, several types of eagle, honey-badger, caracal and rhebuck. (Burger 2004)

The Brenton Blue Butterfly only occurs on the south facing slopes of coastal fynbos at Brenton-on-Sea. This butterfly's survival is largely determined by the presence of the host plant, *Indigofera erecta*, which the larvae exclusively feed on. The butterfly's existence is being threatened by the destruction of its habitat due to increasing pressure from developments, the fynbos vegetation being replaced with unfavourable coastal thicket and the indiscriminate use of herbicides and insecticides which reduce and change insect populations. (Cape Nature Conservation 2000)

3.59. Brenton Blue Butterfly (Cape Nature Conservation 2005)

The Forest Biome Habitat

Over the ages, the Knysna forests have offered shelter from the pressures of humans to a host of wild animals, which still survive, although the forest elephant has become all but extinct, the bloubok completely extinct, and the number of other animals have dropped drastically. Some secretive creatures still make the forest their home. In the forest canopy, the Narina Trogon and Knysna Lourie still fly furtively among the branches. Other forest dwellers include the bushbuck, blue duikers, bushpigs, chacma baboons, vervet monkeys, and smaller mammals, like the woodland mouse. The top of the food chain in the forest is the elusive leopard. The presence of small mammals means there should be predators to tap this source. Besides leopard, the forests are abundant with seldom-seen predators, such as the large-spotted genet and caracal. Honey badgers forage in the forest for rodents, insects, fallen fruit and honey, and more than 60 bird species are found. Bushbuck are most abundant, yet seldom seen due to their consummate stealth, and their colours blend in perfectly with the environment. At Brenton-on-Lake, the animals have become quite tame and move about peacefully from one garden to another; proof that humans and some wild animals can co-exist. (Nell 2005)

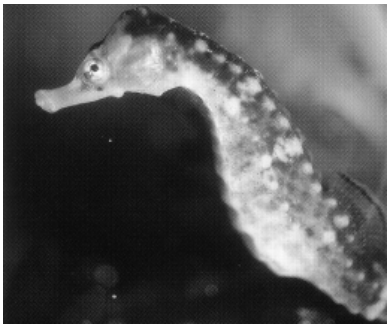
The forest and its denizens are inextricably bonded and co-dependent. The forest provides food and shelter, and the animals give thanks by spreading its seeds and controlling its enemies in an ongoing cycle of life and death. (Nell 2005) The indigenous forests where once home to the greatest of all living land mammals – the elephant (*Loxodonta africana*). Unfortunately, the history between humans and this beast is one of confrontation. When the first settlers arrived, there was enough space for both humans and elephants to give each other wide berth, and as a result the elephants gradually moved deeper into the forests. Then the woodcutters arrived and there was an inevitable competition for the same habitat. (Nell 2005) These elephants carried excellent ivory and were therefore systematically hunted. Sportsmen too, were attracted to the forest by the size of the elephants, and, using the local inhabitants as guides, they hunted the big bulls and carried away their heads, tucks and tails as trophies. (Ukubona Development 2005) In 1870, between 400 and 500 elephants remained in and around the forests. By 1902, their numbers had dwindled to between 30 and 40 individuals. By 1920 only 12 had survived and in 2005 only three remain in the forests. Understandably, they avoid humans. The Department of Forestry carefully monitors their whereabouts, often under difficult circumstances. (Nell 2005) Their greatest enemy today is the excessive damp, inflicting them with rheumatism. (Ukubona Development 2005)

3.60. Tame elephants in the Knysna elephant park (Nell 2005)

3.61. Sign warning people of elephants. Only 3 highly elusive elephants remain in the forest (Nell 2005)

Marine Life

The marine life of Knysna varies greatly from microscopic invertebrates, to fish and shellfish, water birds and sea mammals. Each species fills a niche and link in the foodchain. Some, like the Knysna Seahorse (*Hippocampus capensis*) are unique and occur only in the Swartvlei, Knysna and Keurbooms estuaries. This creature is regarded as the most threatened seahorse in the world. The estuary is home to a vast array of creatures, some, like the seahorse, are seldom seen, while others, like the Southern Right Whale, may on occasion explore the mouth of the estuary, foraging for minute crustaceans. Other creatures here include oysters, mussels, sea squirts, whelks, limpets, stranded jellyfish and bluebottles. Sharks are often seen by deep-sea fishermen and, during the right time of year, both humpback and Southern Right whales can also be spotted. Dolphins are occasionally seen on the breakers and beyond as they prey on smaller species of fish. (Nell 2005) Pollution and silting up of the estuary, as a result of excessive development in Knysna, are serious threats to the marine life habitat. (Vermeulen 1999)



3.62. The rare Knysna Seahorse *Hippocampus capensis* (Nell 2005)

3.4.4. SYSTEMS AND PROCESSES

3.4.4.1. CONSERVATION AND PRESERVATION

A large number of the most famous game parks in the world and nature reserves are located in southern Africa, and South Africa is especially renowned for its abundant wildlife and spectacular scenic beauty. RSA boasts a network of well-managed game parks and nature reserves. (Vermeulen 1999) National parks and nature reserves are either controlled by national, provincial or municipal authorities or by private stakeholders. Apart from protecting and conserving the natural heritage of the country, game and nature reserves also play an important role in educating youth and creating a general awareness of the need and importance of nature conservation. (Vermeulen 1999)

CONSERVATION AREAS

South Africa boasts some 403 terrestrial protected areas, with a total area of 6 638 658 ha or about 5,44% of its total land area. Twenty-two of these protected areas are national parks, and their total area makes up 53,09% of South Africa. A further 13,82% are State forests in terms of the National Forests Act, 1998 (Act 84 of 1998). Provinces are legally responsible for 30,51% of South Africa's protected area estate.

There are a number of management categories of protected areas in South Africa, which conform to the accepted categories of the World Conservation Union (IUCN). The National Environment Management: Protected Areas Bill, which was tabled in Parliament in August 2003, seeks to establish a representative system of protected areas as part of a national strategy to protect the biological diversity of South Africa, and to ensure that biodiversity is able to bring about sustainable benefits for future generations. (Burger 2004)

CONSERVATION CHALLENGES

South Africa faces many of the problems experienced by developing countries, in which rapid industrialisation, population growth and urbanisation pose a threat to the quality of the environment. The Department is reforming environmental law to introduce reform in biodiversity conservation, pollution, waste management and environmental planning. (Burger 2004)

URBAN CONSERVATION

Rapid urbanisation and its concomitant environmental impact are posing serious challenges for South African planners and environmentalists. Up to 16 000 ha of farmland is lost to urban development each year. Low-density urban sprawl and the rapid growth of informal settlements contribute to increasing competition between urban land-users for diminishing space and resources. As a result, many informal settlements are located on marginal and environmentally sensitive land, posing serious threats to human well-being and ecosystems. The environmentally friendly use and development of land can be promoted through official planning processes such as integrated development plans and land-development objectives. New planning and environmental legislation provides for environmental concerns in urban planning and development. Regulations making environmental-impact assessments compulsory for certain planned developments were promulgated in September 1997. (Burger 2004)

PRESERVING GENETIC DIVERSITY (Burger 2004)

South Africa, with its wide range of natural resources, is an ideal proponent to apply the principle of sustainable use of these resources. There is a wide range of benefits derived from the conservation of biodiversity. A large portion of the South African population is directly dependent on biological resources for subsistence purposes, including the gathering, harvesting or hunting of plants and animals as a source of food, medicine, shelter and trade. The use of biological resources therefore provides a buffer against poverty as well as a source of economic gain. A number of industries in the country, such as the fishing, hunting, wild flower and wood-harvesting industries are directly dependent on its biological resources.

The main attractions are nature-based tourism facilities such as national parks and private game reserves. There are some 9 000 privately owned game ranches in South Africa, expanding at a rate of 300 000 ha per annum. The contribution of these areas in maintaining South Africa's unique biodiversity is incalculable

SENSITIVE COASTAL AREA LEGISLATION

"The Environmental Conservation Act, 1989 (Act 73 of 1989) makes provision for the protection of areas which have particular environmental importance, which are sensitive, or which are under intense pressure from development". In terms of this legislation, the Garden Route coastal area from Tergeniet in the west to the Kaaimans River in the east was identified and proclaimed as the Outeniqua Sensitive Coastal Area (Outeniqua SCA) in 1997. On 27 November 1998, the Minister of Environmental Affairs and Tourism extended the Outeniqua Sensitive Coastal Area to include portions of the area between the Kaaimans and Bloukrans Rivers. The implication of the SCA status is that certain activities, which may have a detrimental effect on the environment, are now prohibited unless a permit has been obtained prior to the activity being undertaken. "The SCA Regulations are aimed at controlling small-scale activities at the individual plot level in an effort to ensure sustainable development of the coast". (Knysna Municipality)
The scheduled activities include the following:

1. Disturbance of vegetation (trampling, cutting or removal)
2. Earthworks (excavation, moving, removal, deposit, compacting of soil, sand, rock or rubble)
3. Dredging (dredging, excavation, removal or moving of soil, sand or rock from a river, tidal lagoon, tidal river, floodplain or wetland)
4. Dune rehabilitation (planting on, or covering of dunes or exposed sand surfaces with any vegetative, natural or synthetic material, or the erection of structures and walls thereon with the purpose of preventing the sand from being eroded, accreted or moved by wind or water)

RESERVES

Featherbed Nature Reserve

This reserve is located on the Western portion of the Knysna Heads and has an extent of 70 hectares. It is privately owned and managed and protects the scrub forest and coastal fynbos, which only grows in a few places along the coast, and acts as a habitat for the rare Blue Duiker. This reserve is only reachable by boat and offers functions of recreation (nature trail of 2km) and restaurant facilities. (Vermeulen 1999)

Brenton Blue Nature Reserve

The Endangered Wildlife Trust, the Green Trust and the Lepidopterists' Society in partnership with the Wildlife and Environment Society of South Africa (WESSA) initiated this unique reserve, home to one of the rarest butterflies in the world. It is now managed jointly by Cape Nature Conservation, butterfly specialists and local role-players. (Cape Nature Conservation 2000)

Pledge Nature Reserve

Pledge Nature Reserve is a community project situated within the confines of a developed urban and central commercial area of Knysna. It is 10 ha in extent and easily accessible by car or on foot and its nearest entry point is within 500 meters of the town's busy Main Street. The Reserve offers 3.5 km of pathways through scrub forest and hillside fynbos with fine views over the lagoon. The site was once an abandoned brickfield heavily infested with exotic invader jungle and was also an indiscriminate dumping ground for human household discards. After only ten years of restoration there is no longer any evidence of this former degradation. Today Pledge Nature Reserve is a sanctuary for more than one hundred bird species and a place where our local fynbos diversity is well represented.

Forest Conservation

Aims of the Pledge Nature Reserve Trust:

- To restore the Reserve to its original state of fynbos and forest by the eradication and prohibition of invader species, and then to conserve the Reserve in an natural a state as possible.
- To re-introduce other indigenous plan species and to permit the cultivation of plants of South African origin in selected areas of the Reserve
- To develop trails, pathways and facilities in the Reserve in a manner sensitive to the environment for the benefit of the public and for educational purposes
- To raise sufficient monies to enable the reserve to become self-funding in the long term

(Pledge Nature Reserve Trust)

For many years the forests were mercilessly robbed of their rich resources, supplying timber to the furniture, construction and mining industries. Today the forests are managed according to strict conservation principles. (Vermeulen 1999) The Knysna/Uniondal road (R339) snakes through these forest to wonderful braai spots and picnic facilities, giving access to hiking and biking trails, the Valley of Ferns and a few of the so-called 'Big Trees' (huge yellowwoods found deep in the forests and grotesquely gnarled stinkwood trees). The R339 takes one past localities with names from days gone by, such as: Kom-se-Pad, Veldmanspad, Hoenderspoor, Bakhuisdraai, Knoetskraal, Tata Riet se Ga, Skuinsbrug, and Ysterhoutrug, while another 'Big Tree' can be found at Veldbroeksdraai. (Nell 2005)

Many indigenous forests were managed under the auspices of the Southern Cape Indigenous State Forests and have recently been transferred to the South African National Parks (SAN Parks). (Nell 2005)

3.4.4.2. MANAGEMENT

ENVIRONMENTAL MANAGEMENT (Burger 2004)

Environmental management in South Africa is the responsibility of various government institutions as they ensure that land owners respond to the importance of the environment. At central government level, the Department of Environmental Affairs and Tourism is the central policy-formulating and co-ordinating body.

The vision of the Department is to lead environmental management and tourism in the interest of sustainable development and to contribute to the improvement of the quality of life of all South Africans by:

1. Promoting the sustainable development, utilisation and protectio of the country's natural and cultural resources
2. Establishing responsible tourism that ensures environmental sustainability and contributes to job creation and a better quality of life for all
3. Harnessing the skills, experience and knowledge of the environment of all South Africans
4. Fostering equitable access to the benefits derived from the country's natural and cultural resources
5. Empowering the South African public, communities and organisations through participation, environmental education, capacity-building, research and information services
6. Working with all relevant stakeholders and spheres of government in the spirit of good governance
7. Ensuring that all international participation and obligations are undertaken in accordance with South Africa's environmental policies and principles

WATER-QUALITY MANAGEMENT (Burger 2004)

Quality management of national water resources in South Africa is the responsibility of the Directorate: Water Quality Management of the Department of Water Affairs and Forestry. Water-quality management involves the maintenance of the fitness of water resources for use on a sustained basis, by achieving a balance between socio-economic development and environmental protection. From a regulatory point of view, water-quality management entails the ongoing process of planning, development, implementation and administration of water-quality management policy; the authorisation of water-uses that may have, or may potentially have, an impact on water quality; as well as the monitoring and auditing of the aforementioned. The evolution of South African society and the imperatives for equity of access to water served as the driving forces behind the water-law reform process, which culminated in the National Water Act, 1998 (Act 36 of 1998).

The Department has adopted a hierarchy of decision-taking with regard to source-directed water-quality management:

1. Pollution prevention: preventing waste production and pollution or degradation of the water resource wherever possible.
2. Waste minimisation and remediation: if waste production and pollution or degradation of the water resource cannot be avoided, it must be minimised and remedied.
3. Precautionary principle: if there is no alternative to the disposal of waste and/or the discharge of water containing waste, the precautionary principle applies. In applying this principle, the disposal of waste and/or discharge of water containing waste will only be allowed if the receiving environment has the capacity to assimilate the additional waste load.
4. Differentiated approach: if the receiving water resource has the capacity to assimilate an additional waste load, i.e. when the requirements of the reserve and the other waste users are not threatened, relaxation from prescribed standards or requirements may be considered. This approach is followed for all potential sources of pollution (as defined by the Act) and not only for hazardous substances.

COASTAL MANAGEMENT (Burger 2004)
The Department of Environmental Affairs and Tourism Subdirectorate: Coastal Zone Management is the lead agent for coastal management. This requires empowering coastal users, decision-makers, and the people to sustain and manage the coastal zone and its resources appropriately. The Coastal Management Bill sets out a new approach to managing the coastal resources of the nation, in order to promote social equity and make the best economic use of coastal resources, while protecting the natural environment. The White Paper on Coastal Management was launched in June 2000. According to the White Paper, the coast has been a driving force in the national economy. Its products account for about 35% of the national Gross Domestic Product (GDP) of South Africa and has enormous development potential.

A number of far-reaching initiatives were undertaken. These include:
1. The ruling by the Port Elizabeth High Court in favour of the banning of private 4x4 vehicles on South African beaches. The regulation came into effect in January 2002
2. The removal/bulldozing of illegal cottages on the Wild Coast
3. The declaration of a Whale Sanctuary in Hermanus
4. The restructuring of the fishing-rights dispensation to control the exploitation of coastal and marine resources

These measures supplement the illustrious programme of action already anticipated in the White Paper. Elements of this programme include the following:
1. Diversifying coastal economies and optimising benefits for local coastal communities
2. Promoting coastal tourism, leisure and recreational development
3. Establishing 'one-stop-shops' for development approvals
4. Improving public access to the coast and coastal resources
5. Developing ports and harbours
6. Improving coordination and integration of coastal and marine-resource management
7. Improving the monitoring and management of coastal pollution
8. Rehabilitating degraded coastal areas and resources

3.4.4.3. POLLUTION

AIR POLLUTION (Burger 2004)
According to the UN, the transportation sector worldwide now accounts for as much as 73% of global carbon emissions. Vehicles emit huge quantities of carbon monoxide, nitrogen oxides and volatile hydrocarbons. Most of the petrol used in South Africa contains lead, which poses another serious health risk, particularly for children, as it can hamper their mental development. Oxides of nitrogen combined with water vapour create acid rain. Carbon monoxide can kill a person in a matter of minutes if large enough quantities are inhaled, and hydrocarbons harm human health as well as the environment. The increasing number of vehicles on the roads is compounding the air pollution challenge.

MARINE POLLUTION (Burger 2004)
More than 80% of marine pollution originates from land-based sources such as pipeline discharges, rivers and stormwater run-off. There are many places where water or water containing waste is discharged into the sea. Forty sea outfalls have been formalised through exemptions issued by the Department of Water Affairs and Forestry in terms of the Water Act, 1956 (Act 54 of 1956). An increasing source of concern is non-point-source pollution, especially that coming from the burgeoning informal settlements that form part of many coastal cities. Such pollution is generally the result of inadequate sanitation and other infrastructure, and is very difficult to control or monitor. The balance comes from industrial discharges, urban run-off, and oil exploration and production, the latter contributing only 2%. Of the pollution emanating from shipping activities, the majority comes from vessel operations, with only 12% from tanker accidents. SILTATION

3.4.4.4. RECYCLING AND REUSE

Almost every type of paper produced in South Africa has a recycled content. Each ton of waste paper recycled saves about 17 pine trees, and a ton of recycled paper could save 3m³ of landfill space, meaning that South Africa could save 10 million trees annually. South Africa follows the USA and Japan as the best collectors of used metal beverage cans in the world. The recovery rate of metal beverage cans sold in South Africa has grown to 63%.

A major role in this regard has been played by the Collect-a-Can project, which was founded in 1993 to reduce litter and optimise the recovery of metal beverage cans. In the process, informal employment has been created for over 30 000 people. In comparison with other countries, South Africa has a high returnable glass-container market: 33% of all glass containers produced are returnable or reusable, and these are also recycled. The Minister of Environmental Affairs and Tourism announced, at the 10th anniversary of Collect-a-Can in April 2003, that 37 773 people were earning or supplementing their income through can recoveries, and that more than R270 million had been paid out to collectors over the last 10 years. (Burger 2004)

WASTE MANAGEMENT (Burger 2004)
Towards the end of 2002, government published the White Paper on Integrated Pollution and Waste Management , which outlines its new thinking in relation to pollution and waste management. The Government believes that pollution prevention is one of the most effective means of protecting people and the environment. Pollution prevention eliminates costly and unnecessary waste and promotes sustainable development. It aims to reduce risks to human health and the environment by trying to eliminate the causes, instead of treating the symptoms, of pollution. This objective marks a major shift in emphasis from control to prevention. The White Paper also stresses the need to make pollution prevention a part of everyday activities. Effective pollution prevention not only focuses on the installation of pollution-abatement equipment in industry, but also on the shared responsibility of all sectors of society to protect the natural resources of South Africa, which involves:

1. Innovation in product design and production
2. The encouragement of cost savings through efficiencies and conservation
3. Insisting on sound management of persistent bio-accumulative and toxic substances, and eliminating their use where necessary

In line with global trends, municipalities across South Africa are in the process of implementing so-called integrated waste management plans and policies, and it is essential that waste management options suite specific local conditions and needs. (Meyer 2005:vol.10,no.3)

KNYSNA WASTE-BY-RAIL:

BACKGROUND: In 1989 the Knysna waste disposal site was closed down as it posed a serious health threat to surrounding residents. A previously unused site was then re-opened on a temporary basis while investigations were undertaken to find a new site. Consultants identified and investigated 21 possible sites, but none of these sites were found suitable, either geologically or by the community. In 1994, the District Council commissioned Ingérop Africa to investigate and identify a suitable sub-regional site. After extensive investigations and public consultation, a report on the various options was published and presented to the community. The options included incineration and road and rail transport to George. The Knysna Council resolved to develop the preferred local site, but there was still very stiff opposition from the adjoining community, and by the end of 1996 the matter was still not resolved. During 1997, Spoornet commissioned Ingérop Africa to investigate the planning and costing of a regional waste by rail project for the Southern Cape District. The study assessed the viability of moving waste by rail from the main generators in the region to the existing landfill site at PetroSA. The results of the study were presented to the local authorities in the region and in August 1997 the Knysna Council made the decision to rail its waste to PetroSA. (Meyer 2005: vol.10,no.3)

NATURE OF THE SYSTEM:

1.The receiving and transfer system: which includes a facility where the collection vehicles discharge waste into a ground level conveyor system, which, in turn, feeds into a compactor. Waste is compacted into 28m³ containers. The receiving facility is located in an existing small freight yard alongside the upmarket waterfront development in the heart of Knysna (Site most acceptable to community). The facility is operated and managed by the Knysna Municipality on behalf of Spoornet. The operation of the station ensures that solid waste is exposed to the atmosphere for only a very short time, before it is sealed into a container. There is therefore little likelihood of odours or pests becoming a nuisance. There is, however, an odour control system in place. This transfer station was the first to be licensed with the Department of Water Affairs and Forestry (DWAF) and the process and requirements have set a precedent for future transfer stations. (Meyer 2005:vol.10,no.3)

3.63. The receiving facility, located at an existing small freight yard alongside the upmarket waterfront development in the heart of Knysna (Meyer 2005: 10:3)

3.64. The ground-level conveyor system (Meyer 2005:10:3)

2.The transportation by rail: once full (20t), the containers are transported to PetroSA (near to Mossel Bay) 120km to the west via George. Transportation by rail entails an average of two containers removed daily from the transfer station during the year. During the holiday season, this can increase to up to six containers a day. Standard rail trucks were converted to accommodate the specially developed loading and handling equipment. An Environmental Impact Assessment along the route was undertaken by Spoornet to identify any significant impacts that the system may have, particularly as the section between George and Knysna is a well-known scenic route. (Meyer 2005:vol.10,no.3)

3.65. Railway line across the Knysna estuary (Howard 2003)

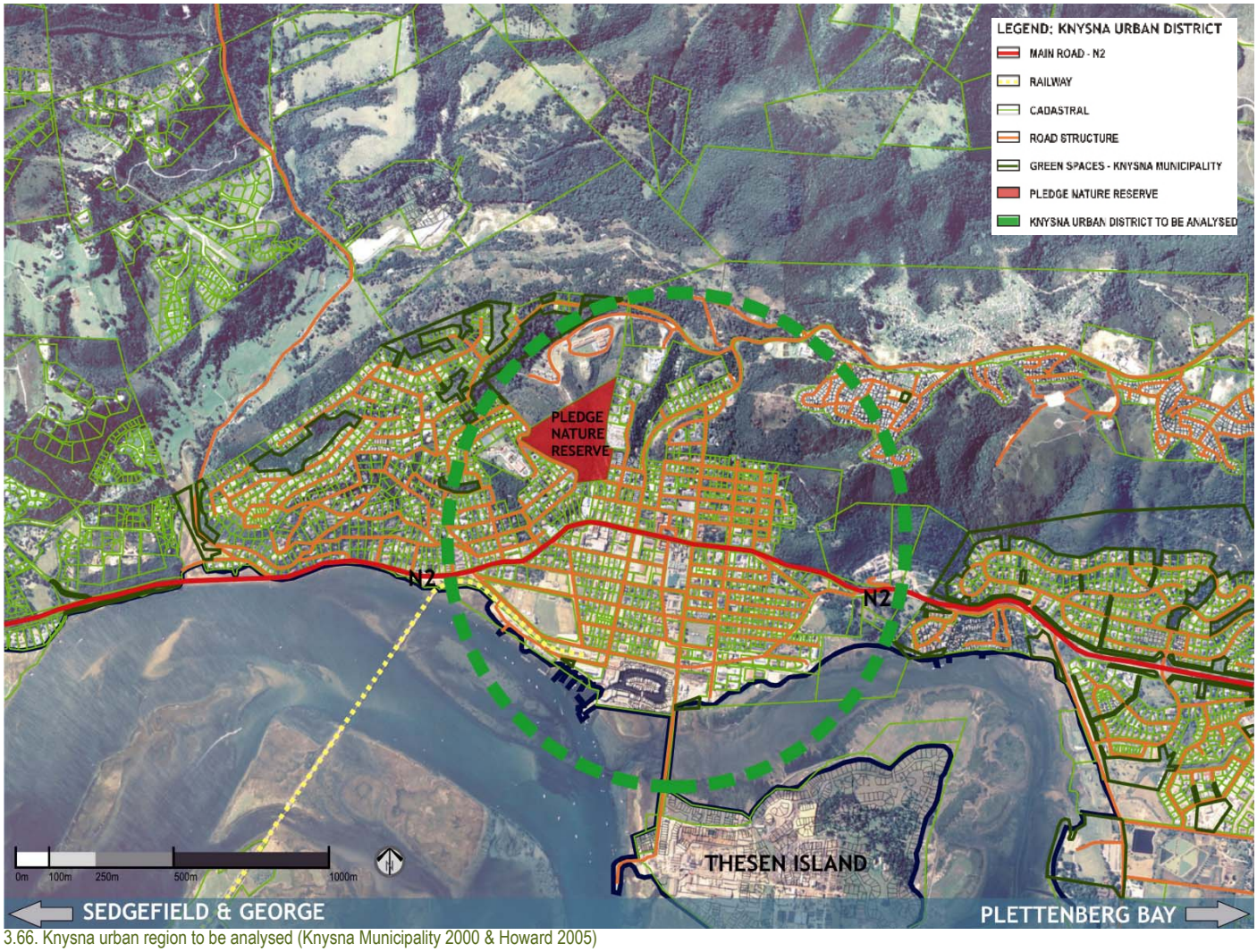
3.The off-loading and disposal: takes place at the large PetroSA landfill. The landfill is DWAF-licensed and serves PetroSA and the town of Mossel Bay. (Meyer 2005:vol.10,no.3)

ISSUES: Gates comments that it is unfortunate that waste is immediately containerised and removed once collected. The constraints of the Knysna site did not allow for a more integrated facility to be provided (Separation of materials for recycling and therefore cost saving). In response to the question whether it is a case of shifting the problem (from Knysna to Mossel Bay), Gates argues that land-filling is still the most cost effective way of treating waste in South Africa. Fortunately, the PetroSA landfill is a large and well-managed permitted site with ample airspace. A very serious waste problem, which had started to have major social and environmental impacts for Knysna, had been resolved in an innovative and environmentally sound way. (Meyer 2005: vol.10,no.3)

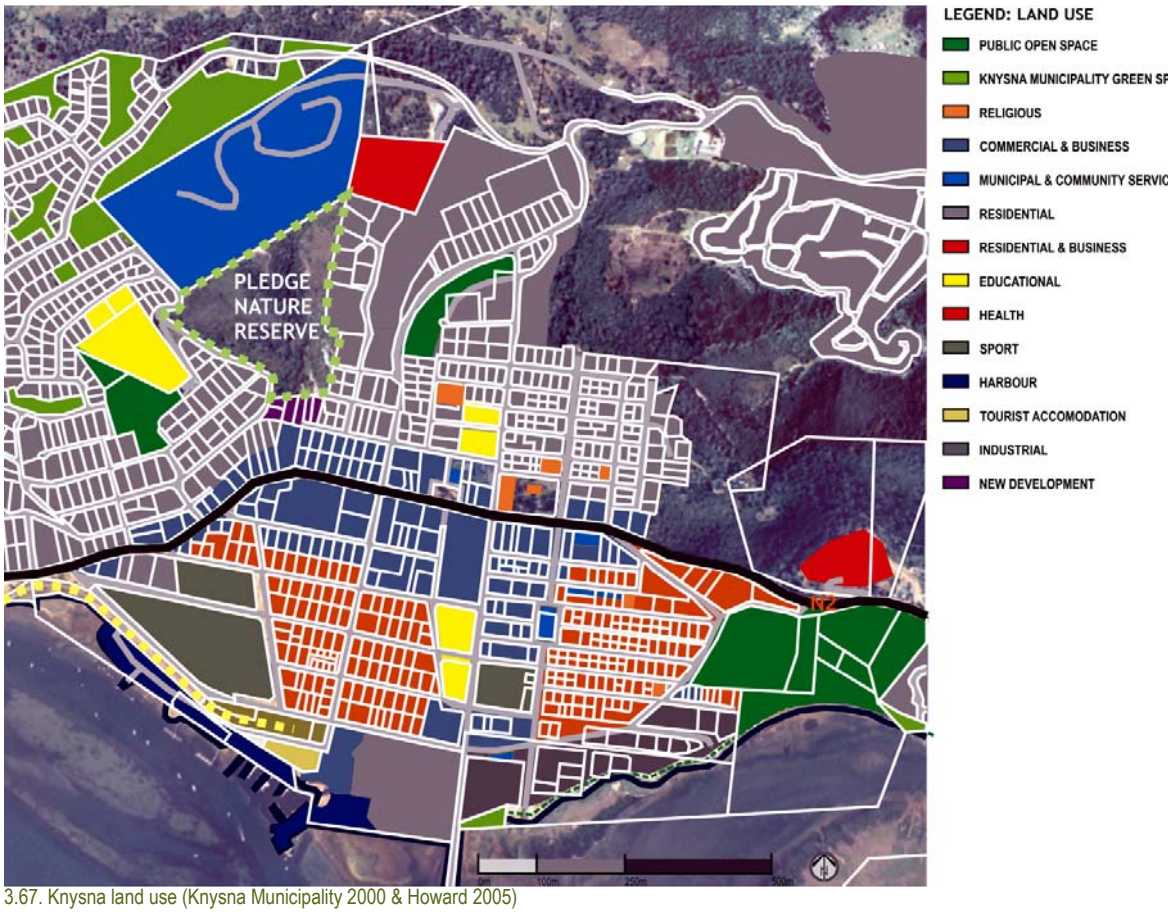
SUCCESS? Tony Gates, project manager of Ingérop Africa, is of the opinion that this Knysna waste-by-rail system, the first system of this kind in South Africa, has proved to be a success and set the standard for similar systems. Waste management in the region has been improved significantly, the receiving facilities are compact and very inconspicuous and the community has benefited from a more environmentally sustainable system. Although it is predominantly a rail system, it is, in fact, an intermodal system as was illustrated during heavy rains experienced in the region during December 2004, which resulted in the railway line being washed away. Road transport was immediately put into operation in accordance with the environmental Response Action Plan, and waste was removed daily until the rail had been repaired. (Meyer 2005:vol.10,no.3)

FUTURE: The Knysna system has the capacity to cope with the projected population growth in the area for at least the next 30 years. With effective waste minimisation programmes in place the system can even have a longer lifespan. According to Gates there are technically no real constraints to the system. (Meyer 2005:vol.10,no.3) According to John Jaftha of the Knysna Municipality, one of the problems encountered after closing their only landfill was dealing with waste types such as garden waste and builders' rubble, as these are expensive to put through a transfer system. Local drop-off sites for garden waste and builders' rubble had to be established. (Meyer 2005: vol.10,no.3) One of the positive spin-offs of the project is that there is a far greater emphasis on recycling of waste. The Knysna Municipality, which operates a two-bag municipal refuse-system, has spearheaded this drive. Green plastic bags are provided free of charge, in which all recyclable materials should be placed. Knysna has subsequently become one of South Africa's leading recycling settlements. (Meyer 2005:vol.10,no.3)

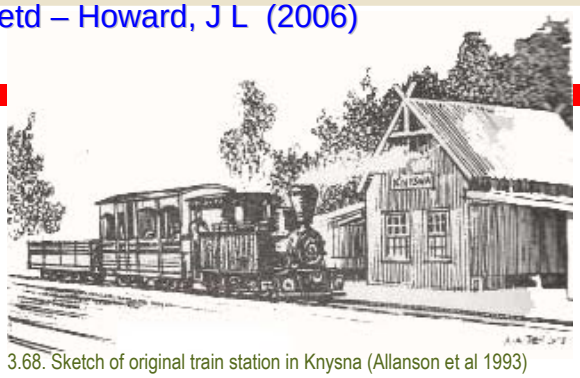
3.5. KNYSNA MAP ANALYSIS



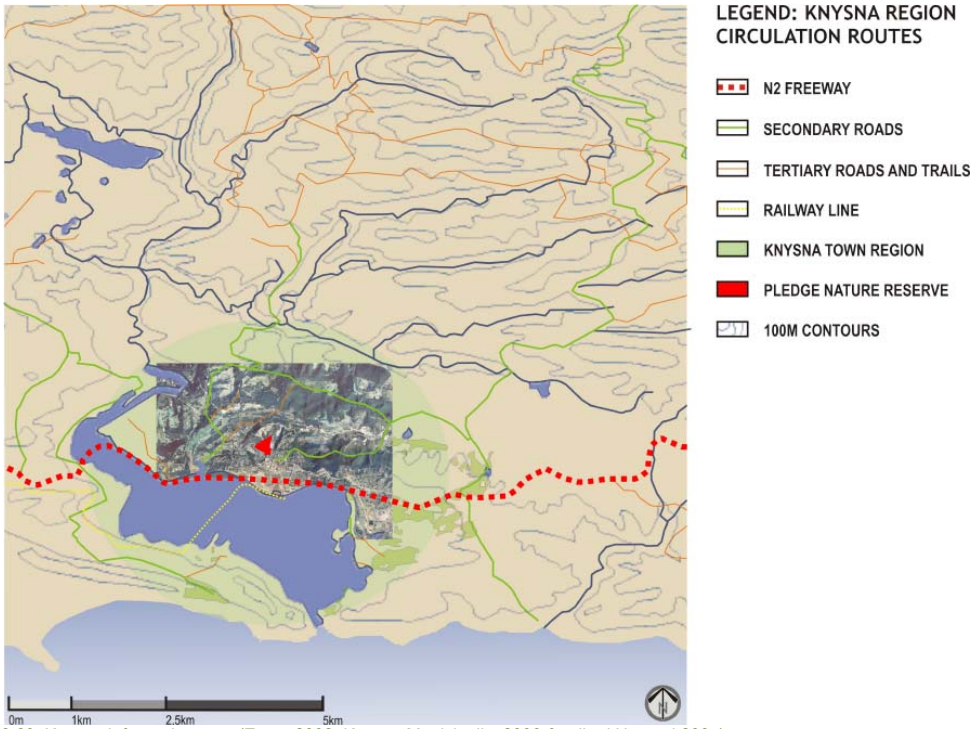
3.66. Knysna urban region to be analysed (Knysna Municipality 2000 & Howard 2005)



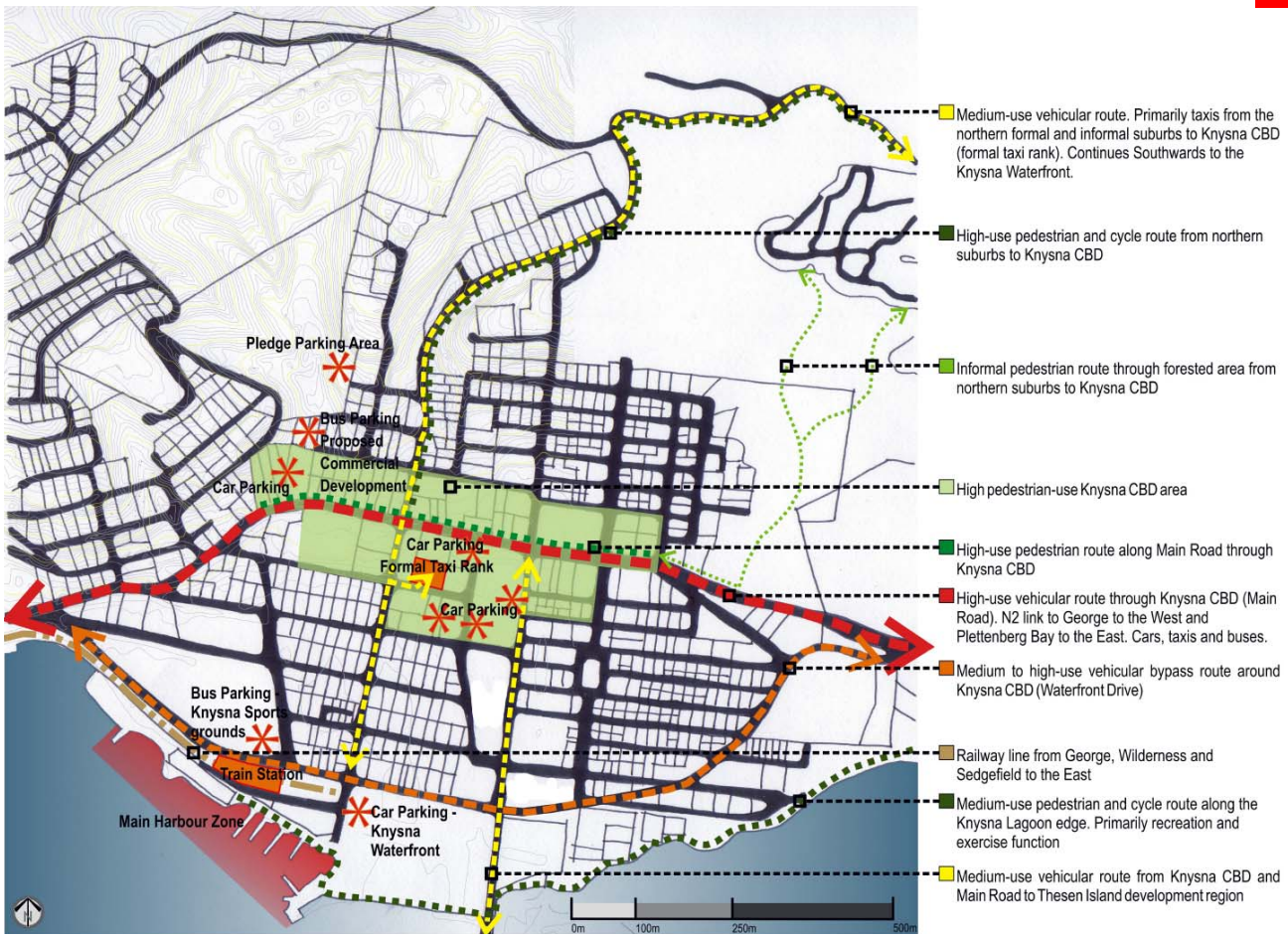
3.67. Knysna land use (Knysna Municipality 2000 & Howard 2005)



3.68. Sketch of original train station in Knysna (Allanson et al 1993)

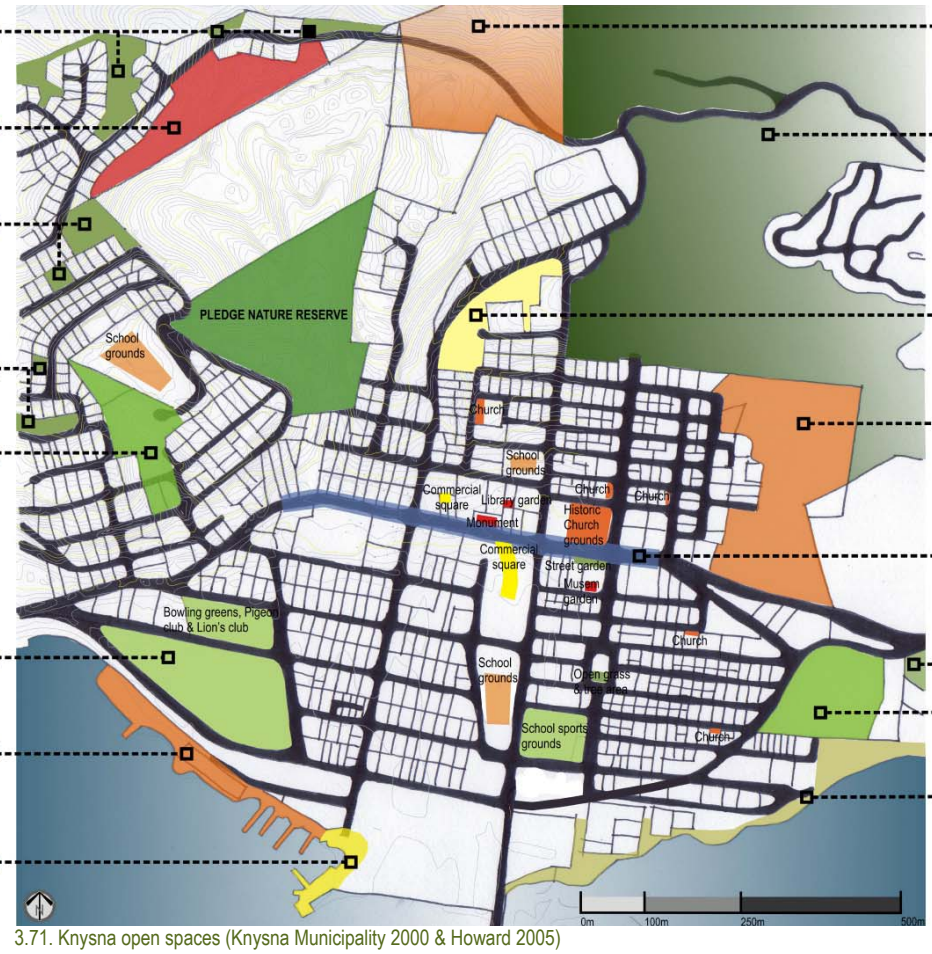


3.69. Knysna information map (Enpat 2002, Knysna Municipality 2000 & edited Howard 2005)



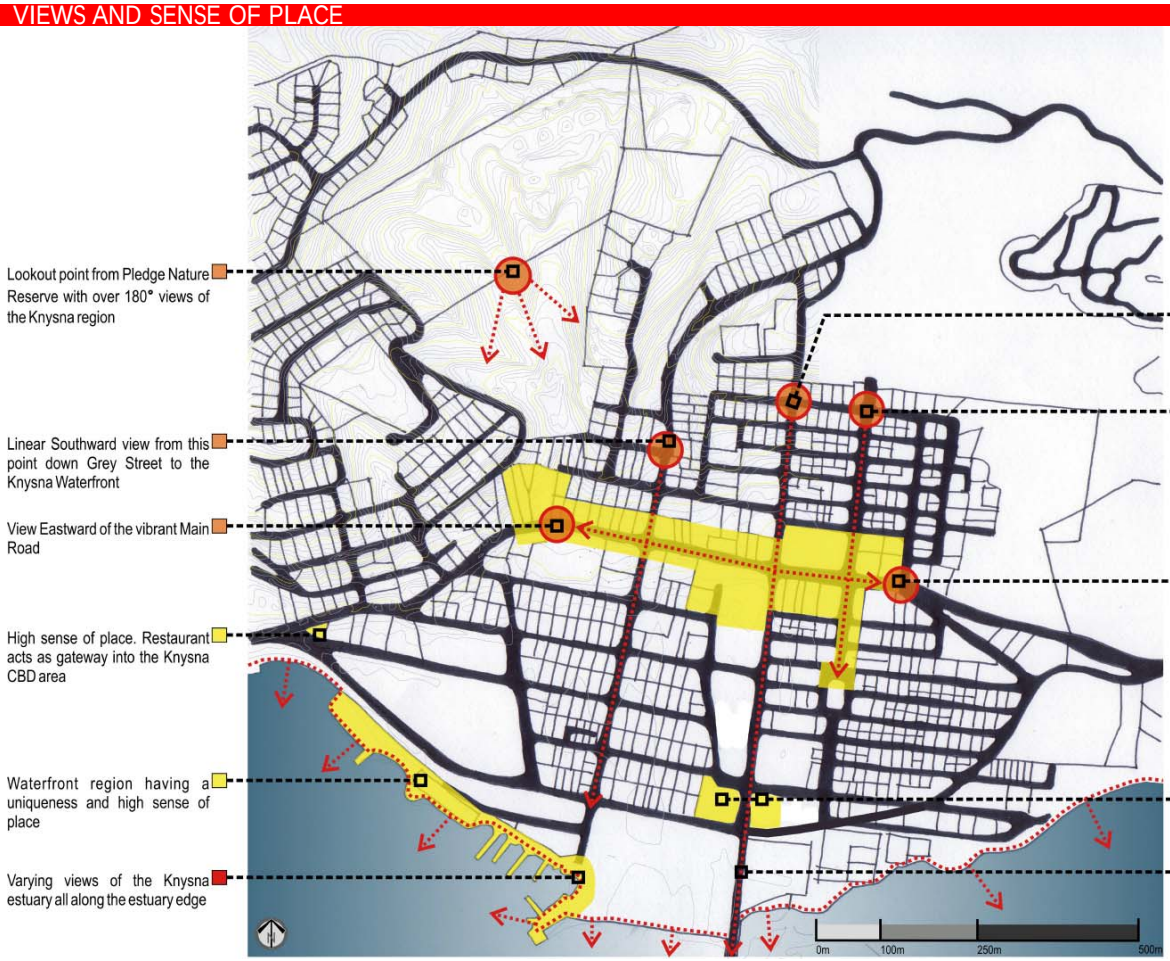
3.70. Knysna circulation (Knysna Municipality 2000 & Howard 2005)

OPEN SPACES



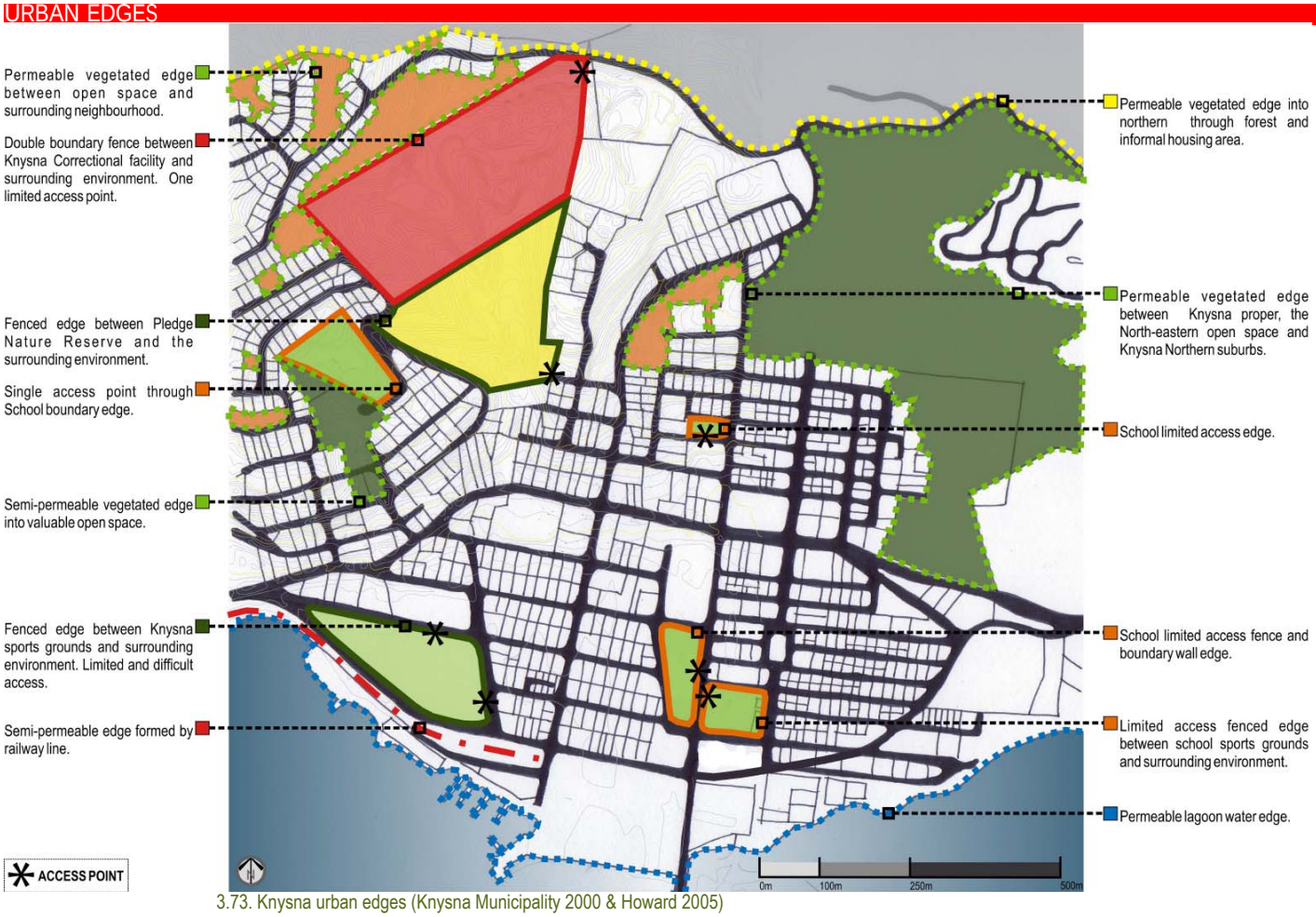
3.71. Knysna open spaces (Knysna Municipality 2000 & Howard 2005)

VIEWS AND SENSE OF PLACE



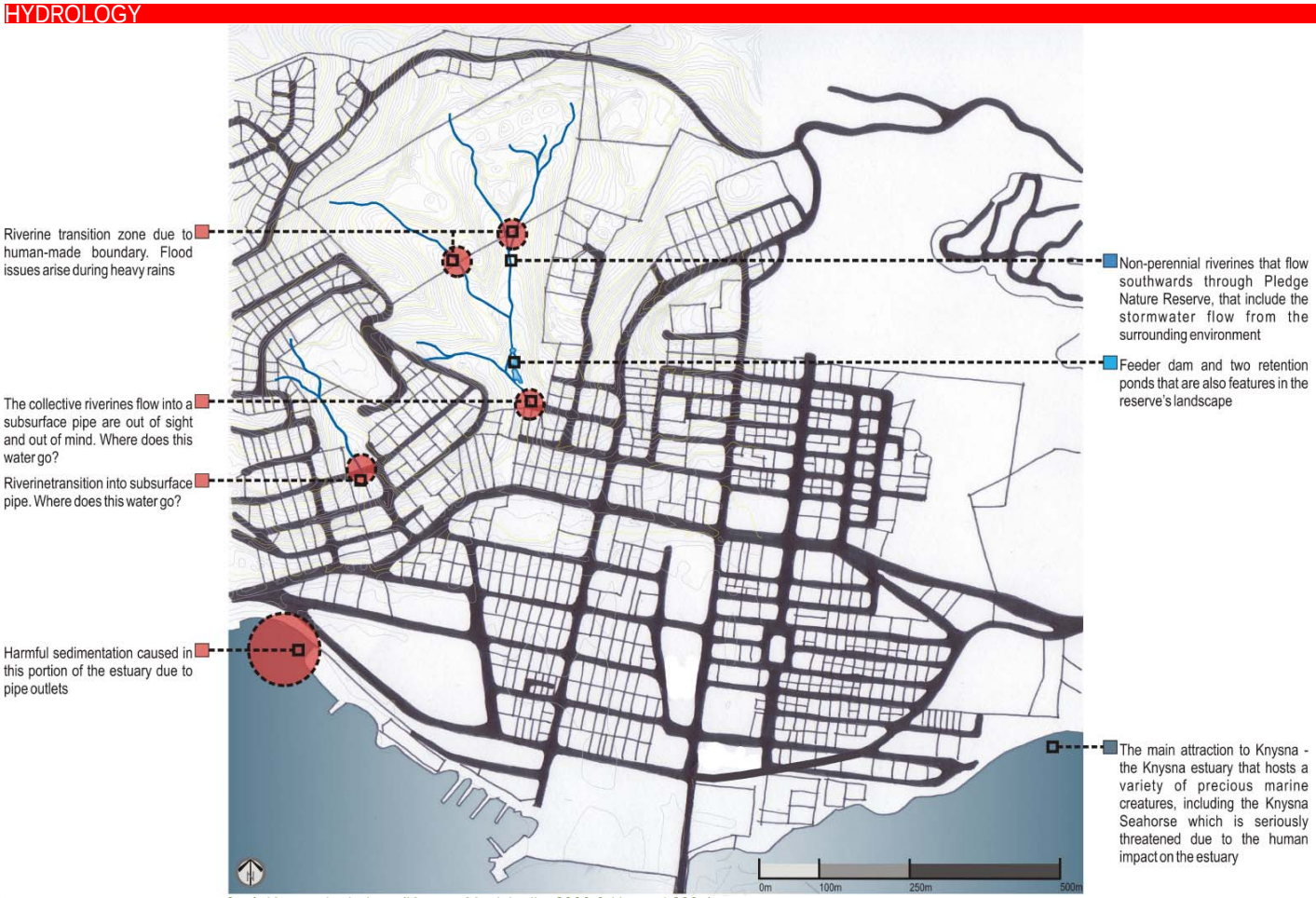
3.72. Knysna views and sense of place (Knysna Municipality 2000 & Howard 2005)

URBAN EDGES



3.73. Knysna urban edges (Knysna Municipality 2000 & Howard 2005)

HYDROLOGY



3.74. Knysna hydrology (Knysna Municipality 2000 & Howard 2005)

3.6. GUIDELINES DERIVED FROM CONTEXT ANALYSIS

3.6.1. GENERAL CONTEXT

- Respond to fundamental human rights
- South Africans are united in their diversity
- Respond to applicable legislation
- Respect the aesthetic and ecological character and the over-developed nature of the Western Cape and Garden Route
- Work with and not in opposition to existing features like "The Heads", Knysna Estuary and Featherbed Nature Reserve
- Refer to all historic inhabitants of the region (Hunter-Gatherer-Herders, Dutch Colonialists, British Colonialists) and how they lived in and altered the environment

3.6.2. SOCIO-CULTURAL ENVIRONMENT

- Cater for all demographic groups and the varied cultures, and refer to the various ways which they respond to the urban landscape in which they live and work
- Limit the use of a specific language and rather use signage symbols and drawings for clarity
- When written instructions are required use at least the three majority languages, namely Afrikaans, English and isiXhosa
- Promote freedom of expression as far as possible
- Pay attention to the Cultural Industries Growth Strategy established by the department of Arts and Culture in conjunction with the Department of Trade and industry
- Explore the possibility of an outdoor art exhibition area to promote local community art and culture
- Cater for persons with disabilities at all times and unite them into the environment, therefore preventing feelings of alienation and discomfort
- Everyone has the right to education and to initiate an independent educational institution
- Refer to the lack of education in the community and attempt to create practical educational tools within the landscape proposal and as part of the Environmental Management Plan
- Approach the SANGALA programme as a nation-building process and as part of planning and design
- Improve accessibility and management of existing sporting facilities
- Provide accessible and comfortable open spaces in the urban environment which can be used by neighbouring communities

3.6.3. ECONOMIC ENVIRONMENT

- Respond to the fact that the South African economy has mostly been built on the use of natural resources (mining and agricultural) and that their has been a shift to the use of human resources (manufacturing)
- Respond to statement that if the Kruger National Park is excluded, only 4% of the surface area of South Africa is formally protected and that we are therefore losing much of our valuable open space and natural resources
- Create opportunities for employment and skills development within the precinct
- Promote the tourism industry of Knysna, especially eco-tourism and cultural tourism

3.6.4. ECOLOGICAL ENVIRONMENT

- Environmental protection is an essential aspect to be maintained within the design proposal
- Respond to the statement that virtually all ecosystems have been modified by human intervention
- The Garden Route region and Knysna is being 'Loved to Death' with a loss of natural open spaces due to urban sprawl
- Great design opportunities exist due to the topographical variance of the town
- Derive design inspiration from the geology of the area, for example the old shorelines, which have educational merit
- Respond to the fact that in South Africa many people do not have access to clean water
- Design and educational value exists in the fact that the town is believed to be part of a drowned valley that silted up
- Take into account that the estuary rises up to 1,7m during high tide
- Inspiration to be drawn from the hydrological character of the area, namely the Knysna River originating high up in the Outeniqua Mountains and the Knysna Estuary as host to many species
- Respond to how human activity has placed strain on the estuarine environment and that it is threatened by pollution and silting, and removal of water for agriculture and industry
- Attempt to decrease urban pollution by reducing cars by providing pedestrian-friendly corridors and by greening the urban environment
- Natural views to be respected with a 3-storey limit on structures
- The potential of northern views to be explored
- Protect existing bio-diversity and increase bio-diversity by re-establishing rare species
- Create an awarenss of indigenous flora and fauna through education and demonstration
- Respond to the fact that bio-diversity in the Cape Floristic Region is under threat due to human intervention
- Approach the problem of invasive vegetation during the planning and design stages and via the EMP
- Respond to the issue of urban sprawl
- Work with and not in competition with other nature reserves
- Refrain from purely conserving and preserving, but rather efficiently manage the urban landscape
- Explore the potential for the development of a recycling centre, with materials being used in arts, craft and education
- Approach air pollution problems by promoting pedestrian and other sustainable methods of getting around
- Work with the current waste management method in Knysna, namely the Waste-by-rail, refer to the issues and problems, as well as the successes experienced (for example provide a unit in which inhabitants without jobs can separate and sort materials
- Explore the potential of education through waste
- Even though the waste system has a long term capacity, consider other methods of reducing and recycling waste

3.6.5. KNYSNA MAP ANALYSIS

- Promote pedestrianisation in the town by creating spaces in which the individual feels comfortable and safe to move alongside other circulation routes
- Respond to and rehabilitate where possible the existing open spaces within the urban area and make use of vacant, misused and brownfield sites for future open spaces
- Make use of views and features while creating links between environments with high sense of place and value
- Attempt to make edges permeable therefore increasing accessibility
- Examine the urban hydrology and stormwater management according to opportunities and constraints so that this urban resource is used to its full potential

3.7. BRIEF DEVELOPMENT

Due to the philosophical and theoretical investigation, as well as the urban context analysis, the project brief and site has evolved to incorporate an extended portion of Knysna's urban environment.

Pledge Nature Reserve is to form part of a Precinct development which includes re-use of mismanaged and vacant areas, while linking the nature reserve to the urban fabric and providing vital community amenities financed by viable economic ventures which are responsive to the ecological environment.

Two concepts explored for this urban intervention:

3.7.1. PRECINCT CONCEPT 1

3.75. Urban intervention Concept 1 (Knysna Municipality 2000 & Howard 2005)

3.7.2. PRECINCT CONCEPT 2: CHOSEN AS THE URBAN INTERVENTION PRECINCT

3.76. Urban intervention Concept 2 (Knysna Municipality 2000 & Howard 2005)