

**ENVIRONMENTAL IMPACT ASSESSMENT
OF TOURIST DEVELOPMENT AT
HIKKADUWA**

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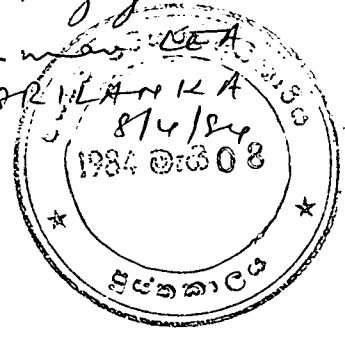
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ENVIRONMENTAL IMPACT ASSESSMENT
OF TOURIST DEVELOPMENT AT HIKKADUWA (SRI LANKA)

THE CENTRAL ENVIRONMENTAL AUTHORITY (SRI LANKA)

STUDY TEAM:-

N.D.DICKSON

RENTON DE ALWIS

PANI SENEVIRATNE

(MRS) REGINA SANTARRE

ANIL PREMARATNE

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A C K N O W L E D G E M E N T

The study team wishes to thank the Ceylon Tourist Board, Urban Development Authority, Coast Conservation Division and National Aquatic Resources Agency of the Ministry of Fisheries, the Central Environmental Authority and the Department of Wildlife Conservation for the co-operation extended by them in providing maps, data and information for this study.

The team also wishes to express their gratitude to the staff of the District Development Council Unit at Hikkaduwa, Hotel owners and the people of Hikkaduwa, for gladly responding to inquiries and providing information to carry out the study.

* * * * *

SUMMARY & CONCLUSIONS

The purpose of this study was to carry out an objective assessment of the environmental impact of tourist development which took place in Hikkaduwa since about 1966. The development was completely unplanned and brought about by free market forces responding to high rates of return to investment on tourism development in this area. There had been no Government investment on the development of infrastructure and back up services in this area in a conscious and programmed manner. The developers absorbed only those costs which were internal to their enterprises.

The increase in the intensity of tourist development created pressures on the available infrastructure facilities as well as on the coastal eco-system which has not been managed in any conscious manner. The exposure of the local population, particularly the younger generation to the negative aspects of tourism also has created problems connected with social values and attitudes.

Special studies were carried out in regard to the historical background, physical, social and biological environment of Hikkaduwa in order to provide a basis for the environment impact assessment of tourism development which took place in this area.

A closer examination of the historical development of Hikkaduwa as a human settlement reveals that as a Community the people of Hikkaduwa have exhibited a high capacity to withstand pressures generated by foreign influences and maintain their traditional social and cultural values. This could be considered as a very desirable factor which could mitigate the social impact of tourism on the people of the area.

An examination of the physical impact and land use of the area reveals that radical changes have been brought about creating many physical problems and conflicting situations. Intensive tourist development which has taken place in a linear fashion particularly on the seaward side of the Galle Road has obstructed access to the beach and also the view of the beach from the Galle Road. Complete absence of planning has brought about many land use conflicts such as the existence of schools amidst tourist hotels, lack of space for the expansion of community facilities, etc.

In terms of the social impact of tourism there is clear evidence that the crime rate of the area has increased and the type of crimes such as those connected with narcotics dealings, sale of illicit liquor and sexual crimes have increased together with the expansion of tourism.

There is also positive evidence that the school drop-out rate has increased since about 1970.

Economically, the impact has certain positive features. The income levels of persons engaged in tourism activities either directly or indirectly have increased, while employment opportunities in tourism and related activities have ^{also} considerably increased. Due to the existence of an informal sector connected with provision of services to tourists, including manufacture of handicrafts, etc, the multiplier effect of tourism is very high. Therefore, it could be stated that when both economic and social effects are taken into account, the tourism has a mixed impact. It is strongly felt that when a more orderly development is introduced, the social effects will be considerably eased.

A detailed examination of the impact of tourism on the biological environment reveals that there exists many serious problems connected with the coral reef, stability of the beach, aquatic life, fauna and flora. These problems if aggravated, could threaten the very existence of tourism in this area.

The Environmental Impact Assessment which is given in chapter VI has attempted to provide some quantitative basis to the impacts of tourism development

and also the remedial measures, which are proposed. The positive economic impacts are very evident. However, in order to make the economic base more stable and also to eliminate conflicts with social, physical and environmental objectives an orderly and planned development with emphasis on resource management will have to be introduced. The introduction of a physical development plan with provision for regulation of tourist activities, provision of a by-pass to Galle Road, (in the long term) provision of access to the beach at regular intervals, including adequate reservations to the beach are some of the important proposals. The provision of a beach nourishment scheme and the management of the coral reef and the marine environment are the other important proposals which have been made.

The 'Marine Park' at Hikkaduwa which will be introduced by the Dept. of Wild Life shortly, will not only help to protect the coral reef and the marine environment, but also promote tourism in Hikkaduwa.

* * * * *

F O R E W O R D

The Central Environmental Authority required three development projects in Sri Lanka assessed by applying the Environmental Impact Assessment Methodology developed by the United Nations Environmental Programme (UNEP). One of these is the Tourism Development of Hikkaduwa. This study was required to assess the physical, biological and socio-cultural impacts of the development. The methodology and proposal submitted by the study team to carry out this assessment was accepted by the Central Environmental Authority, on October, 29th 1982.

The tasks to be covered by this study were also submitted to the Central Environmental Authority together with the proposal and the tasks were assigned to members of the project team depending on their specialisation and background. These tasks were then carried out by the respective members in consultation with each other in order to avoid duplication.

METHODOLOGY

The test model presentation contained in United Nations Environmental Programme (UNEP) publication on the Environmental Assessment Statements of March 1980 provided the basis for most of the work of this study.

The Methodology developed by the United Nations Environmental Programme (UNEP) in this study involves application of some form of social cost benefit evaluation to provide an overall assessment of projects which have serious environmental impacts. The application of this methodology to evaluate a project of this nature involves two problems :

They are ;

(i) Definition of the project :

The tourist development at Hikkaduwa which commenced in the 1960s is still continuing. It includes all important activities connected with tourist development which have implications and impact on resource depletion and enhancement. Identification of all such activities quantitatively is a major problem as the development has been carried out by a large number of individual citizens on their own free will.

(ii) The quantification and valuation of the enhancement and depletion levels of resources, in an objective manner is another major problem, that a study of this nature has to face with.

In order to ensure that subjective and

individual value judgments are not engulfed, certain assumptions had to be made regarding the basis of such valuation and how it is derived. When many social judgments have to be quantified and presented in pecuniary terms and presented in the same balance sheet with values for directly quantifiable items, great caution had to be exercised to ensure that the situation under consideration was not distorted in any way. In many cases the opinions and valuations expressed by the local public and experts in the respective fields have been used.

While environmental impact assessment forms the key element of the study, chapters have been included on the historical background, physical, socio-economic and biological environment and recommendations concerning actions to be taken to reduce resource depletion and promote resource enhancement. It is felt that the study will be of benefit to the Government Agencies and persons who are concerned with development activities in the area.

Source of Data :

The study team was able to utilise much data and information already collected by agencies such as the

Urban Development Authority, the Ceylon Tourist Board, Coast Conservation Division of the Ministry of Fisheries and the National Aquatic Resources Agency (NARA). It was also possible to utilise some individual research work carried out by members of the team as well as the staff of the above agencies, in their personal capacities.

After examining the adequacy of the information base available from the above sources to carry out the proposed tasks, some individual team members had to carry out a few random surveys, to collect data and information that was needed to carry out the tasks assigned to them.

Certain assumptions had to be made in the study as it involves the understanding of the situation that existed in the area about 15 - 20 years ago and where no material evidence could be established regarding the situation prevalent in consultation with people knowledgeable of the area. An accurate quantitative assessment of the situation that existed 15-20 years ago is a very difficult task. The study team is however confident that this factor will not affect the validity of the conclusions made in this study.

* * * * *

CHAPTER 1.

I N T R O D U C T I O N

- 1.1 Tourism is an industry which contributed in a large measure to change the economic base and orientation of the Sri Lankan economy. With the decline of income from traditional exports like tea, rubber and coconut, the non-traditional sectors such as 'Gems' and 'Tourism' came up in importance as new sources of National income and Foreign Exchange of the country in 1960s. For example in 1978, the total foreign exchange earned from tourism was Rs.870 Million, which increased by 350 percent to Rs.3050 Million in 1982. Because of the increase of incomes from Tourism, the financial stimulus to those who were directly and indirectly involved with tourism increased, which resulted in the construction of new tourist hotels, restaurants and other tourist facilities. The physical, social and environmental impact of such a development taking place in tourist oriented areas was considerable, but varied according to the character and the socio-economic background of the areas concerned.

- 1.2 The Tourist Board which was established in 1966 formulated policies for tourism development. The country was divided into 7 tourism development regions and guidelines were provided regarding maximum room capacities in each development region. These regions are :-
- a. Colombo City Region
 - b. Greater Colombo Region
 - c. South Coast Region
 - d. East Coast Region
 - e. Hill Country Region
 - f. Ancient Cities Region
 - g. Northern Coast Region
- 1.3 The Tourist Board Act provides powers to the Board to develop Tourist Resorts and carry out planned development within the resorts. However, a resort of any significance has been created only at Bentota on the Southern Coast and action is now being pursued to develop similar resorts at Passekuda and Nilaweli on the East Coast Region. Small extents of land have been acquired and Tourist Board Guest Houses, etc, have been constructed in other areas too. But no comprehensive and planned development of Tourist areas has been carried out.

- shops, entertainment facilities, sports and travel, handicrafts and industrial products. The interaction of tourists with locals also has produced, 'spread' and 'multiplier effects' of development on the local community which would have been much more limited if the development was well planned and centrally controlled, such as at Bentota.
- 1.5 The unplanned development also had its undesirable effects. The free interaction of tourists with local people, who may not have had a good education or an understanding of business dealings has resulted in foreigners financing and running tourist restaurants and other enterprises, violating foreign exchange regulations and laws of the country. Due to the lack of controls, and comparatively low cost of living, this area attracts many low-spending tourists and those who seek drugs, sex, etc, who can satisfy their aspirations easily in this area than in other formally organized areas. The behaviour of such tourists in increasing numbers and in close contact with the young population of the area may have affected their standards of morality, attitude to sex, marriage and family life. The low-income groups are subject to such influence, more strongly than the well to do.

Therefore, tourism development which took place in the Sixties and Seventies in increasing vigour had varying impacts on areas, depending on their socio-economic background, physical characteristics and the nature of the ecological systems.

- 1.4 In the South-Western and Southern Coastal belts, several areas picked up rapid tourism development such as Negombo (Lewis Place), Mt.Lavinia, Beruwala, Bentota, Hikkaduwa and Koggala. At Hikkaduwa, the main attraction was the Coral Reef, and the quality of its marine environment. Its location on Galle Road with convenient access by road and rail transport gave a further stimulus for development. The local people who had acquired savings from the traditional sectors of the economy such as fishing, coral mining, cinnamon or other agricultural and business pursuits invested money on hotels, restaurants, guesthouses, shops on a recurrent basis in addition to the limited investment which came from sources outside the area. Increased participation of the local community in tourist development, in a free-market-situation, appears to have created a large 'informal' sector in tourism business covering guesthouses, restaurants, batik and curios

- 1.6 The complete absence of a regulatory mechanism and a physical development plan has resulted in a haphazard development particularly of the coast line. This led to undue sacrifices of very valuable natural resources and assets, without proper realization of the long term implications. The area that was subjected to heavy pressures of development at the initial stages is the section between the present Coral Surf Hotel to the North and Coral Sands Hotel to the South. The area is a very narrow strip not normally suitable for any building development. The width of the high-ground, after leaving out the road reservation varies between 30ft. to about 70ft. at few places. Due to non-imposition of a coastal reservation by the Ceylon Tourist Board or the Town Council, (Hikkaduwa) at the early stages, Hotels have been constructed right up to the beach, in order to utilise land to the maximum and on the assumption that more tourists could be attracted if the hotel leads direct to the beach. However, within a few years it was revealed that the problem of beach erosion occurs intensively in this area, mainly due to the construction of vertical walls or buildings on the beach. Due to wave action, particularly during the high-tide, the sand which forms the beaches are carried away back to the sea

thus aggravating the problem of erosion each year. The reaction of the hoteliers who are affected by erosion was to construct more and more retaining walls every year encroaching on to the beach and the sea, fill the area between the buildings and retaining walls with sand and convert such spaces as part of their hotel premises. This process on the one hand resulted in encroachment of the sea and on the other hand reduction of the beach area available for use and recreation. The beach area on this stretch has been reduced to about 800 sq. metres, while at certain places (behind Coral Rock and Sea Sands Hotel), no beach exists at all requiring tourists to get into the sea direct from the hotels.

- 1.7 The reduction of the beach area in this section of Hikkaduwa, which is the heart of the tourist area, constitutes the depletion of a very valuable natural resource. Since tourism in this area depends on the beaches, the loss of beach could hamper economic benefits that accrue as a result of tourism permanently. The construction of many big and small hotels on this narrow strip has prevented the possibility of converting this section as a beautiful marine park, and the construction of hotels on the land side of

Galle Road opposite such a park. Such a development also would have created the possibility of conserving National assets such as the beach, the marine environment and vegetation along the beach while at the same time providing for Tourism development. Such a planned development also would have enhanced the aesthetic appearance of the area.

Due to reduction of beach area towards the North of Coral Gardens Hotel, the development has later concentrated to the South of Coral Gardens Hotel, where the land strip between Galle Road and the beach is about 200 ft. wide at many places. However, hoteliers are anxious to put up buildings covering the entire premises without any reservation to the beach creating problems of beach erosion behind hotels. A satisfactory beach reservation could easily be introduced in this section of Hikkaduwa.

- 1.8 It was also observed that a reasonably good development cannot be effected in this area without land pooling to form blocks of suitable sizes due to individual ownership of very narrow strips of land.

- 1.9 The tourism development at Hikkaduwa has extended to the South in a ribbon like fashion upto Dodanduwa during the recent years. The availability of land with a wide beach and lack of building controls, have promoted the development of this section in a very informal manner. Erosion is also being experienced in sections of the beach in this area, but no major damage has yet taken place.
- 1.10 Towards Wewala, Narigama & Dodanduwa, small guest houses, and houses converted to tourist activities have come into existence, encroaching into the beach in a few cases.
- 1.11 Apart from the beach, the entire marine environment which consists of the coral reef, aquatic life and vegetation is subject to serious depletion due to unplanned and uncontrolled use of these resources in the activities of tourism, fishing and of coral mining. While these aspects will be dealt with in detail in the following chapters, an attempt has been made in the study to consider and evaluate the socio-economic, physical and biological considerations of resource use in order to formulate the basis for ^{an} environmentally sound development plan for the area.

CHAPTER 11.

H I S T O R I C A L B A C K G R O U N D

- 2.1 Evidence of early human settlements in the Hikkaduwa area dates as far back as the 3rd Century B.C. when the Rohana Provincial Kingdom was established. However, these settlements were not in anyway dependent on ocean or coastal resources and were basically communities that depended on inland resources.
- 2.2 The first reported historical incident of significance which indicate a coastal settlement is found in the 14th Century during the reign of Parakramabahu 11 in Dambadeniya. During this period a warrior chieftain Devapathiraja was sent to the south-west to wage war against the South Indian invaders who were occupying this territory. The area where he camped is now called Dodanduwa and is the area bordering Hikkaduwa to the South.
- 2.3 Subsequent to this a large group of Indian soldiers belonging to the Kuru race arrived in the Hikkaduwa area at the invitation of the Sinhala King to fight the moors who invaded the coastal areas. They were later rewarded with land by the king and were

settled in these areas as coast-guards. The king also arranged for them to be paid wages for their services. The Kuru race is identified as the origin of the Karawa caste that consists of about 60 per cent of the present population of the area.

2.4 During the 14th Century the major economic activity in the area was Cinnamon growing, which was the occupation of the Salagama caste. Since adequate wages were not paid to those employed in this industry by the King it was regarded as an activity carried out by outcastes. The emergence of the Dodanduwa bay as a harbour was due to the cinnamon trade which was conducted mainly by muslim traders.

2.5 There is evidence that the Seenigama Bay which is situated immediately north of Hikkaduwa was also used as a landing point for trading in cinnamon at this time.

2.6 With the arrival of the Portuguese in Sri Lanka in 1505 and the establishment of a Fort in Galle, the coastal area from Galle to Balapitiya became even more important as a cinnamon growing area. During the period of the rule of the Portuguese and later of the Dutch, ^{the} majority of the lands in these areas including paddy lands were utilised for cinnamon

growing. This resulted in landlessness among the traditional farming group (the Govigama caste) and forced them to work as labourers in the cinnamon plantations or migrate to other areas.

2.7 The Dutch identified the importance of the Salagamacaste as cinnamon growers and provided them with special incentives, and positions to ensure that cinnamon production was maintained. This resulted in people belonging to the Salagama caste establishing a loyalty to the foreign colonials and assisting them in missionary work to spread christianity. This group also became a land owner-community leader group as a result of the sponsorship of the Dutch rulers.

2.8 During the Dutch period, use of lime obtained from coral and the use of coral chunks as bricks in the construction of Forts and buildings was introduced. This resulted in the development of a coral mining and lime production industry in the Akurala, Seenigama, Hikkaduwa areas, among other areas of the South Coast. This activity was carried out by the Hunu caste. Fishing was only carried out as a marginal activity at this time and was the trade of the landless peasants belonging to the Karawa and Salagama castes.

- 2.9 An inland canal system set up by the Dutch connected the Galle area with Colombo and Puttalam in the West Coast. This also resulted in increasing the activity level of coral mining and cinnamon growing as these waterways were used to transport the produce to Colombo and to Galle. Hikkaduwa Oya, and the Ratgama lake were important water bodies that served the canal network.
- 2.10 In the post 1798 era, when the British took over the rule of the coastal areas from the Dutch, the economic importance of cinnamon growing declined rapidly with the growing of coconut replacing it. Since coconut growing did not require as much labour as for cinnamon, there was a situation of unemployment created, and most unemployed of the Karawa, Salagama and even Govigama castes, chose fishing or lime production as a means of livelihood. This situation also resulted in the emergence of the importance of a new group of people in the area; the toddy tappers who belonged the Durawa caste. However, toddy tapping did not establish itself as a major economic activity in the Hikkaduwa area as much as it did in the Panadura and Kalutara areas. Another factor that contributed to the limited growth of toddy tapping in the area was the Temperance movement of the early 1900s which was

- directed against the British rule and its excise policy. Some of the Temperance movements' leaders were from the Southern coastal areas, and this led to it having a widespread influence in the region.
- 2.11 This development also resulted in further displacement of workers who took to coral mining, lime production and fishing as a profession. By this time the area had become a major coral mining and lime production centre and in 1895 a special railway platform for loading and unloading coral was constructed in Hikkaduwa. In addition the coir industry based on coconut huskings, also developed as a cottage industry mainly employing women and children in its activities.
- 2.12 In the 1900s, ^{the} Hikkaduwa coral reef and the coral garden headland became a popular picnic spot for British administrators. The establishment of the Hikkaduwa Rest-House made the adjacent area a popular bathing and recreation centre in the years to come.
- 2.13 In the political arena Hikkaduwa in common with the adjacent townships of Ambalangoda, Dodanduwa and Balapitya produced active Nationalist support for the Independence movement in the first half

of the 20th Century. The low level resource base, high population density, unemployment that prevailed in the area, and the relatively high level of literacy and political awareness, created as a result of the missionary educational infrastructure and the involvement in the Temperance movement respectively, a political base in the Hikkaduwa area as much as in the other southern coastal areas. These areas acted as strongholds of the marxist political parties in the pre-independence era and in the post independence era.

2.14 Culturally, Hikkaduwa and adjacent areas maintained their Buddhist religious identity (with a touch of the Hindu influence) in spite of the penetration of the Dutch and British missionaries through the educational medium. While Dutch and British architecture was adopted by the locals, they maintained their traditional rituals and other cultural practices, which have been revived today in the form of low country dances ('yaga', 'tovil') mask making and other handicrafts to cater to tourism demands.

2.15 In the present context of the social organization of the area, one could trace the predominantly caste oriented structure which is identified as a

historical phenomenon associated with relative importance of the economic activities carried out by these caste groups in different periods. What is left today is only a broad caste identification with the 'salagama', 'karawa', and 'hunu' castes involved in activities such as fishing, coral mining, tourism, teaching, government employment, etc. without any caste specific orientation as in the past.

2.16 However, there is still evidence of caste consciousness in common issues such as politics, administration, etc, which surface in crisis situations in the community. Tourism which developed in the post 1966 era in Hikkaduwa, first as an informal activity and then as an organized sector had resulted in further reducing the caste orientation in the community, by providing common opportunities for economic advancement.

2.17 Hikkaduwa, today remains a community, similar to what it was in the Dutch and British periods, where new economic opportunities (cinnamon and coconut then; tourism today) together with social and cultural change agents (christianity, missionary education then; new western values and modes associated with tourism today) are at play which

has exhibited a great deal of tolerance and absorption capacity in its historical past.

CHAPTER 111.

P H Y S I C A L E N V I R O N M E N T3.1 General

Hikkaduwa Town is situated in the South West Coast of Sri Lanka within Wellabada Pattu AGA's Division in Galle District. It is located 60.5 miles south of Colombo and 10.5 miles north of Galle. The total extent of land falling within the Hikkaduwa Town Council area is approximately 300 acres.

The area has a temperate climate and the average annual rainfall exceeds 2000 milli-litres.

3.2 Marine Environment

Hikkaduwa is one of the main tourist resorts of Sri Lanka which is based largely on its attractive beach and the coral reef. The presence of the coral reef, the aquatic life and the marine vegetation that goes with it provides a unique underwater environment. The shallow sea at the coral reef provide a very beautiful view of the underwater plant and aquatic life with varied formations of corals on the background.

At the edge of the coral reef there are beautiful rock out crops rising from the sea bed, which had been a nesting place for rare varieties of birds many years ago and the area had been designated a bird sanctuary.

The growth of tourism in this area in an unplanned and uncontrolled manner is causing serious problems on the maintenance of this marine environment without allowing its quality being depleted. The Department of Wild Life together with NARA (National Aquatic Resource Agency) has already contemplated the establishment of a Marine Sanctuary covering the coral reef and the related environment. The main objective is to ensure that human activities particularly connected with Tourism, such as water sports, fishing, coral mining, etc, do not create conflicts with the fragile eco-system that sustains the marine environment.

The sea with these natural endowments provide the marine economic base of Hikkaduwa. Fishing, Tourism, and Coral mining are at present the main sources of income for its population. The manufacture of coconut fibre products is another important source of livelihood mainly for females. The existence of resource use conflicts within and between the

different economic activity sectors has caused a situation that leads to the depletion of some of the resources. These aspects will be dealt with in greater depth in later sections.

3.3 Physical setting

The land to the west of the railway line is mostly high ground and most commercial, public buildings, hotels, restaurants and permanent houses are located on this side. An extensive low lying area also exists on the fringe of the built up area.

There is a major canal known as Kuduwegoda Ela providing an outlet for the surplus rain water to the sea. The outlet of this canal is closed during most part of the year but during the rainy season when the water level rises the outlet needs to be opened up by the Irrigation Department to enable adequate flow of water to the sea, in order to prevent inundation.

Opinions have been expressed by experts that the in flow of fresh water to the sea where the coral reefs are located result in damage to the coral. It was recommended that this outlet to the sea be diverted. This may require further investigation, as closing of this canal could create flood

problems in the surrounding areas.

The topography of the area to the East of the railway line is conditioned by highland where roads and buildings are located, interspersed by low lying areas some of which are paddy fields. There are several public roads to the East from the Galle Road leading to the surrounding villages and also connecting other towns to the east. They are the roads to Egodagoda, Kurunthuwatta, Baddegama, Amarasena Mawatha, Road to Wewela and Pannamgoda Road.

3.4 Land use classification

For the purpose of assessment of land use characteristics, the Hikkaduwa T.C. area can be divided into 6 environmental areas as follows :

Environmental area No. 1

Boundaries - Hikkaduwa T.C. boundary to North; Coast and railway line to the West and East respectively, and Kurunduwatta Road to the South.

Features - Low residential and mixed commercial activities. Area is mostly high ground, no good hotel development has taken place - very little vacant land is available.

Buildings consist mainly of old structures in this area. Due to erosion, there is no land available for any building development between the sea and the road. However, there is little land available between the railway track and Galle Road, partly occupied by old buildings which can be put to better economic use.

The sharp bend of the Galle Road on this stretch, needs re-alignment together with the development of vacant or underutilised land. These should be considered as priority action projects. The old dilapidated buildings located between the beach and Galle Road, which obstruct the view of the beach should be removed and re-located on the landward side of the road. Since this section of road forms the main approach to the Hikkaduwa Town from Colombo, this area needs to be developed in a planned manner.

Environmental area No. 2

Boundaries - T.C. boundary to the North East and the continuation of Kurunduwatta Road to the South and the railway line to the West.

Features - This area is highly residential in character. It also reflects a very high proportion of mixed uses. Being the traditional village it is also the location of a number of temples. The area has a very high percentage of vacant lands. No development of tourist hotels has taken place in this area except for the conversion of a few houses as guest houses.

This part of Hikkaduwa has been annexed to the Town Council area, not due to its urban character, but because it houses the residential population. It is also noted that this area has not been affected by tourism development to a noticeable degree. It is unlikely that the area will open up for tourism even in the future. However, there is potential in this area for developing a handicraft industry based on local skills.

Environmental area No. 3

Boundaries - Kurunduwatta Road to the North: Town Council boundary to the East; Baddegama Road to the North and the coast line to the West.

Features - Area has a fairly low residential land use and is mostly high ground. Commercial activity is predominant; vacant land is very insignificant. Except to the East of Railway line there is no significant development connected to tourism.

This area consists of the heart of the Town Centre including the main commercial area, the railway station, new bus stand (for Galle Road and Baddegama buses). To the East of the Railway station there is a large vacant land triangular in shape, with the office of the A.G.A., etc, located within it. This area could be planned as an administrative centre for the whole town, to which all haphazardly located Govt. Offices and activities which occupy congested sites in Tourist and Commercial areas of the City could be shifted. Furthermore some planned efforts could be carried out to promote the development of the City Centre to some extent in the East-West direction along Baddegama Road and discourage further intensive growth of the Town in the North-South direction along Galle Road. The planning of the Railway station area and the bus stand should be used as an opportunity to provide a

better and convenient pedestrian circulation system and eliminate the present confused mix of activities such as commercial, educational, and tourism.

Environmental area No. 4

Boundaries - The area is bounded to the North by the Fisheries Housing Scheme, to the South by the Town Council boundary and to the West and East by the Coast line and the Railway line, respectively.

Features - The area has low residential activity (in terms of housing) but contains the dominant tourist hotel belt.

The area consists mainly of high ground. Commercial activities also continue along either side of Galle Road. Every vacant site is now being built upon, thus reducing open spaces available between the road and coast.

The hotels located to the North of Coral Gardens are having serious problems of erosion and the hoteliers are trying to protect their land and

buildings by constructing retaining walls on the beach or the sea. This has resulted in the reduction of the beach area with the problem of erosion becoming increasingly acute. A satisfactory technical solution has to be found for the improvement of the beach by a sand nourishment scheme or by the demolition of retaining walls which encroach the beach.

In case of hotels located to the South of Coral Gardens no planned development has taken place, thus reducing the quality of the visual environment. The limited size of land parcels act as a constraint to planned development. The construction of hotels on the beach side of Galle Road in a continuous manner has resulted in covering up access to the beach from Galle Road at regular intervals. However, due to the substantial width of sites available on the beach side it would be possible to maintain an adequate coastal reservation to the beach, and promote planned development.

The development that has taken place on the land side of Galle Road is unplanned in many places. This may again be due to smallness of sites. It is suggested that areas along Galle Road, which are not occupied by Tourist Hotels be planned out

in detail and leased out to developers on a guided development basis. The other alternative is to invite detailed development proposals from prospective developers.

Another important observation that could be made is the inadequate carrying capacity of Galle Road within the entire town council area. Presently, there is a large volume of informal activities and pedestrian traffic on Galle Road at Hikkaduwa, which has to be accommodated in addition to the volume of through-traffic. It is noted that both demands are difficult to satisfy as the road width in many places is limited to about 25ft. It is therefore recommended that the through-traffic be diverted on a new by-pass road to be constructed about 1 km. to the East of the present road.

This will enable the utilisation of the present road mainly for local requirements with properly designed street scapes, and pedestrian walkways.

Environmental area No. 5

Boundaries - Baddegama Road to the North, railway line to the West, the Town Council boundary to the East and the Public road to the South.

Features - The area has a medium residential density and also has a high percentage of mixed development, with guest houses and other tourist activities to which residential premises have been converted. The area also has a very high proportion of low lying lands, some of which are in agricultural use. The area had no commercial activities. Its land use pattern reflects a significant percentage of agricultural activities with only a very small number of hotels.

The area indicates a gradual transformation to tourist activities. Most of the houses in the area are converted for tourist accommodation. The introduction of some planned guidelines will help to prevent physical and social degradation that usually arise as a result of the development of uncontrolled tourism.

Environmental area No. 6

Boundaries - Railway line to the West, Town Council boundary to the East and South, Public Road to the North.

Features - The area is predominantly residential in character with very little mixed uses, and a temple. The land is of a high elevation with a few vacant sites within the area. There are no hotels except for a few houses which are converted as tourist accommodation.

Some traditional arts and crafts could be developed in this area with a view to cater for tourism. The nature of tourist activity to be permitted in this area need some regulation both for enhancing physical environment, and for ensuring sound socio-cultural and economic development.

3.5 Road network and transport

The width of Colombo - Galle main road varies from 25 to 30ft, and is subject to heavy pressure on account of increased road usage due to tourism. The daily traffic volumes have increased to 7400 p.c.u. The road capacity also is being encroached by Tourist Shops on road sides which are constructed during the tourist season, obstructing the traffic flow. The result is the increase of congestion and rate of vehicle accidents which has increased from 6 in 1971 to 31 in 1980. The social cost of

congestion has considerably increased and the possibility of road widening and improvement also has been considerably reduced due to the construction of buildings without an adequate road reservation. Some buildings have been constructed without adhering to the street line requirement.

3.6 Infrastructure

a. Roads and Transport -

While the Galle-Colombo road is the major bus route in the area, Hikkaduwa-Baddegama Road should be considered as the important route providing access to the interior. The following internal roads are also available for use of light vehicles :

- | | |
|----------------------------|-----------------------------|
| 1. Hettigoda Road | - 1.5miles long 10ft wide |
| 2. Amarasena Mawatha | - 1.0mile long 10ft.wide |
| 3. Wawalagoda Road | - 2.0 mile long 10ft.wide |
| 4. Pannangoda Central Road | - 1.0 mile long 10ft.wide |
| 5. Wawalagoda-Wewala Road | - 1.5 miles long 10ft.wide. |

These roads are narrow with poor alignment and steep gradients. But their useage has increased due to an increase in the number of housing units constructed and the conversion of some houses for tourist activities.

The number of buses and trains per day operating to Hikkaduwa and beyond during 1980 were as follows :

Trains	-	28
CTB Buses	-	526

In addition, there were 53 cars and coaches, 42 motorcycles and 164 bicycles. With the introduction of private buses, the numbers going through Hikkaduwa have considerably increased during the past few years. The mixture of through traffic and local traffic and also vehicles of different speeds have affected the movement. Pedestrian traffic, particularly during the tourist season has considerably increased with the construction of tourist shops in a ribbon form on either side of the Galle Road. These encroach into the carriage width of the road and affect the efficiency of traffic movement, causing accidents in many instances.

b. Water supply -

A new water supply scheme for Hikkaduwa - Dodanduwa area was completed in June 1982 with a daily supply capacity of 150,000 gallons. The water is being pumped from Gin - Ganga at Halpatota. This scheme was initially planned

for dwelling houses aiming at a target of 20 gallons per head. The new tourist hotels and guest houses are also supplied with water from this network at present and the capacity of this watersupply scheme need to be increased to cater to both residential and tourism demand. However, certain interior areas are still not provided with water from the main supply. Domestic wells are the major source in such areas and the quality of water is quite satisfactory. According to 1971 statistics, there are about 500 wells in the Hikkaduwa T.C. area, of them 70% are shared by more than one family.

c. Electricity -

The existing electricity supply does not cater to the demand in the area specially during the tourist season. It was found that frequent power failures occur and the voltage is below normal. The hoteliers have frequent complains about the insufficient power supply. The network needs improvement to ensure an efficient supply.

About 45% of the total number of houses located mainly along the Galle Road in the T.C. area obtain electricity through the main power supply.

As in any other town, street lighting is the other factor which needs improvement specially along the Galle-Colombo Road and the Baddegama Road. According to the Police this is one of the major factors causing accidents in the T.C. area.

The beach is not illuminated at all by public lighting. This creates a deadness of beach in the night and pave way for illicit activities.

d. Sewerage -

The growing tourist development at Hikkaduwa demands a central sewerage system which is not available at present. The tourist hotels use septic tanks for disposal of sewerage. Although these tanks are emptied annually, the Public Health Authorities complain that they often overflow causing inconveniences to the residents and tourists and also pollute the coastal waters, and the beaches.

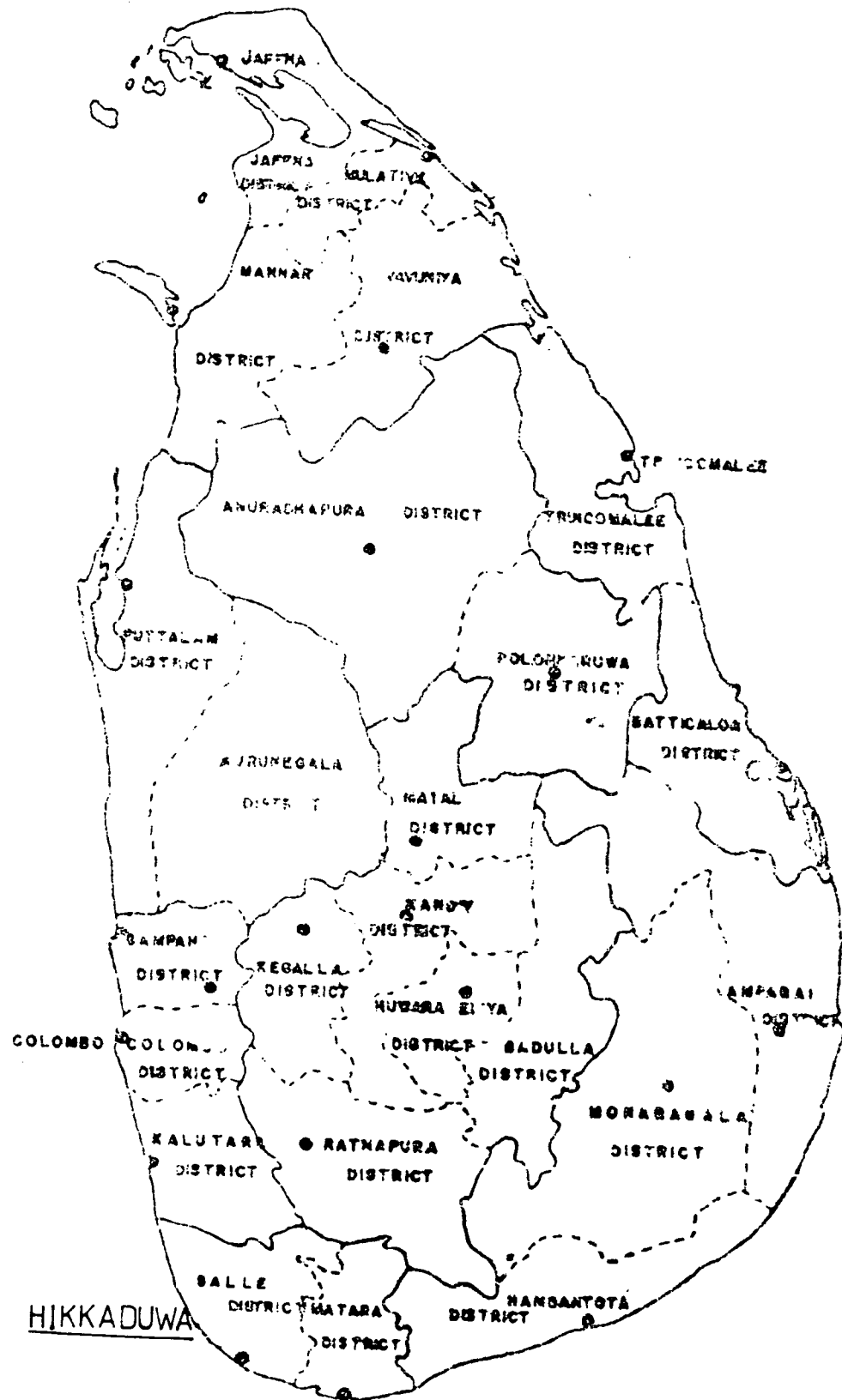
Among dwelling houses, about 35% do not have any toilet facilities. Those who live by the sea-shore use the beach as soiling ground thus causing a problem of beach pollution.

There are about 36 public bucket latrines constructed by the Hikkaduwa T.C. for which a private land is used as the trenching ground.

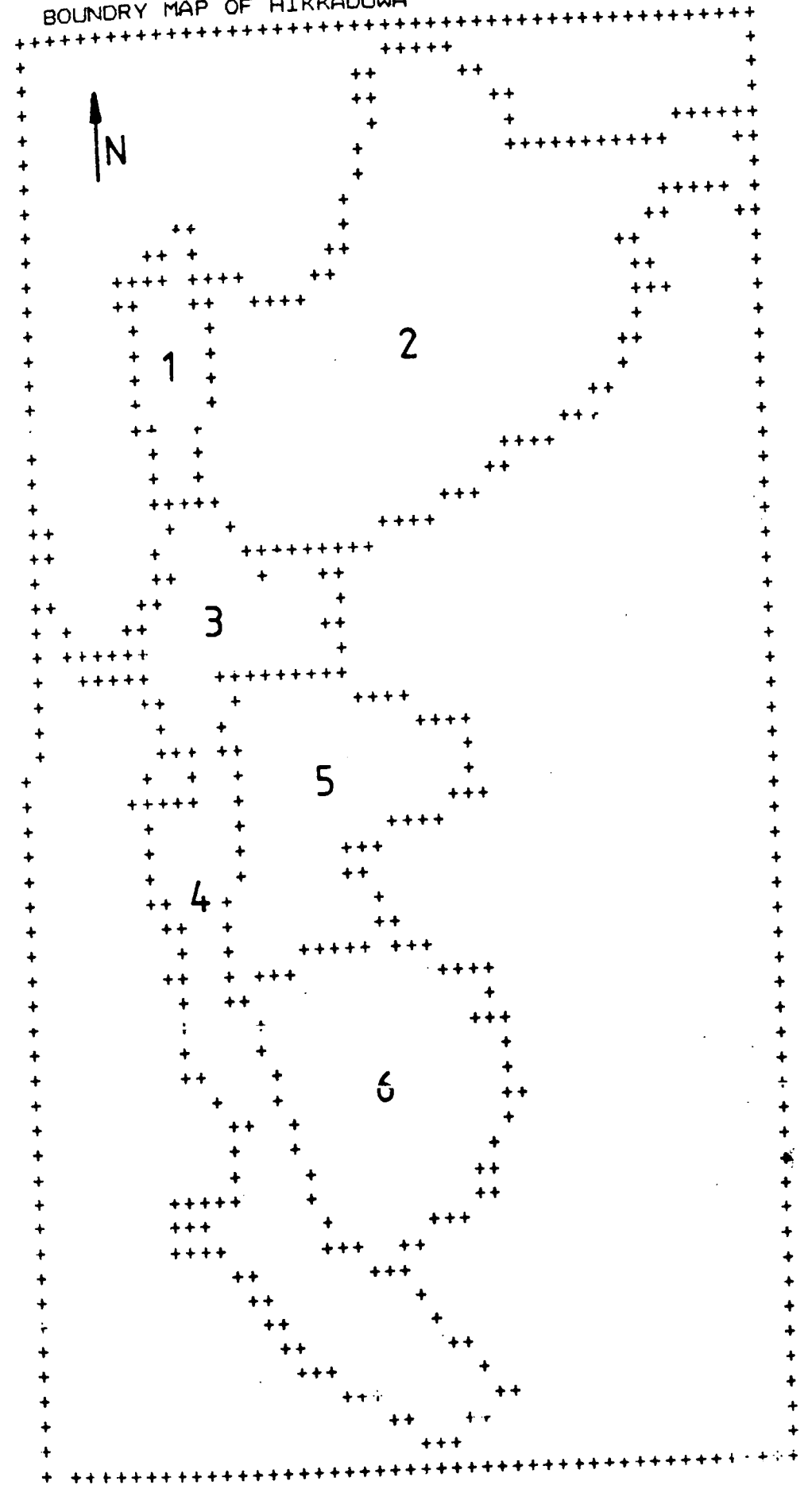
The table shows the distribution of the type of toilet facilities available in the town.

Water seal	-	230
Bucket latrines	-	33
Pit latrines	-	65
Non users	-	185

MAP OF CEYLON WITH LOCATION OF HIKKADUWA

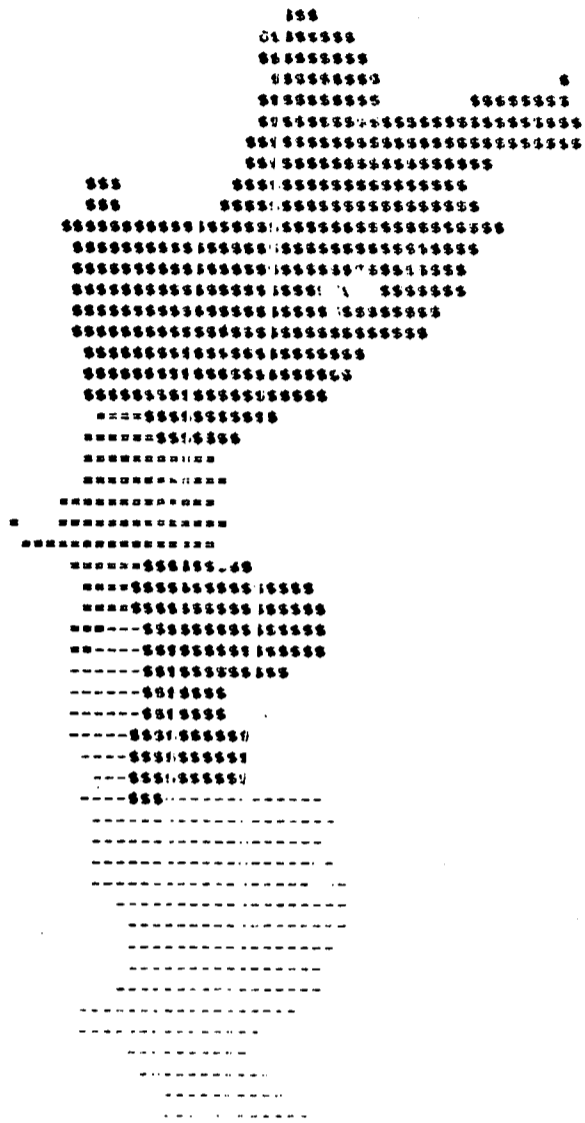


ENVIRONMENTAL AREAS
BOUNDARY MAP OF HIKKADUWA



DENSITY OF MIXED AREAS

DENSITY OF MIXED DEVELOPMENT ACTIVITIES IN HIKKADUWA

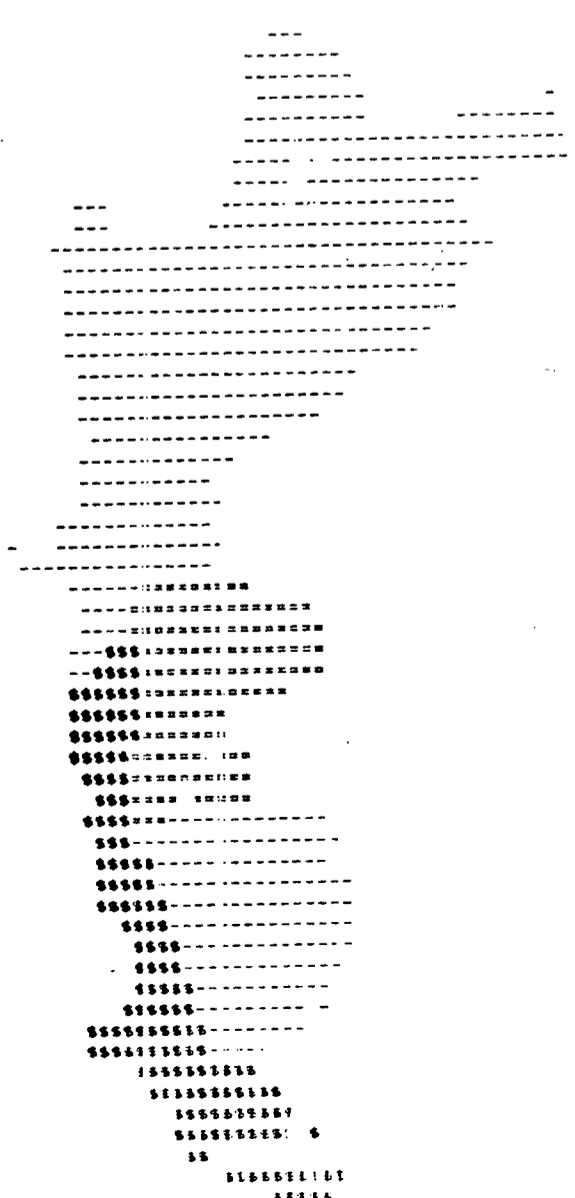


Den. of Mixed

----	3.34071159E-05
----	4.97418750E-05
----	6.60766341E-05
----	8.24113932E-05
----	9.87451523E-05
----	1.15000911E-04
----	1.31415670E-04
----	1.47750429E-04
----	1.16408518E-03

03
03

DENSITY OF HOTEL DEVELOPMENT
HOTEL DENSITY IN HIKKADUWA

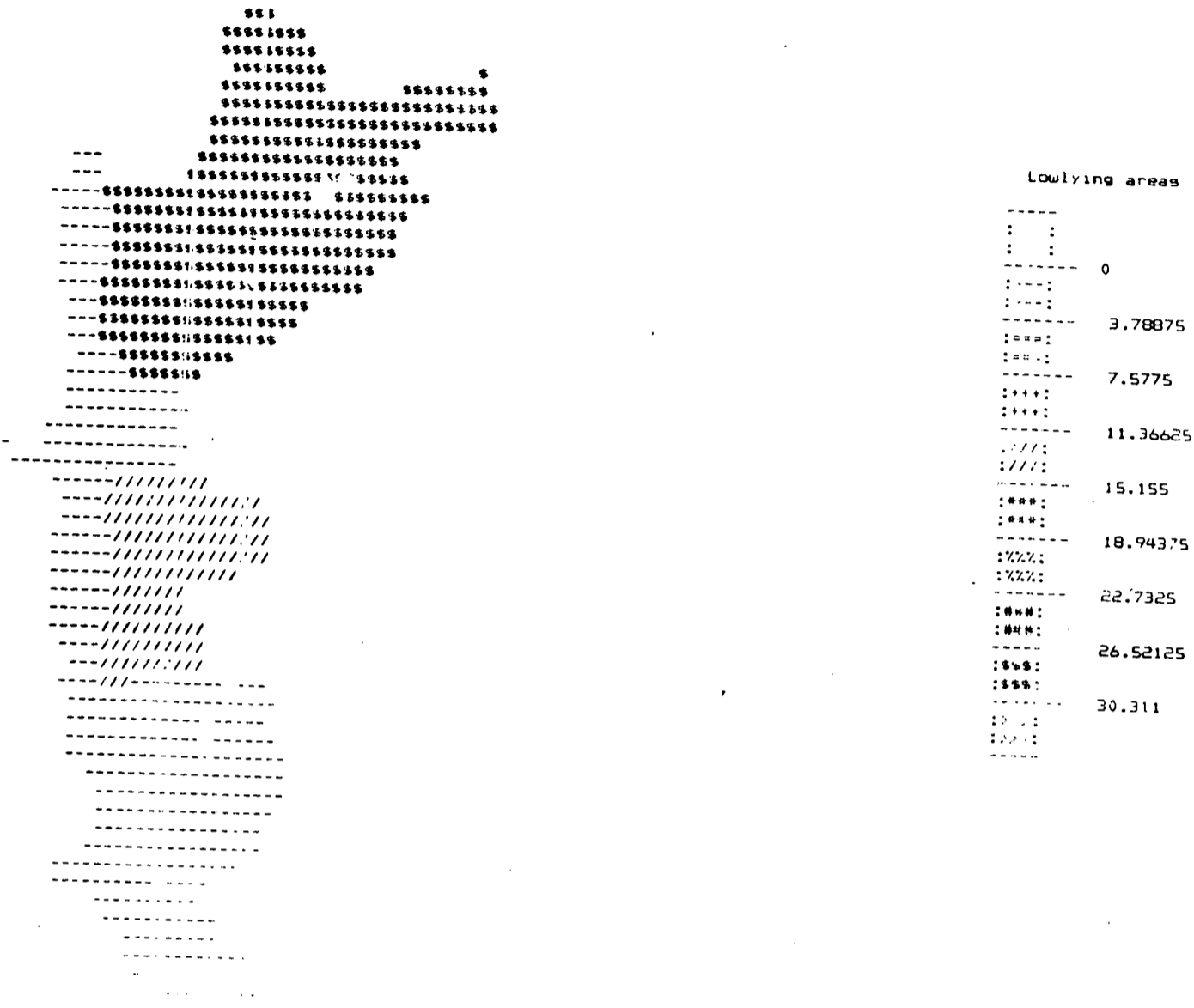


Den. of Hotels

----	0
----	5.13237005E-05
----	1.02647401E-04
----	1.53971101E-04
----	2.05294802E-04
----	2.56618502E-04
----	3.07942203E-04
----	3.59265903E-04
----	1.41058960E-03

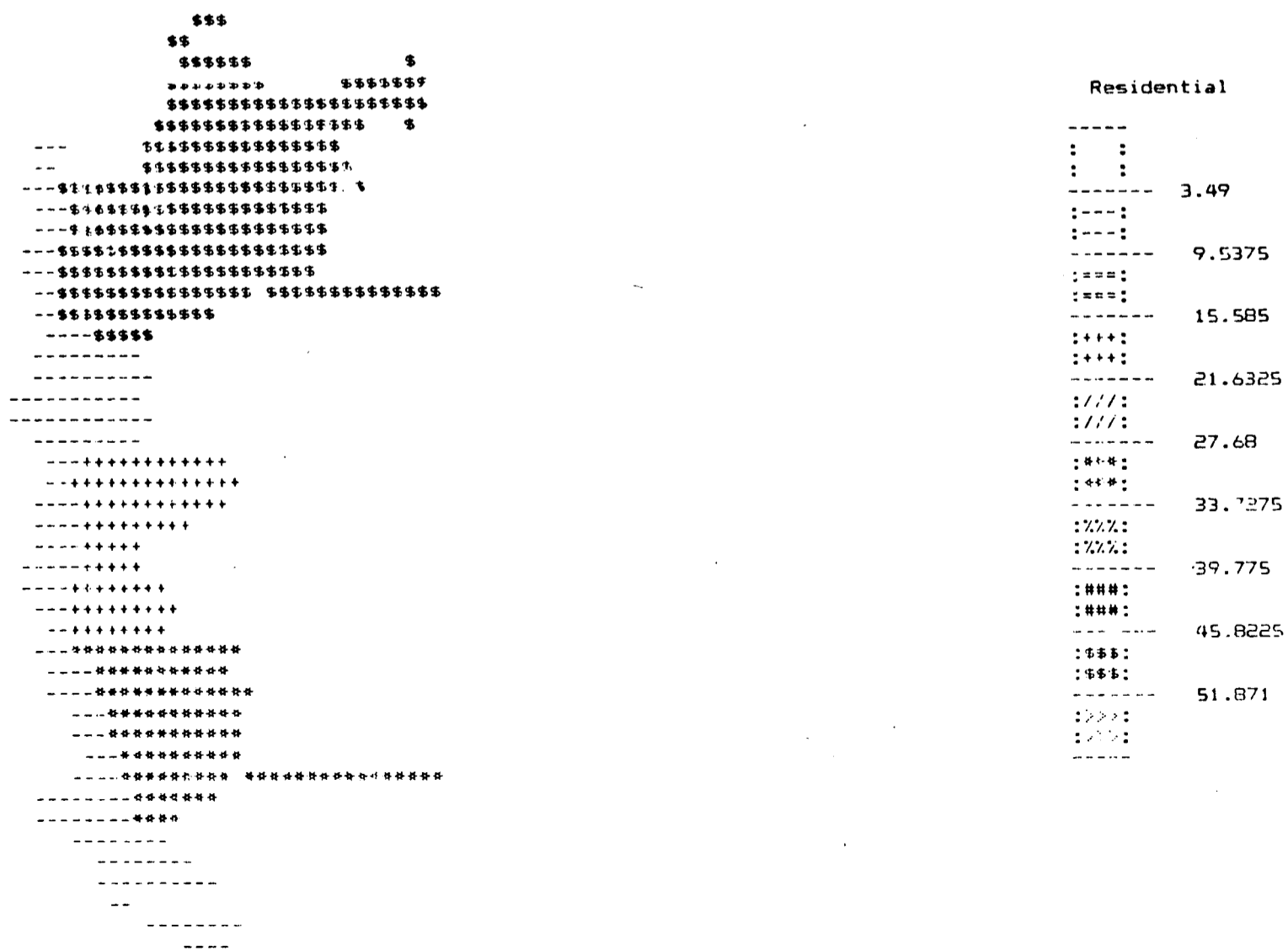
EXTENT OF LOW-LYING AREAS

DISTRIBUTION OF LOWLYING AREAS IN HIKKADUWA



DENSITY OF RESIDENTIAL BUILDINGS

RESIDENTIAL DENSITY MAP OF HIKKADUWA



DENSITY OF COMMERCIAL BUILDINGS

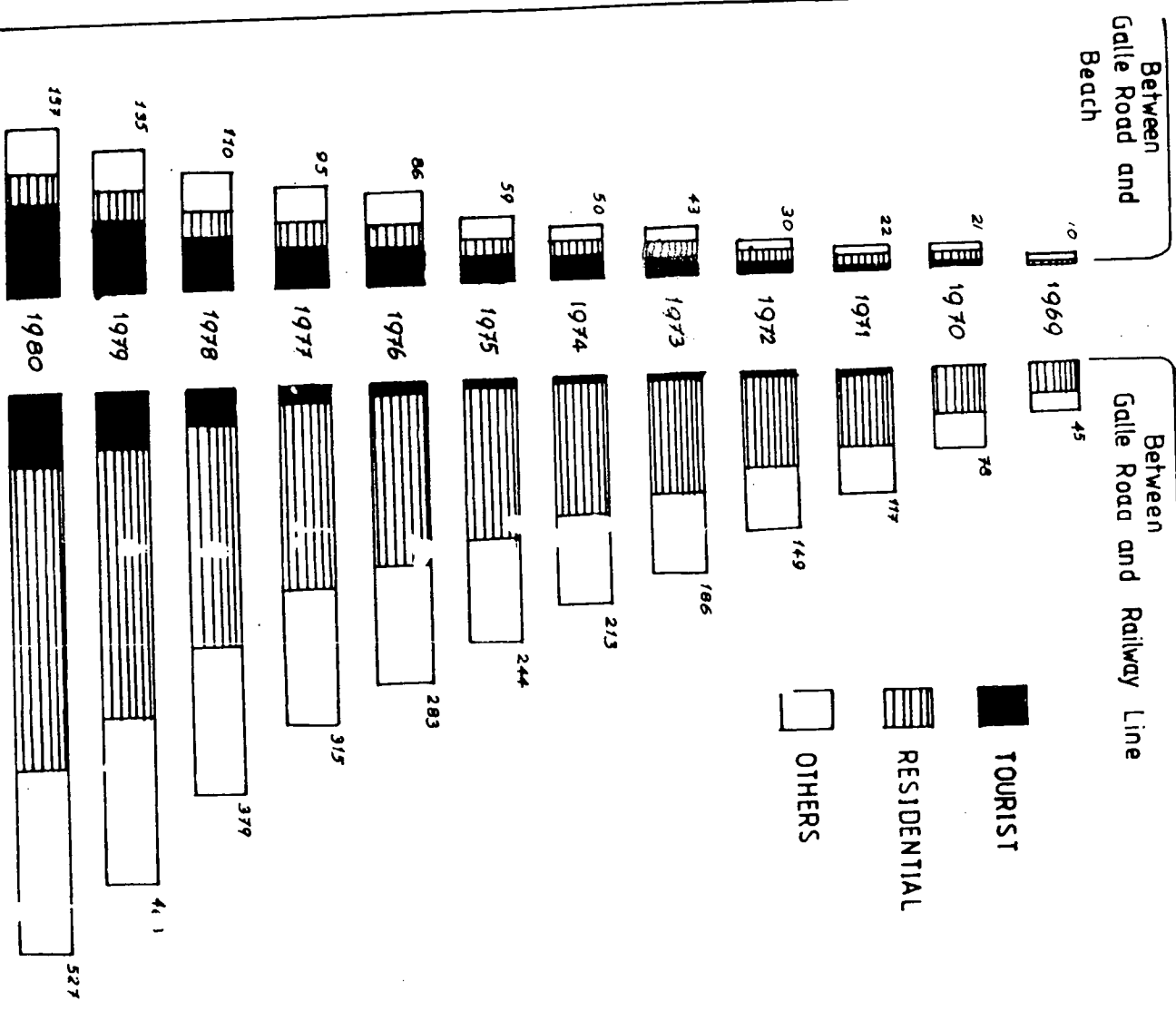
DISTRIBUTION OF COMMERCIAL ACTIVITIES IN HIKKADUVA



HIKKADUVA

TOURIST HOTELS, RESIDENTIAL AND OTHER CONSTRUCTIONS

1969 - 1980



CHAPTER IV.

S O C I A L E N V I R O N M E N T4.1 Population -

In the year 1931 the total population within the Hikkaduwa Town Council area had been 1,835. In 1963 it was 2,855 while in 1971⁽¹⁾ it was 3,240. It is estimated that the present population to be close to 8,000. According to the 1971 census 52.6% of the population consisted of males while 47.6% were females. The average size of the family was five, while 50% of the population belonged to the age group 18 - 50 with 28% below 14; 15 percent over 50 and 7% between 15 - 18 age group.

4.2 Employment and Income -

A classification of the population according to employment, reveal that approximately 65% of the adult male population is engaged in the fishing industry; 20% of the male and female population in the coir industry (making rope, coir mats, etc) 5% in inland coral mining and, 10% in Tourism and other s~~ar~~ied employment including Government Service.

(1) Census of 1971, Dept. of Census & Statistics.

Of the income categories, around 60% of the population belonged to the income group below Rs.300/- and were eligible for the food stamps subsidy allowance. Out of the total population of 76,370 in the AGA's Division of Wellaboda Pattu (vide 1981 Census Report) a total of 19,304 persons lived within the Tourist area. Out of this amount the number of persons who received food stamps were 12,310. The distribution of these persons by Grama Sevaka Divisions in the Tourist area are given below.

<u>Grama Sevaka Division</u>	<u>Receipant of Food Stamps</u>	<u>Population</u>
Patuwata	2,431	3,158
Tiranagama	3,772	4,913
Narigama	1,347	1,903
Wewala	1,167	1,445
Wawalagoda	1,137	1,771
Hikkaduwa	2,456	6,114
	<u>12,310</u>	<u>19,304</u>
	=====	=====

In the Hikkaduwa Grama Sevaka area 2,456 persons out of a 6,114 received food stamps. For the other Grama Sevaka areas where tourism exists, ie. Narigama and Tiranagama, the respective figures are 1,347 out of 1,903 and 3,772 out of 4,913.

Approximately 20% of the workforce in Hikkaduwa belong to the income category between Rs.300/- to Rs.1,500/- and are employed in the tourist industry, both directly and indirectly.

- a. in Hotels, restaurants and guesthouses
- b. trade stalls, factories (Batik, Garments and Handicrafts)
- c. touring, guiding and entertainment.

In addition those employed in government offices and in fishing also belong to this category. The income group of Rs.1500/- to Rs.5000/- include 15% of the workforce and consists of those employed in the Batik, Garment, Restaurants, Guest houses and Tourist travel service sectors. Income earners of over Rs.5000/- (5%) are the land owners, fish mudalalis (owners of nets and boats) wholesale traders, gem and jewellery shop owners, exporters of batiks and garments and hoteliers.

4.3 Housing -

According to the survey carried out in Hikkaduwa it was revealed that the owners of houses or property located close to the tourist area (area between the coast and the railway line) to have had greater opportunities for increasing their standards of living through enhanced incomes,

during the post 1966 tourism development period. Prior to 1970 the value of land between the Galle Road and the beach was around Rs.90,000/- per acre. In contrast the present value is around Rs. 1,600,000/- per acre. In response to a question on the location of their houses if the choice was given to relocate the house, more than 63% of the respondents stated that they would prefer to have it located in the area between the railway line and the Galle Road. The reason for this choice was the capacity to earn incomes by engaging in activities connected with tourism.

The present housing stock in Hikkaduwa was found to be of a high standard with more than 70% of the houses belonging to the satisfactory category with 11% of 'good' standard; 16.5% and 1.7% were in the 'unsatisfactory' and very bad conditions respectively. Most of the houses in the latter group were owned by traditional fishermen.

Another inquiry revealed that 67% of the houses were self owned while only 9.5% were rented. There were also government houses, which amounted to 19% of the total housing stock in the area. Of a total of 73 houses surveyed, 43 or 59% had been renovated after 1970 (with incomes gained through tourism) while 30 are in the original

condition without renovation. 18 or 60% of the unrenovated houses belonged to traditional fishermen.

The survey also revealed that persons who were involved in tourism had the purchasing power to acquire more household items of a luxury type when compared with those in other professions.

4.4 Tourism plant -

Prior to the enactment of the Ceylon Tourist Board Act No. 10 of 1966, there was virtually no sign of organized tourism activity in Hikkaduwa. The only tourist facility available in the area was the Hikkaduwa Rest House established during the British Rule. The Rest House contained seven rooms and was located at the promontary where the new Coral Gardens Hotel is being constructed. In addition there were 24 tea boutiques and four small restaurants within the Town Council area prior to 1966. With the establishment of the Ceylon Hotels Corporation in 1966 the Rest House was vested in them and was later expanded with the addition of a new wing of rooms.

The growth of tourism in Hikkaduwa occurred in two different phases with the period 1966 -1976

being the phase of slow growth during which the gradual transformation of attitudes and lifestyles of people to receiving the new norms and requirements of tourism took place. The period after 1976 is identified as the period where the infrastructure (hotels, restaurants, guest houses, etc,) mushroomed with rapid pace in keeping with the need to service the large influx of tourists into the country. (Eg. Tourist arrivals during the period 1976 - 1981 had an average annual growth rate of 24%).

As indicated in the introduction to Chapter VI, Tourism Development in Hikkaduwa occurred in a complete laize - faire situation. There was no planned development during any period of its growth. It was only in 1979 that attention was paid to controlled development in the beach front areas in order to conserve coastal resources through joint administrative action by the Ceylon Tourist Board, Coast Conservation Division and the Urban Development Authority.

AT the present time there are around 15 hotels in Hikkaduwa with more than twenty rooms together with about 350 guest houses and 250 restaurants.

Most of the guest houses and restaurants are former housing units that have been converted for tourist uses. According to records only 7 of the hotels and 4 guest houses have Tourist Board approval while some others have obtained a licence issued by the Hikkaduwa Town Council. (See Table 2)

Table 2

Record of Facilities Registered with the Hikkaduwa Town Council.

Accommodation	- Hotels & Guest Houses, above 5 rooms.)	48
	Guest Houses below 5 rooms)	37
Restaurants	- Annual value above 1,500/-)	27
	Annual value above 1,000/-)	08
	Annual value below 1,500/-)	12
	Annual value below 1,000/-)	20

Due to the non-availability of a definite code for evaluating Tourist Services or infrastructure facilities the local authorities have in the past paid attention only to the aspect of increasing revenue from licences in the approval of projects. The following comparison of the income of the Hikkaduwa Town Council in the years 1979 and 1982 is an indication of this fact.

1979

Rs. 777,323/-

1982

Rs. 992,385/-

It is also observed that the Town Council has been able to provide better infrastructure facilities for the area as a result of the increase in revenues. However, facilities provided do not match the requirements necessitated by the rapid growth of tourism within the stretch of land between the coast and the railway line and this has resulted in the creation of many environmental problems as enumerated in the previous chapter.

Rates charged for accommodation in Hikkaduwa provide an interesting basis for understanding the present nature of the tourism infrastructure. While the charges for single accommodation in the Tourist Board approved hotels range from Rs.350/- to Rs.500/-, it is also possible to have a room in a guest house (residence) for Rs.25/- to Rs.50/- per person per day. There are also situations where camp beds are rented for Rs.10/- to Rs.15/- per day. The rates charged at moderate guest houses range from Rs.125/- to Rs.200/- depending on its location and facilities available.

4.5

Foreign Investment in the Tourist Industry -

increase

While there is a substantial/ of foreign investment in the Tourist Industry in Sri Lanka on a collaborating venture basis, Hikkaduwa does not indicate the same overall pattern. However, the foreign investments made in ventures in Hikkaduwa are all carried out on an illegal basis whereby the laws governing investment by foreigners have been not adhered to. The normal procedure for such investment demands that the approval of the Foreign Investment Advisory Committee (FIAC) is necessary prior to undertaking a venture. Since most of the facilities that have foreign investments do not qualify for FIAC approval, these investments are made through unofficial and informal arrangements between investors and local collaborators. A random survey reveals that the following projects had a foreign investor operating behind the scene -

<u>Name of Hotel</u>	<u>No. of Rooms.</u>	<u>Rate R/O</u>
Swiss Hotel	10	Rs. 450/-
Sea View	08	Rs. 500/-
Tropical Garden	12	Rs. 400/-
Dolphin	05	Rs. 250/-
Sanasuma	06	Rs. 200/-
Palm Garden Club	10	Rs. 400/-

Projects under construction :

<u>Name of Hotel</u>	<u>No. of Rooms.</u>
Siri Madura	15
Seetha Inn & Guesthouse	10
Miga Villa	10

4.6 Socio-Cultural Impact of Tourism

The social impact of Tourism has had a mixture of effects on the local population in Hikkaduwa. The large influx of tourists has indeed caused a change in the outlook of the people who were traditionally not familiar with such lifestyles. However, the exposure of the area for over 400 years to foreign domination of some form; the relatively high level of literacy in the area; and the situation as a township along one of the most used highways in the country, helped the people of Hikkaduwa to adapt to the 'new' situation with relative ease. This was indeed further strengthened by the economic benefits derived by a large proportion of the local population. It is therefore noted that most of the social ill effects such as prostitution, drug use, homosexuality are phenomena that developed towards the peak development period in the latter part of the 1970's. The increased inflow of tourists

into the country and the relaxation of import restrictions were factors that resulted in the increase in the intensity of socio-cultural maleffects. Several studies have indicated that members of the lower income level of the population too have taken to prostitution and other activities for the pecuniary benefits, while organized groups are involved in drug trafficking. It was also found that there were outside 'operators' in prostitution and homosexual activities migrating into the area during the season to meet the increased demand.

Other impacts due to tourism such as changes in the value structure, attitude towards elders, culture, etc, are hard to determine. However, it was revealed that more than 74% of a sample of 115 were indifferent to tourism development stating that it had both the good and bad impacts. Only less than 2% of the sample stated that it was definitely bad. They also identified the bad social practices of prostitution, child beggary, and touting to be the most problematic activities.

Another aspect of social impact is the inter-marriages that take place between local residents and tourists. According to the Registrar of Marriages for the area during the period 1979 - 1982 there were over 75 inter-marriages in the area. Of these he had performed over 30 ceremonies, where local girls married foreign tourists (mostly Germans). In addition, there had been 5 cases where foreign girls had married local men. According to observers in the area most of the girls who married foreign tourists are now in the husbands country and continue to assist their families financially as well as in kind. Most of the funds received in this manner are utilised to improve the conditions of their houses.

There is definite evidence of a co-relation between tourism development and the increase of crime in the Hikkaduwa area. While the total number of crimes committed in the Hikkaduwa Police area was 146 in 1971, it was 1075 in 1980. In addition an analysis of the type of crimes committed also reveal that there is a definite increase in illicit liquor and narcotic dealings together with sexual crimes. There is also an increased number of crimes recorded involving tourists within the past half decade.

Tourism related activities have also caused an increase in the school drop out rate in the area, as young boys and girls of school going age are able to find lucrative employment in the tourist sector. It is recorded that 130 out of a total of 823 enrolled at Kumara Viduhala in Hikkaduwa during the period 1970 - 1980 have dropped out of school. This is a high rate of 15 percent, in an area traditionally known to have laid heavy emphasis on educating its children.

The impact on cultural aspects is extremely difficult to measure as no significant visible change has taken place in the social infrastructure at the present time. Such visible changes will only surface in the future where the present younger generations attitudes to tradition, religion and values replace the existing concepts and systems.

This according to sociologists is an inevitable transformation that will take place in any society which is exposed intensively to the influence of external phenomena. The degree and the direction of such transformation will depend on the ability of the local culture to absorb or withstand the influence of external phenomena.

CHAPTER V
NATURAL AND BIOLOGICAL ENVIRONMENT

5.1 As indicated in the introduction the tourist industry at Hikkaduwa is fundamentally dependent on the coastal ecosystem. The potential of this ecosystem to function effectively in order to provide maximum benefit, is governed by the inter-action of chemical, biological, and physical factors. In other words, the total resource capability of the coastal ecosystem at Hikkaduwa is based on its 'carrying capacity'. This carrying capacity is dependent on:

- a. patterns of discharge and freshwater inflow to the coastal waters;
- b. the physical processes such as tidal flow and water currents;
- c. supplies of biologically important dissolved chemicals and gases and suspended organic material to the coastal waters.

These factors in turn are responsible for the quality of the biological components of the ecosystem. If, due to uncontrolled development or unmanaged resource-use any of the above patterns and processes are adversely affected, then the capacity of the ecosystem is drastically reduced. The situation prevailing at Hikkaduwa today is that uncontrolled development and unmanaged resource-use, mainly connected to the tourist industry has reduced the carrying capacity of the coastal environment leading to its continued degradation.

a. The pattern of discharge and freshwater inflow to the coastal waters:

The coastal waters off Hikkaduwa receive freshwater from two main inland water systems, the Hikkaduwa Ganga and the Ratgama Lake. In addition to these main waterways, there are some small culverts that drain into the sea. These culverts are operational only during heavy rainfall. The freshwater inflow to the coastal waters is dependant on the seasonal monsoon system. The major impact along the southwest coastline is during the southwest monsoon, i.e. from about March to June (the monsoon period varies from year to year and could begin as late as May or June)

Table 1. Rainfall data 1977 to 1982 for the Hikkaduwa coast.**

	1977	1978	1979	1980	1981	1982
	mm*	rd* mm	rd mm	rd mm	rd mm	rd mm
Jan	8.9	2 84.7	8 53.9	9 125.8	7 102.0	7 17.3
Feb	265.9	12 90.1	10 102.0	8 4.6	3 83.2	8 1.8
March	118.1	14 143.3	14 69.3	9 63.4	7 88.7	10 151.3
April	100.8	15 178.5	13 291.1	14 175.3	21 273.0	15 421.3
May	315.2	22 390.1	26 233.6	11 102.3	14 394.0	22 322.0
June	139.4	24 200.0	18 286.9	24 126.5	23 52.8	11 235.4
July	78.0	12 70.7	16 198.1	20 61.3	19 44.8	15 191.9
Aug	157.2	- 284.7	14 36.6	10 148.8	19 147.9	8 158.6
Sep	168.4	14 217.6	15 468.5	26 416.4	18 148.0	22 174.3
Oct	469.1	25 141.7	14 299.0	20 244.5	19 239.9	16 218.6
Nov	410.5	18 425.6	15 657.6	28 286.0	19 305.9	10 577.1
Dec	114.8	16 119.1	11 181.2	15 253.3	10 205.8	10 87.3

** Source: Meterology Department, Colombo, for Galle station.

* mm = millimeters of rain

rd = raindays, i.e., days with more than 0.2 mm of rain

Hikkaduwa Ganga is open to the sea all year round, while Ratgama Lake and the smaller culverts are open only during heavy rainfall and are closed by sandbar formations at other times.

b. Tidal flow and coastal water currents:

The average range between high and low tide for this region of the coastline is about 0.4 meters (Gerritsen, 1974). However, prevailing weather conditions, coastline features, etc. can give rise to localized deviations in the tidal range. The tidal flow is responsible to some extent for flushing and cleansing of the coastal waters. Prior to 1960s, this tidal influence was felt about 24 to 32 kilometers upriver and was affecting paddy lands situated upstream of Hikkaduwa Ganga. The construction of the Hikkaduwa Ganga salt water extrusion scheme limited this tidal influence to about 5 to 8 km upriver. This scheme, however, must have had some influence on the productivity of the brackish and coastal ecosystems in the vicinity, due to the reduction in nutrient exchange and flushing.

The general pattern of coastal water currents on the west coast are in response to the monsoon systems. The currents flow in the northerly direction, parallel to the coast, during the southwest monsoon; and in a southerly direction during the northeast monsoon. The strength of these currents can range upto 0.5m/second in the Galle area (Gerritsen, 1974). In addition movement of water and materials in shallow coastal areas is influenced by wind and wave

induced currents; for example, wind induced longshore currents. These currents are important in the movement of sand along the coast line. Bottom profile, gaps in offshore reefs, etc. influence the path and velocity of these currents, and activities such as coral mining can adversely affect these processes.

c. Supplies of dissolved chemicals and gases and suspended organic matter:

The freshwater flow and runoff from land are the most important sources of chemicals (trace elements) and nutrients to coastal waters. In addition, during the monsoons and other storms, winds cause localized upwellings that enrich the waters. These sources, especially the freshwater flow and runoff, of nutrients have been modified since the 1960s by the saltwater extrusion scheme at Hikkaduwa Ganga and the urbanization of Hikkaduwa town in connection with the development of tourism. These changes undoubtedly, had consequent effects on the productivity of the coastal waters and its coral reef ecosystem.

The salinity of the coastal waters normally falls within the range of 32 to 36 o/oo, dropping to 20 o/oo after a heavy rainfall. The water temperatures range between 25 to 28° C. Since the condition of the coastal waters varies seasonally, any attempt to quantify the parameters of water quality off Hikkaduwa should be carried out for at least a period of one year. Such a study is beyond the scope of this report. A visual assessment of the coastal waters did not indicate

any serious or permanent deterioration of the water quality. However, some potential threats to the quality of the coastal waters in the area were identified. These are as follows:

- i. sewage disposal and organic pollution
- ii. coconut fibre pits
- iii. oil and chemical contamination
- iv. siltation

These man-induced factors that affect the quality of the coastal waters at Hikkaduwa will be discussed below.

It was the components of the coastal ecosystem at Hikkaduwa that led to the rapid development of the tourist industry at Hikkaduwa. In other words the clear waters, surf, sandy beaches and coral reef. The rocky islet bird sanctuary was an added attraction to bird watchers. These features together with the rural atmosphere and the close proximity to Colombo (96 km) are responsible for the boom of tourist activity that has occurred here since the 1960s.

5.2 Resource-uses Connected to the Tourist Industry

The use of coral reefs as a visual and recreational resource:

The easily accessible coral reef fringing Hikkaduwa has been the focal point of tourist attraction. The reef extends from a few meters from the beach to some 9 to 12 meters of water. Snorkelling and scuba-diving are the main recreational activities on the reef. The opportunities for spearfishing has, in the past, attracted many visitors to Hikkaduwa. The operation of glass-bottom boats to

view reef-life has become popular in the last decade, thus attracting the largely non-swimming local population to Hikkaduwa.

The species of coral predominant on this reef are Acropora spp. and Madrepora spp. The coral reef is also the habitat of many varieties of colourful reef fish, dominated by surgeon fishes (Acanthuridae), parrot fishes (Scaridae), snappers (Lutjanidae) and damsel fishes (Pomacentridae). These fishes are, however, an uncommon sight nowadays for reasons to be discussed below.

Collection of exotic fish, corals and other reef fauna:

Spearfishing and collection of live aquarium fish are common activities on the Hikkaduwa reef. Due to these activities the fish on the reef are not as plentiful as they used to be two decades ago, and some varieties, particularly the butterfly and angel fishes (Chaetodontidae) and triggerfishes (Balistidae) occur in very diminished numbers (Rodney Jonklaas: personal communication). The more desirable species, i.e. either the tastier or the colourful varieties of the groups mentioned above have been fished away. The continuous activity on this reef leaves little chance for the natural recovery of these populations. For example, on a 45 minute survey conducted with a glass-bottom boat on the reef adjacent to the main hotels at Hikkaduwa, we were able to see one school of some 10 to 15 parrot fish (average 0.3m in length), some angel fishes and a few damselfish. By no means was this evidence of a healthy coral reef community!

Coral is also actively collected as souvenirs or as items for sale. It is estimated that the greatest damage to the coral reef adjacent to the hotels occurs due to the active collection of corals. Further anchoring of boat, feet of waders and snorkellers, oars and other punting devices cause damage to coral. Several gaps have been created in the reef to allow the passage of glass-bottom boats and fishing boats killing the coral in the fringes. The only patch of living coral in a relatively healthy condition is now found leewards of the Rocky Islets, and unless action is taken to protect this area it too will be subject to the degradation evident in neighbouring areas. No large-scale coral mining for construction purposes occurs in the reef-area between Hikkaduwa Ganga and Ratgama Lake. However, such activity is common to the north and south of this section of the beach; hence this coastal stretch too is subject to erosional problems as a result of this extensive coral mining.

Collection of shells is also a common activity on the reef. According to many local divers the reef has been virtually 'shelled' out. The cone shells (Conidae) and cowries (Cypraeidae) and other attractive varieties (Murex spp.) are presently scarce on this reef. These shells are collected as souvenirs by visitors or by vendors for sale to tourists. Such shells are a common sight in most tourist souvenir shops, hotels and guest houses in the neighbourhood.

Sea anemones, sea fans, tube worms, clams, etc., with which fauna^{are} usually associated within a healthy reef are very uncommon at Hikkaduwa. It is suspected that these animals have long been 'fished' away by locals for aquaria and for export. Unless restocking and protection programmes are initiated as soon as possible (discussed later), the foundation of the tourist industry at Hikkaduwa will be irreversibly lost.

Use of other fauna (fish, birds, etc.):

Hikkaduwa is principally a fishing village. Most of the adult male villagers are engaged in fishing, though this picture is changing with tourist related activity attracting many fishermen. Closer to shore cast netting, beach seining (madel), hand lining and lobster trapping are the main fishing activities. The main offshore fishing season is during the southwest monsoon, when valuable tuna species dominate the catch. Often times, the very rough weather during this season forces the fishermen to anchor their boats in the safety at the fisheries harbours at Beruwala or Galle. During the rest of the year the boats are anchored at Hikkaduwa and fishing does take place upto 15 km from shore, mainly for open water species such as seer and paraw.

In recent years, the demand by hotels and restaurants in the area for fresh sea food has increased and fishermen have benefitted greatly from it. However this has also had the effect of attracting 'outsiders' to the fishing industry, much to the displeasure of village fishermen. Such outsiders are soon 'dealt

with' and fishing rights are closely guarded by the villagers. The tourist industry has also had the effect of turning many fishermen away from fishing to the lucrative business of operating glass-bottom boats. The regular 5.3 m fibre-glass boat is converted for viewing by inserting a glass sheet on the bottom and a canopy to shade viewers. Each half hour excursion to the 'coral gardens' leeward of Rocky Islets brings in about Rs.100 to 150 to the operator.

The Rocky Islets situated about 0.3 km offshore from Hikkaduwa point was declared a sanctuary under the Fauna and Flora Protection Act in 1940. The main species the declaration sought to protect were sea birds. According to the locals about 2 to 3 species of terns, some gulls and sandpipers and the fishing eagle used to frequent these islets. Today, the islets lie barren and windswept, the birds all scared away by the numerous and frequent visitors.

Use of inland lakes and water bodies:

The freshwater streams and canals in this region are used extensively by the villagers to soak coconut husks for making coir fibres. In recent years, the coir industry has flourished due to the increased demand for household coir products by hotels, guest houses and restaurants. This increased demand is reflected in the increasing areas that are utilised to soak the husks. These inland water systems, particularly Ratgama Lake, supports some amount of subsistence fisheries for species such as tilapia and mullet. It is becoming popular among visitors to Hikkaduwa to turn to the inland

areas for recreation, mainly angling and swimming. Ratgama Lake is also the site of an island buddhist hermitage - Polgasduwa, used both by local as well as foreign monks and other visitors as a retreat.

5.3

Identification of Problems connected with Resource-use at Hikkaduwa.

The coastal ecosystem under consideration can be classified into the following features for the purposes of identifying the problems connected with the use of coastal resources at Hikkaduwa:

- a. Coastal shorelands - land immediately adjacent to the coast and drains directly into the coastal waters.
- b. Inland water systems - the network of inland streams and lakes and man-made drainage systems
- c. Beach
- d. Coastal waters

a. Coastal Shorelands

The characteristics of the shoreland has a major effect on the stability of the beach and influences the coastal waters by affecting the quality and quantity and rate of flow of runoff water. The shoreland is also prime land for tourist development since tourist establishments on this strip have immediate access to the beach. Consequently, it is cleared of vegetation and bears little resemblance to the original pre-development shoreland. Unplanned and unauthorised development on this coastal strip at Hikkaduwa is having far reaching effects on the carrying capacity of the coastal ecosystem.

Development on this strip requires that the cleared land be covered to some extent with impervious

surfacing, such as concrete and tar. The percentage of land cover by impervious surfaces at Hikkaduwa is estimated to be as high as 75 percent on the coastal strip (excluding the beach). Such surfacing modifies the total volume and pattern of surface runoff. It also accelerates the flow of such runoff, reducing detention time of the water in the vegetation and soil, thereby preventing the natural cleansing and filtering of water that occurs in the soil. Artificial drainages built on such land effects the coastal ecosystem by accelerating runoff. Conversely, during low rain and high water periods these drainages allow the intrusion of seawater, contaminating the ground water table.

Such runoff water, though derived from rainfall, is very different in composition from rain water. It receives greater concentrations of substances from the soil by soil erosion, the leaching of nutrients from exposed soils, from detritus, and from various accumulated wastes in the soil.

Table 2. Average Concentration of Various Components of Urban Runoff and Rainfall (from a residential - light commercial area)

	Urban Runoff	Rain fall
	milligrams/litre	milligrams/litre
Suspended solids	227	13
Biological oxygen demand	17	less than 16
Total Nitrogen	3.1	1.27
Total Phosphates (as phosphorous)	0.36	0.08

Source: National Academy of Science, Washington, D.C.1969; from Laws, 1981.

Though the figures vary from place to place, the order of magnitude is representative, and shows that increased loads of suspended solids are carried by urban runoff. Similarly, comparing storm runoffs from vegetated and urban watershed areas, it was shown that suspended solids from urban stormwater runoff is as much as 60 times greater than from forested stormwater runoffs (Laws, 1981)

Freshwater runoff can adversely affect coral reefs by the stress brought on by reduced salinity and the smothering effect of excessive suspended solids. Although corals can tolerate salinities in the range of 27 to 40 o/oo (Laws, 1981), salinities of surface waters may drop to lower levels after heavy storms. Undoubtedly, the effects of heavy rains have been tolerated by the coral reef for the past many hundreds of years. However, such effects have been exacerbated by the development that has occurred in Hikkaduwa within the last two decades; resulting in greater volumes of freshwater runoff and a more rapid delivery of such waters to the coral reefs.

During a survey of vegetation along the south-west coast of Sri Lanka, Wijewansa (1981) noted that the vegetation along Hikkaduwa shoreland is scanty or absent. Only at Narigama there is a good growth of *Ipomea* in a belt 6 m wide. Since no set-back zones are observed and hotels are found on the beach, it is suggested that vegetation cannot be used to effectively bring about the stability of the shoreland and beach at Hikkaduwa (Wijewansa, 1981). However, by increasing the ratio of vegetated

surfaces to impervious surfaces on the shoreland, the quality of the runoff water can be greatly improved and its delivery to the coastal waters slowed.

The more serious and most evident problem related to intensive development of this coastal strip is soil erosion due to the accelerated runoff and the removal of natural cover vegetation. Soil erosion can be retarded if rate of runoff flow from the shoreland can be reduced as mentioned above.

b. Inland Water Systems

The streams and inland lakes found at Hikkaduwa are important since they provide habitats for a variety of juvenile marine organisms, feeding grounds for water birds, support aquatic vegetation, fishing and recreation and are essential in maintaining the quality of freshwater available for human activities in the area. As mentioned earlier, such freshwater systems also protect the coastal waters by retaining and cleansing runoff water by the removal of sediments, excess nutrients, and toxic substances.

The freshwater bodies and streams are affected to a lesser extent in Hikkaduwa, where in the course of development and expansion of the tourist industry, they have been encroached upon and drained in the peripheral areas. Vegetation on the banks of such freshwater systems is important in the cleansing process of runoff water, to promote sedimentation and percolation through the soil. Yet, in many places in Hikkaduwa such vegetation

is being removed for a variety of reasons. Such alterations accelerate the rate of runoff and reduce the ecosystems capacity to remove sediments and contaminants from runoff.

Another problem that is evident at Hikkaduwa is the use of these water bodies as dump sites for small-scale industrial as well as household wastes, and for soaking coconut husks. Besides untreated household and sanitary refuse, waste products from the growing batik industry also find their way to these streams and lakes. Batik dyes and chemicals used in the industry are conveniently disposed of in increasing quantities, contaminating the water and possibly harming the aquatic fauna and flora.

In some areas of the water systems coconut fibre pits are found in large concentrations. The effluent water from these pits is brown in colour and foul smelling containing many organic pollutants such as lignin. Unless dilution of all these waste products in the system is adequate, these effluents will increase the chemical oxygen demand (COD) and biological oxygen demand (BOD) of the waters. This deprives the water and aquatic life of the optimum amount of dissolved oxygen necessary for maintaining a healthy ecosystem. The fibre industry should be regulated so that water quality remains at optimum levels; eg. the number of pits allowed in an area of water should be determined, making allowance for rain and other dilution factors.

Septic tanks built near such water systems allows the leaching of nitrogen and other contaminants

into the soil and water. Therefore, the design of septic tanks and their location should be carefully reviewed by proper authorities. Existing septic tanks should be inspected for leakages and improper construction methods. The environment near such leaking septic tanks would also allow the growth of pathogenic bacteria and other organisms, that could eventually find their way into the freshwater supply of the area and the coastal waters.

c. Beach

Ironically, the beach which is the main attraction of tourists to Hikkaduwa is very narrow or non-existent in many places. Unaltered, the beach should be able to absorb the intensity of the southeast monsoon weather, and then rebuild itself during the calmer northeast monsoon season. However, for a variety of reasons, including buildings on the beach and the extensive coral mining that occurs in the southwestern coast, this coastline is subject to a great degree of erosion.

As early as 1965, Swan characterized the beaches along the southwestern coasts of Sri Lanka, including those within the town limits of Hikkaduwa (Table 3).

Sector of Beach	Beach Stability	Headland	Other Characteristics
Hikkaduwa Ganga Bay	Absolute instability	Vague or lacking	fringing reef rocks offshore coast of relatively soft coral/sandstone human interference aggravating erosion public property endangered.
North Coral Gardens Hotel	absolute instability	vague or lacking	same as above.

Sector of Beach	Beach Stability	Headland	Other Characteristics
62 mile post to C G Hotel	chronic instability	vague or lacking	rocks offshore coast of relatively soft coral/sandstone human interference aggravating erosion public property endangered.
62 to 64 mile-post	growing instability	vague or lacking	coast of hard rock.
Outfall of Ratgama	growing instability	retreating	

Swan (1965) stresses the fact that human interference has aggravated the problems of coastal erosion along the Hikkaduwa beach. Since 1965, the amount of human activity along this coast has increased enormously, compounding the problem of coastal erosion many times over.

The hotels and other beachfront buildings are constructed on dynamic areas of the already unstable beach. There is virtually no observation of the set-back zone as authorised by the Coast Conservation Division. The natural beachfront responds to wave action by dissipating wave energy, but vertical seawalls or foundation walls reflect the wave energy almost completely, creating a scouring action near the toe of the wall and causing the undermining and eventual collapse of the structure and the loss of the beachfront (Figure 1). This scouring action is evident at many locations along the beachfront property line at Hikkaduwa.

The south western coastline in Sri Lanka is used by sea turtles, such as the loggerheads and greens, as nesting grounds. In the past, they have been known to come ashore at Hikkaduwa to nest. Present day human activity, however, prevents turtles from using these nesting grounds, and they are very rare along this stretch of the coastline.

d. Coastal Waters

The carrying capacity of the coastal ecosystem at Hikkaduwa is governed by the quality of its water. The shallow coastal waters, with its rich diversity of life is very vulnerable to damage by pollution and ecological disturbances. The life in these waters is supported by the nutrients from land runoff, adequate amounts of dissolved oxygen, sufficient penetration of sunlight, and proper water circulation. These factors are also important in maintaining the quality of the waters.

The most damaging form of pollution is the chronic release of contaminants. This results in the pervasive and continuous degradation of the ecosystem evident only by a decline in the carrying capacity of the system and not in large fish kills or other such dramatic events. Pollutants, even though found in minor concentrations in the water, may be concentrated in organisms and biologically magnified up the food chain finally affecting humans.

Sources of pollution to the coastal waters are polluted runoff, sewage disposal on the beach, sanitary wastes, and the concentration of boats seen on the beach at Hikkaduwa. Since most of the

buildings are on the beach, leakages from septic tanks, sewer pipes, waste dumps, etc. can contaminate the coastal waters directly. As most of these buildings seem to be unauthorised, the chances of careless construction are high, hence chances of contamination are high.

The waters off the coast of Hikkaduwa are used to anchor some 15 to 20 fishing boats and numerous glass-bottom boats. These boats cause a permanent oily sheen to the water immediately adjacent to the beach; waters that are used by visitors for swimming and snorkelling. Such chronic oil pollution is also a threat to the coral reef ecosystem. Corals are particularly vulnerable to oil, which affects their growth and reproductive physiology. It is a strong possibility that this oil has been contributing to the degradation and retarding the recovery of the coral reef at Hikkaduwa.

The extensive patches of frothy material and garbage found floating in the coastal waters immediately adjacent to the resort area at Hikkaduwa, provides ample evidence that the ocean is being used as a dumping ground for all manner of waste materials.

The coral reef at Hikkaduwa: The reduction in salinity (usually associated with increased freshwater flow) and water clarity, increase in suspended solids, BOD, COD, sewage discharges and chemical contaminants in the runoff, etc. have affected the coral community at Hikkaduwa for the past few years. All this in addition to the

physical damage that is inflicted on to the reef by visitors! It is estimated that only about 30 percent of the coral reef between Hikkaduwa Ganga and Ratgama Lake is alive.

Coral grow slowly even optimal conditions, their maximum growth rate being about 1 cm per year (Laws, 1981). Thus if the coral reef off Hikkaduwa is to recover to any appreciable extent drastic measures must be taken. These include halting urbanization and development at Hikkaduwa, diverting runoff water, revegetating bare shoreland, preventing reclamation of watershed areas and protecting the coral reef from physical damage.

To restore health to biological ecosystems and to retard the process of degradation of these ecosystems at Hikkaduwa, the following preventive and restorative measures are recommended:

As explained in previous sections, accelerated runoff and the composition of such runoff affects almost all components of the coastal ecosystem in a negative manner. Hence, a plan for managing this runoff is essential to reverse the trends at Hikkaduwa.

5.4 Runoff Management:

The activities along the coastal shoreland that affect runoff, such as excavation, clearing, paving, and the spatial arrangement of development projects must be conducted with careful planning and management.

Barren soil along the shoreland should be stabilised using vegetation and terracing methods.

Paved or impervious surfaces should be kept to a minimum to allow sufficient filtration of water into the soil. Surfacing by the use of vegetation should be encouraged wherever possible.

Land surfaces used for development should be graded to divert and detain water for a maximum period of time.

Runoff water could be diverted for such uses as watering lawns, washing of vehicles, etc.

Sufficient acreage of land must be left undeveloped to provide soil stability, runoff detention areas, ground water recharge and other water protection measures. The creative use of such areas for recreation and / or decorative purposes can bring economic benefit to the owners.

A buffer strip of natural vegetation of appropriate width should be maintained along the edges of all waterways and water bodies. These buffer zones protect the waterways from pollutants in the land runoff. No development should be allowed within the buffer zones.

Low-lying areas should be reclaimed (if necessary) only on the basis of a drainage plan.

Canals that drain inland areas directly to the coastal waters should be diverted or avoided.

5.5 Inland Water Systems:

Coconut fibre pits should be regulated in number and extent, taking into consideration rainfall and natural flushing rates. Effluent from these pits should be adequately diluted.

Aquatic vegetation should be left in its natural condition as much as possible.

Watershed areas should not be cleared of vegetation, except under strict control and in limited extents. Bare watershed land should be forested with fast-growing varieties of trees. Deforestation for firewood etc., should be controlled, and programmes of reforestation carried on simultaneously.

Better methods of waste disposal, including the proper construction of septic tanks, waste dumps, etc. should be introduced and regulations enforced.

Stocking of inland water bodies with tilapia and other species of fish is necessary to encourage the use of these lakes for fishing and recreation. This is important to reduce the pressures on the coastal ecosystems.

5.6 Beaches:

As much as possible permanent development should be placed well inland of the active part of the beach in the future. The set-back zone authorised by the Coast Conservation Division and the Urban Development Authority should be enforced.

Removal and unnecessary disturbance of coastal shoreland vegetation should be avoided.

Positive action must be taken to prevent the further loss of sand from the beach, eg. a beach nourishment programme should be initiated as soon as possible.

Offshore coral mining, a widespread problem along the coast, should be reduced or halted before erosion problems become more severe. The feasibility and environmental impact of inland coral mining should be looked into.

5.7 Coastal Waters:---

Proper runoff management as discussed earlier will control the quality and effects of runoff water on the coastal waters.

Garbage dumps, septic tanks, etc. should be located well back from the beach to prevent the leaching of pollutants into the water. The present system utilized by hotels to dispose of the wastes onto the beach should be halted and penalties issued to offenders.

Municipal and household wastes should be disposed of away from the beach, and where necessary treated to remove pollutants with a high potential for damaging the coastal ecosystem.

Activities in the waters, eg. anchoring of boats, should be regulated and located away from sensitive coral reef areas.

To prevent further degradation and to restore the health of the coral reef ecosystem at Hikkaduwa a marine park management system is recommended. Under such a concept certain activities could be

prohibited; controlled and managed, and offenders could be punished. This serves to discourage future offenders. Specialised zoning systems could be devised taking into consideration the ecological condition of the environment, eg. waders and snorkellers can be prevented from entering areas where they would cause damage to coral with their feet. In order to help the system to recover, the following activities can be prohibited within a particular area of the reef; spearfishing; collection of shell and fish; collection of coral, dead or alive; collection of other invertebrate fauna and reef flora; lobster trapping, net fishing, and hand-lining on the reef; etc. Visitors should not be allowed on the Rocky Islets, to revive the bird sanctuary.

Visitors should be encouraged to feed the fish in the reef, in order to attract and keep the fish in the area. Only approved types of food, however, should be allowed.

Other types of fish attractants, such as artificial reefs created from discarded tyres, car bodies, etc. could be used to build up the reef area. Such projects should be undertaken with proper technical advice.

The operation and number of glass-bottom boats should be controlled, in order to limit the number of visitors per unit time into the park area.

To rehabilitate the reef an extensive restocking programme should be established. The programme should involve reef fish as well as mobile and sedentary invertebrates. Controlled restocking and monitoring of reef-life should restore some of the original beauty of the reef. Restocking should be conducted with proper technical help.

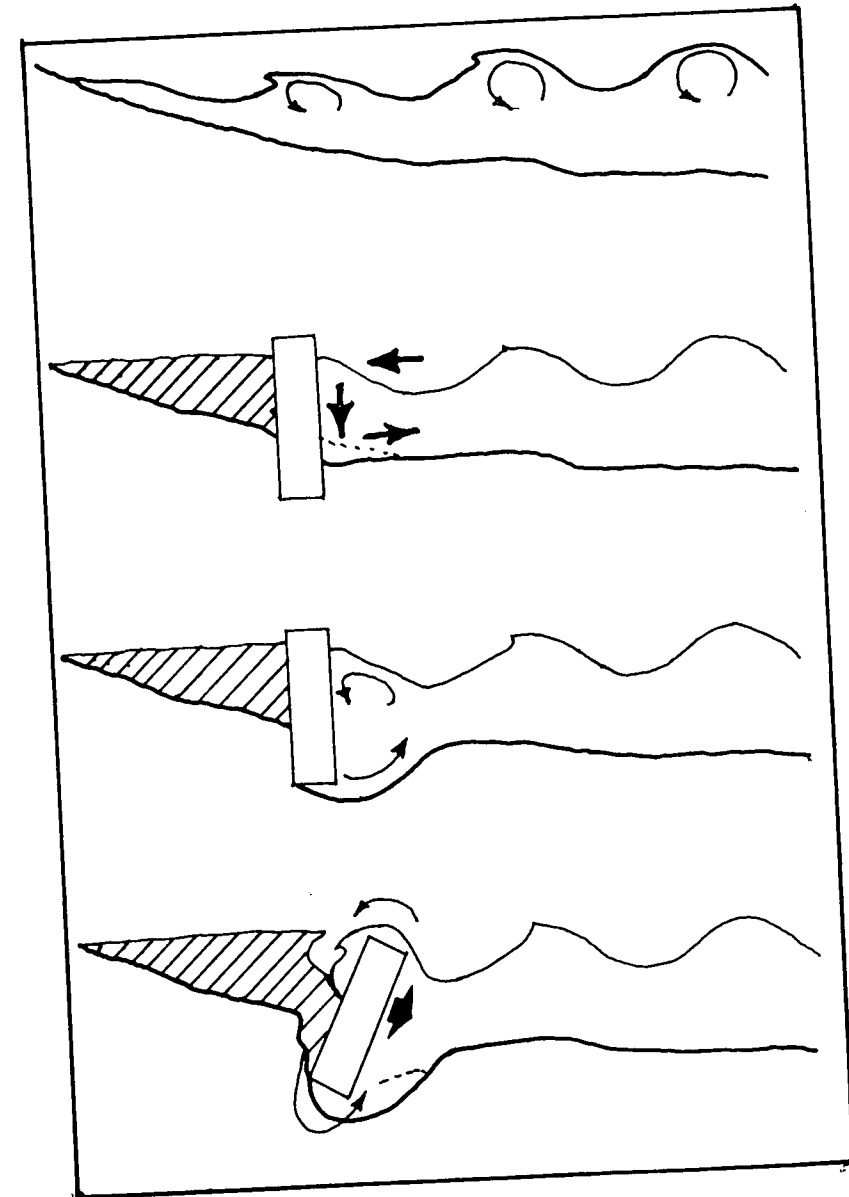


Figure 1.

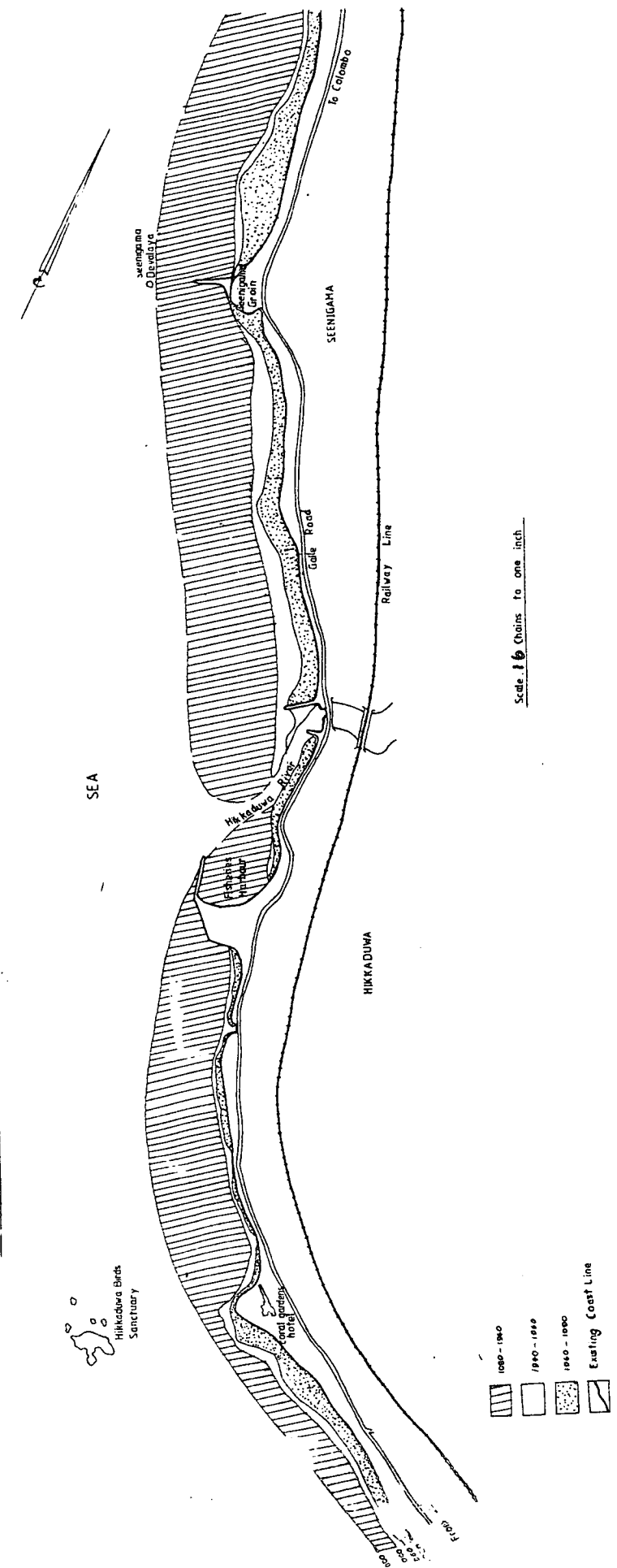
A naturally sloping beach dissipates wave energy, but a seawall or building foundation wall reflects the energy almost completely, creating a scouring action near the toe of the wall and causing the undermining and eventual collapse of the structure (55)

(The Conservation Foundation, 1977)

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CHANGES NOTICED IN THE COAST LINE OF HIKKADUWA AREA DURING THE PERIOD 1880-1980



CHAPTER VI
ENVIRONMENTAL IMPACT
ASSESSMENT

1. Introduction:

The methodology of Environmental Impact Assessment as Developed by the UNEP and contained in the "Environmental Assessment Statements" has been applied on 'on going' or 'proposed projects' which have been well conceived and planned out in great detail in terms of their input-output relationships and other components. Each project is implemented either by the State or by a private firm, and the decision making rests with a single agency.

On the contrary development of tourism at Hikkaduwa, (Sri Lanka) to which the above methodology is applied in this study represents a decade of haphazard development spearheaded by several hundreds of entrepreneurs within the confines of a given geographical area. In other words tourism development in this area has taken place under completely uncontrolled and unplanned conditions. The high rate of return on investment in the Tourism Sector in general, coupled with incentives, motivated developers to invest on tourism in Hikkaduwa. The choice of Hikkaduwa for such development is attributed to its coral reefs, sandy beaches and easy accessibility by road and rail. The development had a high-multiplier income effect on people belonging to all income groups and to different social strata and motivated many of them to change their original vocations such as fishing and coral mining. Many employment opportunities were found in activities, related to tourism to which even young school leavers were attracted.

COST BENEFIT PRESENTATION

The Cost Benefit Assessment is represented in two parts. The first part of this Assessment consists of an evaluation of Resources Enhanced and Resources Depleted as a result of this Development, over the last decade. Certain monetary values had to be assigned to assess the magnitude of physical, (land use), environmental and sociological problems. Although the Study Team attempted to be objective as far as possible, these values in most instances are arbitrary and were made on value judgement of the Study Team. The experience and the specialist knowledge of the Study Team members have provided the basis for the level of confidence of these estimates.

The second part of the assessment takes into account the adoption of several long term remedial and restoration measures which are contained in the development plan for Hikkaduwa to overcome most of the physical land use and environmental problems and cover a period of thirty years. Specific remedial measures cannot be identified to overcome sociological problems that exist in the area under the present state of its development. However, it is felt that with the introduction of a physical development plan, (which will eliminate conflicts in land uses etc.) the present problems will be eased to some extent.

ASSESSMENT

On the basis of data presented in the analysis, this project could be considered to be economically beneficial. Furthermore, it will have high multiplier effect, particularly on low-income sections of the

community, all of which cannot be quantified. The benefits could be enhanced, and social costs associated with physical and environmental problems could be reduced by implementing remedial measures as contained in the development plan for Hikkaduwa. If planned development as recommended is not carried out, it is likely that the natural resources such as the coral-reef and the beach which serve as the basis for the economic development of the area will be depleted over a period of time. An assessment carried out on assuming that the present trends will continue, will necessarily indicate a large increase in the social costs and a trend of progressive decline in the growth of income from Tourism. The present Study is carried out on the assumption that a planned development process is a necessary requisite for an environmentally sound development of the area.

DECISION MAKING

Development of tourism in most countries, except in very underdeveloped parts of the world is carried out on a planned basis. Tourism is based on natural endowments such as sandy beaches, fauna and flora, coral reefs, etc., and tourist development involves development of the surrounding areas for accommodation, recreation and enjoyment by tourists. The physical structures and infrastructure that have to be constructed, unless carried out in a planned manner could lead to deterioration of the natural environment leading to a complete collapse of tourism development. In order to avoid such a socially catastrophic occurrence many countries take great care to plan out national policy on tourism, to monitor the situation in relation to national

and inter-national trends, and to plan tourist areas and their infrastructure in accordance with these trends. Individual sites may be developed by private entrepreneurs, subject to strong controls and restrictions as provided in the Master Plan for the development.

Tourist Development at Hikkaduwa is based on many natural endowments which were developed without any physical planning but guided only by free market forces. Within a period of about 15 years, it has reached a critical stage in relation to physical, environmental and social conditions. Most of these could have been avoided if there was a well conceived physical development plan to regulate and guide development.

Introduction of a development plan at a stage when the development has already taken place in a haphazard manner will necessarily create many problems of implementation. e.g. the cost for relocation of activities, provision of environmental additionalities for resource restoration such as 'beach nourishment schemes', construction of an alternative by-pass road to Galle Road at Hikkaduwa to ease traffic congestion, etc. Even at this late stage, a decision has to be made without delay, to implement a development plan and to incur such costs as may be required in order to avoid a more disastrous situation in the future.

It also provides a good basis for the future to prevent haphazard growth of tourism in other parts of the country as well.

11 (a) R E S O U R C E S U S E D

(1) DIRECTLY USED/CONSUMED

Serial	Item	Quantity	Value in (Rs.million)
11(a)1	Land for tourist activities ¹	22 acres	17.6 ²
aa(a)2.	Beach area used for tourist development.	0.5 acres	4.0 ³
11(a)3.	Building material cost of tourist hotels, quest houses, tourist shops, restaurants etc. (Both local & foreign exchange cost)	950,000 (sq.ft.)	130.0
11(a)4.	Labour employed for hotel construction	60,000 ⁴ (man months)	60.0
11(a)5.	Hotel and Restaurant Management and Operation	48,000 ⁵ man months	72.0 ⁶
11(a)6.	Labour employed in handicraft tourist shops, entertainment and recreation.	60,000 ⁷ man months	48.0 ⁸

1. Includes land exclusively used for hotel and Restaurant development but excludes residential units converted or extended as tourist facilities.
2. Valuation @Rs.5,000/- per Perch. Prime properties have a present value of Rs.10,000/- per Perch while others with restricted or no beach access have a value of Rs.3,000/- per acre., e.g. For purposes of lease of prime land by Ceylon Tourist Board, the official valuation was Rs.10,000 per Perch.
3. Assessed at 10 times the value of a Perch at 11(a)1. in consideration of the opportunity costs.

4. @ of 1000 persons employed over a period of 5 years.
5. No. of persons employed during the season (six months per year) is 1200, considered over a period of 8 years.
6. Average earnings per man month @Rs.1500/- (includes salary and other emoluments)
7. No. of persons employed is 1250 over a period of 8 years (six months per year)
8. Average wages @Rs.800/- per month.

11 (b) RESOURCES USED

(11) INDIRECTLY AFFECTED

Serial No.	Item	Quantity	Value (in Rs.mn)
11(a)11(1)	Vacant agricultural and utilised ¹ for housing	10 acres	0.8
11(a)11(2)	Conversion of houses to Guest houses/ restaurants	165 units 330,000Sq.ft.	16.5 ²
11(a)11(3)	Erosion of beach resulting from hotel construction	0.5 acres	50.0 ³
11(a)11(4)	Depletion of coral reef structure	10% loss over 10 years	(3.0)
11(a)11(5)	Depletion of aquatic life ⁴	-	(5.0)
11(a)11(6)	Depletion of flora	-	(1.0)
11(a)11(7)	Restriction of public access to and along the beach	-	(5.0) ⁵
11(a)11(8)	Depletion of land suitable for commercial activities other than tourism and land use conflicts between tourism and other uses	-	3.0 ⁶
11(a)11(9)	Reduction of the effective width of Galle Road due to encroachment	-	2.0 ⁷
11(a)11(10)	Disturbance of tranquility of residential areas	-	IT *
11(a)11(11)	Deterioration of cultural and moral standards of younger generation which is exposed to negative aspects of tourism	-	IT

1. Value of Agricultural land is low due to neglect of crops such as cinnamon, coconut and Paddy. Further most paddy land are affected by increased salinity.
2. Loss of housing stock calculated @Rs.50/- per Sq.ft.(replacement cost not included)
3. Includes scarecity value plus replacement costs.
4. Includes depletion due to collection of exotic fish, spea fishing activity and marine pollution.
5. Related cost of provision of new access
6. Includes costs of relocation.
7. Includes social costs of congestion, increased volume of accidents and the loss of scope for widening of road.

* It - Intangible (Cost element identified without quantification)

11(b) PRODUCTS AND RESIDUE CREATED

1. DIRECTLY FROM DEVELOPMENT PROCESS

Serial No.	Item	Quantity	Value (in Rs.mn)
<u>Products</u>			
11(b)(i)(1)	Development value as at 1983 land and buildings subject to Tourist development and ancillary uses. Approximately 800 rooms in guest houses and houses converted to tourist accommodation of 22 acres of land. Approximately 800 rooms and ancillary facilities.		(1000.0)
11(b)(i)(2)	Net income from hotels & guest houses (rooms, restaurant and vehicle hire) (past 10 years) ¹		300.0
11(b)(i)(3)	Net income from informal activities connected with tourism eg. selling of curios, hire of bicycles etc. and motor bicycles, boats (past 10 years)		(30.0)
<u>Residue</u>			
11(b)(i)(4)	Pollution of beach- Kitchen Waste and boats discharging diesel		(1.0) ²
11(b)(i)(5)	Contamination of ground water by soakage pits, due to lack of a sewage scheme		(3.0) ³

1. Net income is defined as income after payment of wages, rents, operational expenses and government dues excluding depreciation costs.
2. Represents cost of corrective measures.
3. Includes cost of corrective measures and other social costs.

(111) RESOURCES EXHAUSTED/DEPLETED/DETERIORATED
(BY PROJECT AS NOW IMPLEMENTED)

Serial No.	Related Serial No. of 11	Item	How	Net losses	
				Quantum	Value (in Rs.mn.)
111(1)	11(a)ii(I)	Depletion of land suitable for agriculture	Due to Conversion of land suitable for agriculture for building development.	10 acres	(0.8)
111(2)	11(a)ii(2)	Depletion of Housing Stock	Conversion of houses into accommodation facilities for tourists	165 units	16.5 ¹
111(3)	11(a)ii(3)	Erosion of beach	Construction of vertical retaining walls on the beach contributing to erosion	0.5 acres	50.0 ^(b)
111(4)	11(a)ii(4)	Depletion of Coral reef structure.	The intensive use of coral reef by tourists indiscriminately and the commercial exploitation of the reef have caused this deterioration		3.0 ²
111(5)	11(a)ii(6)	Depletion of Aquatic life	Due to collection of exotic fish and intensive use of coral reef by tourists		(5.0)
111(6)	11(a)ii(6)	Depletion of Flora	Removal of coastal and other vegetation for hotel construction		(1.0)

1. Alternative homes need to be constructed to relocate the families who were living in these homes.
2. Beach and the coral reef are the main resources which attract tourists to the area. Therefore it has a very high value.

(111) RESOURCES EXHAUSTED/DEPLETED/DETERIORATED
(BY PROJECT AS NOW IMPLEMENTED)

Serial	Related Serial No. of 11.	Item	How	Net Losses Quantum Value (in Rs.mn)
111(7)	11(a)ii(7)	Reduction of public access to beach	Construction of hotels in a row encroaching into paths leading to the beach has obstructed public access to beach	(5.0)
111(8)	11(a)ii(8)	Depletion of land for commercial and public purposes	Development of Hotels and tourist oriented activities in areas used for commercial activities and public purposes-land use conflicts.	(3.0)
111(9)	11(a)ii(9)	Congestion of Galle Road and social costs associated with same	Increase of Tourist traffic has caused heavy congestion on Galle Road leading to high rates of accidents.	(2.0)
111(10)	11(a)ii(II)	Deterioration of cultural and moral standards generation.	It is a general presumption that tourism has had a negative impact on cultural and moral standards, particularly of the youth in Hikkaduwa. However, the degree of such impact is difficult to establish	IT
111(11)	11(b)(i)(I)	Pollution of beach by disposal of waste water from hotels	Depletes beach environment and its attractiveness for tourism and has a negative effect on health and sanitation	(1.0)
111(12)	11(b)(i)(2)	Contamination of Ground water	Affects the quality of portable water and limits further expansion of development activities	(3.0)

IV - RESOURCES ENHANCES

(BY PROJECT AS NOW IMPLEMENTED)

Serial No1	Related Serial No.of 11(a)	Item	How	Net Gains	
				Quantum/Value (in Rs.mn.)	
IV(1)	11(a)(I) 1	Utilization of land for tourist activities	The commercial value of land increased considerably due to high demand for tourist activities.	22 acres	22.0
IV(2)	11(a)(I) 2	Construction of many hotels, guest houses, restaurants.	950,000sq.ft. of buildings constructed for tourism which increased the value of physical resources of the area.	950,000 sq.ft.	130.0
IV(3)	11(a)(I) 4	Increase of incomes of labour engaged in hotel construction ¹ (10Yrs)	12,000 man months involved in construction, leading to an increase of incomes and enhancement of labour skills	12,000 (man months)	12.0
IV(4)	11(a)(I) 5	Hotel Management and Operation ²	Incomes and job opportunities for youths in the area and entrepreneurial profits	48,000 (man months)	38.4
IV(5)	11(a) 6	Labour employed in handicrafts, tourist shops, entertainment and recreation	Increase in job opportunities and incomes for those engaged in service activities. (Handicrafts, entertainment, recreation, etc)	48,000 (man months)	(48.0)

1. Represents only additional opportunities created due to expansion in Tourism related construction.

2. Based on assumption that all jobs are created through tourism development.

V. REQUIRED ADDITIONAL PROJECT COMPONENTS
FOR RESOURCE RESTRICTION, MAINTENANCE,
EXPANSION (POTENTIAL ACTIVITIES)

Serial No.	Related Serial No. of Section 11/111	Item	How enhanced	Cost	Net Gain Quantum	Value
V(I)1	II(a)ii(I)	Depletion of productive agricultural land	This will be prevented by zoning of suitable areas for agriculture and enforcement of planning regulations.	0.1	20acres	1.6
V(I)2	II(a)ii(2) & II(a)ii(3)	Conversion of pre-houses as guest houses and diminishing of housing stock	This will be prevented by zoning regulations and enforcement of service charges for conversion.	0.1	200units	20.0 ¹
V(I)3	II(a)ii(3) & II(a)ii(4)	Loss of beach area due to hotel construction & depletion of coral reef structure.	This will be prevented by definition of beach reservations and strict enforcement of regulations.	0.1	1acre	0.8
V(I)4	-as above-	Loss of beach.	Introduction of a sand nourishment scheme to restore lost beach.	5.0	1.0acre	8.0

1. It is assumed that economic loss will be Rs.100,000/- per unit and there will be an increase of income due to high hotel occupancy rates.

Contd....

Serial No.	Related Serial No. of Section 11/111	Item	How enhanced	Cost	Net Gain Quantum	Value
V(i)5	11(a)ii(4)	Depletion of coral reef	This will be prevented by the proposed marine sanctuary and marine park at Hikkaduwa by the Dept. of Wild Life. This will also protect marine vegetation.	2.0		(8.0)
V(i)6	11(a)ii(5)	Depletion of Aquatic life	- do -			
V(i)7	11(a)ii(6)	Depletion of Fauna & Flora				
V(i)8	11(a)ii(7)	Restriction of Public access to and along beach	This will be eliminated by acquisition of such access ways by the Govt. at regular intervals and opening up of a walk way along the beach as provided in the Development Plan.	2.0		(3.0)
V(i)9	11(a)ii(8)	Depletion of land suitable for commercial purposes and land use conflicts (non-conforming uses).	Land use conflicts will be eliminated by following provisions in the Development Plan - (a) Shifting of Educational institutions located in close proximity to tourist areas (Wf. Sri Sumangala Mahamaya Vidyalaya) (b) Shifting of weekly pola & commercial activities landward to the north of hotel belt.	10.0		(15.0) ^a

Serial No.	Related serial No. of section 11/111	Item	How enhanced	Cost	Net Gain	
					Quantum	Value
V(i)10	11(a)ii(9)	Reduction of effective width of present Galle Road and problem of congestion.	Congestion of the present Galle Rd, and conflicts in road usage between local and through traffic will be eliminated with the proposed diversion of Galle Rd, from Hikkaduwa bridge to Kumarakanda, about 1 km, landwards.	25.0		b (15.0)

a. Cost of relocation of schools and commercial activities can be partly recovered by selling those sites for tourist development. Social benefit that will arise by providing better environment for education are identified as additional gains and are embodied in value added.

b. Benefits of this development could be realised only in the long term values land abating the new road increased through productive use.

COST BENEFIT ASSESSMENT 1.

DEVELOPMENT AND OPERATION UNTIL THE IMPLEMENTATION OF DEVELOPMENT PLAN

(PROPOSALS 1973 - 1983)

Reference	Item	Cost (in Rs mn.)	Benefits (Rs.mn.)
11(a) 1	Land for tourist activities including hotel construction.	17.6	
11(a) 2	Beach area used for hotels	4.0	
11(a) 3	Building material cost of tourist hotels guest houses, tourist shops, restaurants et.	130.0	
11(a) 4	Labour employed for hotel construction		60.0
11(a) 5	Labour for hotel management and operation		72.0
11(a) 6	Labour employed in handicrafts, tourist shops entertainment and recreation.		48.0
11(a)ii(1)	Vacant agricultural land utilised for housing and tourist services	0.8	
11(a)ii(2)	Conversion of houses as guest houses/ restaurants.	16.5	
11(a)ii(3)	Erosion of beach due to hotel construction.	50.0	
11(a)ii(4)	Depletion of coral reef structure	(3.0)	
11(a)ii(5)	Depletion of Aquatic life	(5.0)	
11(a)ii(6)	Depletion of Flora	(1.0)	
11(a)ii(7)	Reduction of Public Access to beach	(5.0)	
11(a)ii(8)	Depletion of land suitable for commercial activities and land use conflicts between tourism and other uses.	3.0	
11(a)ii(9)	Congestion on Galle Road due to increase of Tourist traffic.	2.0	
11(a)ii(10)	Disturbance of tranquility and the deterioration of cultural and moral standards of young people	IT	

Reference	Item	Cost (Rs. mn.)	Benefits (Rs.mn.)
11(a) ii (11)	Developed value of land and buildings subjected to development of tourism		(1000.0)
11(a) ii (12)	Net income from hotel room rents, restaurants etc, during past 10 years		300.0
11(a) ii (13)	Income from informal activities connected with tourism, (Eg. bicycle and motor bicycle hire, selling of curios etc)		30.0
	Balance as per Assessment 1.	237.9	1510.0

COST/BENEFIT ASSESSMENT 11.

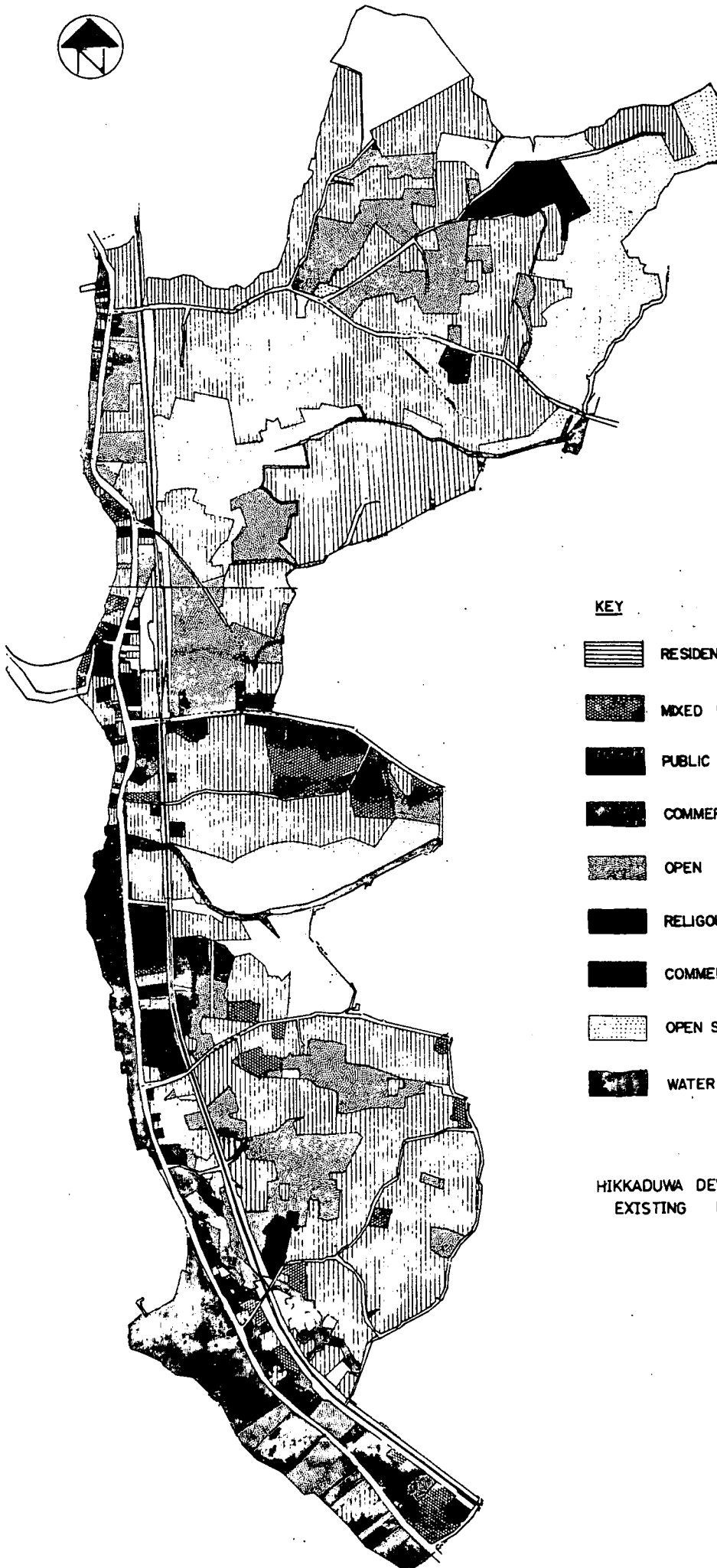
AFTER INTRODUCTION OF DEVELOPMENT PLAN AND OTHER ENVIRONMENTAL IMPROVEMENTS (1983 - 2013)

V(i) 1	Zoning of land available for agriculture to prevent further depletion.	-	1.6
V(i) 2	Zoning of residential areas and restrictions on conversion of use	-	20.6
V(i) 3&4	Loss of beach due to erosion and hotel construction will be arrested by strict enforcement of a beach reservation, as per development plan and execution of a sand nourishment scheme.	5.1	8.8
V(i) 5,6,&7	Depletion of coral reef, aquatic life and Fauna and Flora will be prevented by proposed marine sanctuary and marine park.	2.0	(8.0)
V(i) 8	Provision of public access to and along the beach as part of the development proposal.	2.0	3.0
V(i) 9	Prevention of depletion of land for commercial and public purposes and prevent land use conflicts - as per Development Plan.	10.0	(15.0)
V(i) 10	Prevention of congestion on present Galle Road - at Hikkaduwa by providing a by-pass as per Development Plan.	25.0	(15.0)










Reference	Item	Cost (Rs.mn.)	Benefits (Rs.mn.)
11(b) (i) (1)	Appreciation of value of land and buildings for tourist development over the next 30 years.		2000.0 ¹
11(b) (i) (2)	Net incomes from hotel room rents, restaurants, bar and vehicle hire inclusive of guesthouses (next 30 yrs)		600.0
11(b) (i) (3)	Income from informal sector activities connected with tourism		60.0
	TOTAL :	282.0	4241.4

1. Appreciation of land values and increase of incomes from tourist hotels and restaurants are forecast to increase at progressively higher rates than in the past 10 years, due to the introduction of the Development Plan Proposals and associated changes.

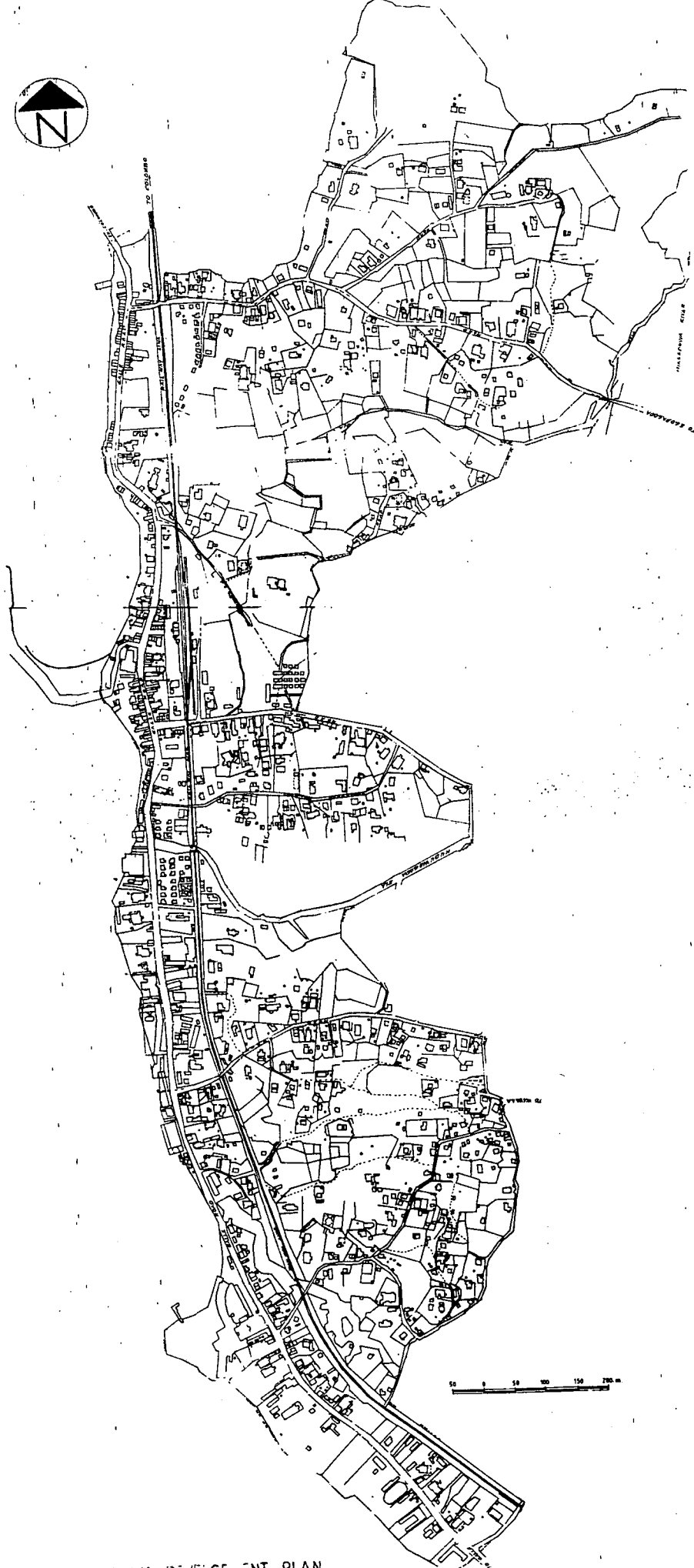
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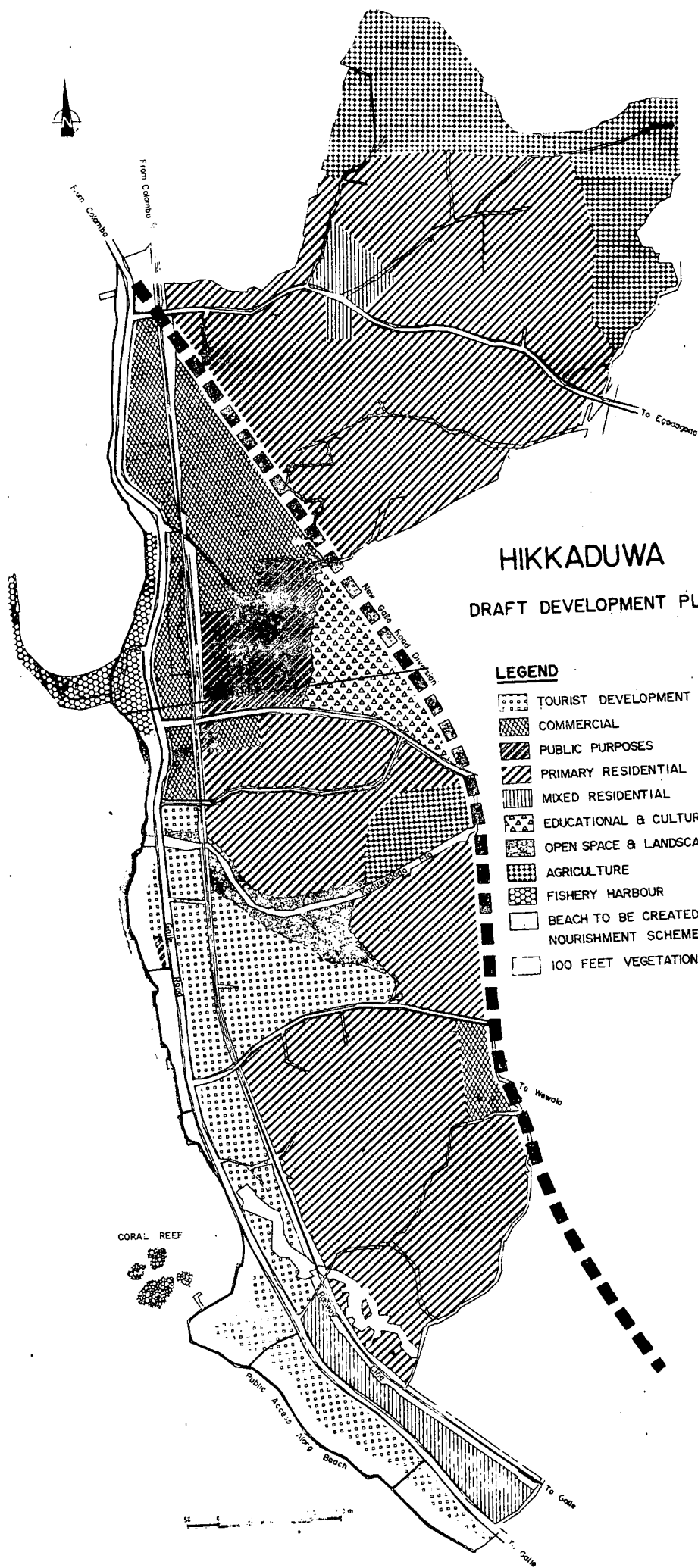
KEY

-  RESIDENTIAL
-  MIXED USE
-  PUBLIC
-  COMMERCIAL - HOTELS
-  OPEN SPACE
-  RELIGIOUS
-  COMMERCIAL - SHOPS
-  OPEN SPACE - LOW LYING
-AREA
-  WATER BODIES

HIKKADUWA DEVELOPMENT PLAN
EXISTING LAND USE














HIKKADUWA DEVELOPMENT PLAN



HIKKADUWA

DRAFT DEVELOPMENT PLAN

LEGEND

-  TOURIST DEVELOPMENT
-  COMMERCIAL
-  PUBLIC PURPOSES
-  PRIMARY RESIDENTIAL
-  MIXED RESIDENTIAL
-  EDUCATIONAL & CULTURAL
-  OPEN SPACE & LANDSCAPED AREAS
-  AGRICULTURE
-  FISHERY HARBOUR
-  BEACH TO BE CREATED BY SAND NOURISHMENT SCHEME
-  100 FEET VEGETATION SET BACK

CORAL REEF

0 0.5 1 1.5 2 2.2m