DEVELOPMENT PLAN FOR TRINCOMALEE METRO URBAN DEVELOPMENT AREA

VOLUME ONE
Part I

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PART ONE

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DEVELOPMENT PLAN FOR TRINCOMALEE METRO URBAN DEVELOPMENT AREA

1.0 INTRODUCTION

Trincomalee District is one of the three districts in the Eastern Province of Sri Lanka is located in the Dry Zone. It covers an area of 2,727 sq. km, including a 98.0 sq. km of large inland water bodies. The boundaries of Trincomalee District are Yan Oya from North, Indian Ocean from East, Verugal Ganga from South and boundaries of Anuradhapura and Polonnaruwa Districts from West.

The civil disturbance that has escalated in the North and East has drastically curtailed the development of the Trincomalee district well over the last two decades even though the area is having enormous potential to develop in many sectors at mega scale.

With the recent control of the civil disturbances and extended administration over a uncleared areas by the Government of Sri Lanka expelled the need of having planned development encircling one of the most magnificent natural harbours in the World. The integrated comprehensive development that has to be addressed to the area would make the way for a major physical development once the peace restore in the Trincomalee Metro Urban Centre.

The Urban Development Authority in co-ordination with relevant Government Ministries, institutions, armed forces and the regional and local representatives made this consolidated effort to successfully formulate a comprehensive integrated physical development plan to the area while addressing the needs of regional economic development and generation of employment opportunities in the industrial, fisheries, tourism and agricultural sectors in order to enhance the integrity among different ethnic groups.

Accordingly Trincomalee Metro Urban Centre is defined and addressed the major issues while enhancing the development potential of the largest urban agglomeration in the East Coast of Sri Lanka consists of Trincomalee Urban Council, former Town Council areas of Clappenburg, Kinniya and Muttur as well as surrounding areas of these urban centres. Trincomalee Metro Urban Centre is one of the four urban Metro Centres advocated for future urban development by the National Physical Planning Policy of the National Physical Planning Department prepared in the year 2000.

2.0 REGIONAL ANALYSIS

2.1 Topography and Physical Characteristics

The Trincomalee district is comprised of a mosaic of diverse topographical features with lands of slightly undulating. Isolated mountain ranges are found in Northwestern and Southeastern parts of the district at Morawewa and Kantale Divisional Secretariat Divisions (DSD). More particularly, the coastal fringe is generally flat except in Trincomalee Town and Gravates DS Divisions. Accordingly the elevation varies between 600 m at hilly region and 3 m MSL at coastal belt. The hilly area is insignificant in extent by covering about 5% of the total land area of the district. The coastline of about 210 ha is characterized with wide sandy beaches that have been created through littoral drift of sand brought along the Mahaweli ganga. The beach is also enriched with extensive lagoons, estuaries, mangroves, coastal marshes and dunes; and the seaward is enriched with coral reefs, sandstone and shallow beds of coastal and estuarine sea grasses.

The 11 rivers with a basin area of 14,463 sq. km decorate the coastline with a radial pattern of drainage with 15 bays, and 14 lagoons. Out of 75 operating inland tanks of the district, 22 are classified as major irrigation tanks (Fig 2.1). The district comprises of unique landscape features due to the uniqueness of its topography. Trincomalee bay is one of the largest natural deep harbors in the world and it gets connected to the Indian Ocean through a submarine canyon (900 m deep) that cuts through the continental shelf of which the average depth is about 70 m. The bay is enriched with 11 islands, which are providing excellent habitats for aquatic birds. The riverrine environment created with Mahaweli Ganga, the largest river in the island flows through the area and falls into the Indian Ocean at Trincomalee bay.

2.2 National and Regional Linkages

Trincomalee has acquired fame as one of the most magnificient harbours in the world. Thsis sea port flourished in 1598 BC. Being away from 257 km from Colombo, the Trincomalee district is located in the Eastern Province of Sri Lanka approximately 81^0 25 – 81^0 55 E of longitudes and, $8^0$60 – $8^0$10 N of latitudes. With a total extent of 2,727 sq. km, the district covers 4.0 % of the total land area of the Island. Trincomalee is linked to the rest of the world through its harbour.

Trincomalee is the District Capital and the Provincial Capital of the Eastern Province. This nationally and internationally important urban centre is linked to the other urban centres by Colombo- Trincomalee (A6) Road, Puttalam Trincomalee (A 12) road, Batticaloa – Trincomaleee (A 15) road and the Colombo- Trincomalee Railway line. The other regional urban centres like Anuradhapura, Batticaloa, Vavunia and Mannar is connected on land by main road network (Fig 2.2).

In relation to functional diversity in the region Trincomallee holds its strong position as Industrial, Tourism and Recreational Centre.

2.3 Population Distribution Pattern

Total population of the district was 255,948 in 1981 of which 34.0% was concentrated in four towns of Trincomalee, Muttur, Kinniya and Kantalai. The rest was dispersed along the Trincomalee – Habarana and Trincomalee – Pulmodai roads. The district population has been growing at an average rate of 4.1 % per annum i,e at 10,493 per annum. In the year 2001 the Census of Population and Housing was not conducted within the entire district properly so as the estimated population in the district is taken for analysis as 413,719 at 2006.

Table 2.1

Population Concentration by Divisional Secretary Divisions
Trincomalee District

D.S. Division	**1971**	**1981**	**1991 #**	**1998 #**	**2006 #**
Town & Gravets	58,013	72,756	84,400	95,363	110,826
Kinniya	39,093	31,072	36,748	59,816	75,123
Muthur	29,299	40,040	47,191	54,050	64,628
Kantale	25,059	37,600	45,002	47,091	48,642
Seruwila	13,161	20,187	16,998	15,870	13,886
Gomarankadawela	*8,634	7,096	8,350	7,558	7,252
Padavisiripura	-	-	13,079	13,650	12,179
Kuchchaveli	**14,986	17,914	20,880	16,770	29,990
Thambalagamuwa	-	20,854	24,509	26,896	32,078
Morawewa	*	9,271	11,043	5,649	7,162
Verugal (Eachchilampathai)		-	6,800	9,723	11,923
Total	**188,245**	**256,790**	**315,000**	**352,436**	**413,719**
Annual average rates of growth		**1971 - 81**	**1981 – 91**	**1991 - 98**	**1998 - 2001**
		3.15%	1.70%	2.50%	0.30%

* Kaddukulampattu West Division (in 1971)
** Kaddukulampattu East Division (in 1971)
# -Estimated

Sources :
1. Department of Census and Statistics
2. Deputy Director (Planning) District Secretariat, Trincomalee
3. Report of the North East Irrigated Agriculture Project
4. Report of the Governors Office, NE Provincial Council

The total population in the district covering all ethnic groups is 413,719 in 2006 of which Muslims makes the majority and proportion of Tamil and Sinhalese became second and third (Table 2.2). Similar pattern is existed in gender distribution as well.

Table 2.2

Population Distribution by Ethnicity – 2006

Ethnicity	Population	Percentage Share
Sinhalese	100,454	24.34
Tamils	143,282	34.73
Muslims	168,696	40.89
Others	115	0.03
Total	**412,548**	**100.0**

Source: Planning Secretariat, NEPC

Prior to the civil disturbances in 1981, Tamils were the largest ethnic segment in the district, which was nearly 36.4% of the total. Sinhalese and Muslims were the second and third in the ethnic category. Since 1981, number of Tamil and Sinhalese population have increased relatively at a low level compared to the rate of increase of Muslim population. Growth rate of Muslim population is faster than the other two ethnic groups. As a result Muslims represent more than 40.0 percent of total population at present and Tamil and Sinhalese become second and third respectively.

If compared to the changes in the ethnicity by DS divisions, Mutur & Kinniya, which are predominantly Muslim areas, recorded highest population growth rates. The population has almost doubled during the period between 1981 and 1999. At the same time except in Town & Gravets, in the other divisions, the Tamil population had reduced significantly. In the Snhalese population, although there is an overall increase between 1981 to 1998, the number of Sinhalese persons in certain DS Divisions such as Morawewa, Kuchchaweli, Seuwila and Town & Gravets has been decreased due to the conflict situation.

Buddhist was the largest religious group having 32.0 % of the population in the district in 1981. More or less similar percentages of (31% and 30%) population worship Hinduism and Islam respectively. Christianity is the fourth religion with about 7% of the population. The present situation is drastically changed and Islam holds 40.88 percent while Hindu and Buddhist come to 30.6 % and 24.08 % respectively.

2.4 Land Use and Climatic Condition

2.4.1 Land Use

The land use pattern of the district indicated that the land utilized for agriculture specially paddy (45,615 ha), homestead crop (18,830 ha), and sugarcane (6,270 ha) are the major users. Sparsely used land it may either use as highland crop is occupied about 46,000 ha. Agriculture sector provides employment to about 48.0% of the district population.

Lands occupied by forest in different categories are as moist monsoon forest (4. ha), Dry monsoon forest (108,710 ha), forest plantation (6,786 ha), riverine dry forest (1,823 ha), and mangroves (1,761 ha). Approximately 14,500 ha of land are utilized by sparse forest cover in Trincomalee District.

The district has a coastal stretch of 210 km, which is composed of one of the best natural harbours, 15 bays, 14 lagoons and 75 inland tanks.

The land use pattern of the Trincomalee District is analyzed on the basis of available maps published by the Survey Department viz. District Land Use Survey Map 1990 and Topographic maps of 1:50,000 published in 1986. The land use data will be updated with the satellite images within the Metro Urban Centre would provide detailed updated information. The maps prepared by the UDA have been used for the analysis of existing land use of the Trincomalee Urban council area and other Pradeshiya Sabha Areas.

a. Land Used for Human Settlements

Out of the total land area of the Trincomalee District, about 7.0 % is classified as built up areas. This includes 4 town centers viz, Trincomalee UC, Kantalai, Mutur and Kinniya as well as emerging town centers such as Gomarankadawala, Seruwila, Nilaweli, Uppuweli areas. Rural settlements with homestead crops covers approximately 17.0% of the total area i.e. classified as homesteads.

The settlement areas are distributed in the following manner:

a. Concentrated settlements in four town centres.
b. Relatively low density human settlements along main roads viz., Agbopura, Thambalagamuwa, Palampoddaru, Vayirittu along the Habarana- Trincomalee Highway; Nachchikulam, Morawewa, Veppankulam along Anuradhapura-Trincomalee Road and Palatoppu, Ichchilampattai along the Batticaloa-Mutur Road.
c. Scattered settlements in Nilaveli, Irakkandy, Kuchchaveli and Pulmoddai along the coastal belt.

b. Agricultural Land Use

The land use for agricultural activities amounts to 36.0% of the total area of the District. The agricultural land use can be divided into four broad categories in terms of crops; i.e. coconut, paddy, sugarcane and highland crop cultivation.

Paddy is one of the most important crops in the District, which covers about 16.6% (45,680 ha) of the total land area. These paddy lands are distributed throughout the District with rural settlements. Out of the total paddy lands only 61.6% is cultivated and the rest remain unutilized. This indicates the high degree of subsistence and undeveloped level of the agricultural sector in the district.

Analysis of the present position in agriculture indicates that the majority of the plots under paddy cultivation (79.9%) are less than 5 acres and only 2.3% of plots exceed 15 acres in extent. The productivity in 3 acre land plots evidence a higher economies of scale than other scale operations. The subsistence level of production was found in this majority group mainly due to the practice of poor technology as well as inadequate and fragmented market opportunities.

As most of the crops cultivated in the District are rainfed, the rainy seasons dictate the cropping patterns. During the Maha season the land use patterns adopted in the farms were paddy cultivation and in other lands cultivation like home garden crops, highland crops and chena crops is planted. Only 8,198 ha is rainfed; 16,386 ha in major and 2,685 ha in minor irrigation schemes are presently under cultivation.

c. Forest Cover

Out of the total land 133,532 ha or 50.0% is covered by different kinds of forest. This forest includes moist monsoon forest, dry monsoon forest, forest plantation, riverrine dry forest, mangroves and sparse forest. The forest lands are distributed in the western and north western parts of the district. Most of these forest lands are earmarked as wildlife sanctuaries viz., Somawathi Chaitya area, Seruwila-Allai Sanctuary, Nelugala Corridor, Veddikachchi Intermediate Zone, Mahaweli Ganga North and South reserve, Vappiah – Verugal Reserve and Chundankadu Reserve.

d. Land used for Archaeological Sites

According to historians, Traincomalee has been an international sea-port since the 6th Century B. C. The discovery of several Buddhist, pre-christian inscriptions and a large number of ancient sites with remains of buildings Trincomalee owned a rich archaeological heritage. The Trincomalee Fort area also bears witness to the fact that the area around the port and the city had been colonized as early as the 3rd century B C and possibly in the 5th Century B C.

A large number of items of archeological interest were discovered from various sites of excavation in the district which are exhibited in the Trincomalee Museum and at some of the temples in the area.

The district of Trincomalee also has a large number of sites of historic value, eg.

- Seruwila Mangala Raja Maha Viharaya
- Fort Fedric
- Gokanna Templee
- Girihaduseya in Tiriyaya
- Rangiriulpatha Temple
- Wilgam Vehera Rajamaha Viharaya
- Gantalawa - Sri Agbo Raja Maha Vihara
- Pankulama - Sri Gajaba Vihara
- Kanniya Hot wells
- Sri Koneswara Temple in Swami Rock etc.

e. Water Bodies and Mangroves

Under this category of land use includes the lagoons, bays, freshwater tanks and streams in the area. It covers about 7.25% of the total land area of the District. There are about 417 tanks located in the district for irrigation purposes. Total command area of all tanks is 22,133 ha.

2.4.2 Climatic Condition

Climate is the combines or composite picture obtained by averaging the day-to-day weather conditions through a large region over a long period of time. Hence, climate indicates the general overview of a wide area during very particular season. The major climatic zones of Sri Lanka; Wet, Intermediate and Dry zones are further subdivided into 24 agro-ecological regions based on the rainfall, temperature, elevation and soil (CEA, 1988). A larger part of the district falls within the Dry Zone segment of Sri Lanka within DL_1 except in two locations in Allai and Kandakadu areas where agro-ecological zones are DL_2, DL_3 and DL_4.

Climatic condition is very essential to understand in order to make development proposal to the area specially during the North east monsoon period any material susceptible for dispersion is very high and make it more polluted the areas along the wind direction.

a. Rainfall

The mean annual rainfall in the Trincomalee district is 1,727 mm. The rainfall is relatively high during the months of October – January during the Northeast monsoon, when mean monthly rainfall ranges from 210 to 374 mm. This has been influenced by the formation of the low-pressure system, depressions and tropical cyclones in the south Bay of Bengal. During the rest of the year, the rainfall is light with mean monthly levels of 18 to 103 mm.

b. Temperature

The annual mean temperature of Trincomalee district is 27.8 ^{0}C and during the Northeast monsoon period, reaching a minimum of 26.6^{0}C in January. The minimum temperature occurs due to cool dry northerly winds of this season. It is reaching to a maximum of 30.35 ^{0}C during Southwest monsoon period. The highest temperature occurs between April and July during this monsoon period due to sheltering of the westerly winds by the central hills. There is very little annual and diurnal variation in ambient temperature.

c. Wind

Mean daily wind speed in the district is 3 to 6 meters per second, with an annual average speed of 4.5 meter per second. Prevailing wind directions are from the northeast and southwest during the *Yala* and *Maha* seasons respectively. June to August is windy months and during this period particularly in the evenings alternating land and sea breeze can be experienced. During the inter-monsoonal periods, wind directions are not as persistent, although they maintain general northeast and southwest directions.

The circulating wind speed exceeds 62 km/h is known as cyclone and when it exceeds 118 km/h it is called a severe cyclonic storm. Normally the cyclonic storm season of Sri Lanka is November to December with as nearly 80% of occurrences had been during these two months. Severe cyclonic storms that formed in the Bay of Bengal hit the east coast where Trincomalee district is also affected, as it is situated high intensity zone of cyclone prone areas. 13 cyclones have hit Sri Lanka during the period of 1901 – 1995 and Trincomalee had affected ten times except in three occasions. In 2000, Trincomalee was affected by a severe cyclone and inflicted with heavy losses.

d. Relative Humidity

Relative humidity is a pressure of the moisture content in the atmosphere. When the relative humidity is high, the air is more humid. The climate of the Trincomalee is humid with relative humidity of 60 % during the day and 90 % during the night. The day humidity is generally lower than the night humidity, because at higher temperature the saturated air can hold more water vapor. Mean values of the relative humidity are high during the northeast monsoon period.

2.4.3 Hydrology

a. Surface Drainage

Depending on the physical features of the Eastern Province, the surface drainage pattern is a mosaic of rivers, streams, and cascades. Some of which are perennial. In addition to that, there are natural water bodies such as lakes and lagoons in the coastal belt. Man made water bodies of tanks and reservoirs established for irrigation purposes can also be observed in Trincomalee district. Inland waters cover about 204.6 sq. km (Approximately 20,000 ha), which accounts for 7.2% of the total land area of the district as it indicated in Fig 2.3.

Table 2.3

Rivers and Connected Tanks in the Trincomalee District

Name of River	Area in km^2	No. of Tanks	Runoff 1000 Ac. ft Annual Total
Kantalai Aru	487	120	221
Palampotta Aru	145	101	46
Panna Oya	70	12	90
Pankulam Aru	388	164	223
Kunchikumban Aru	207	95	71
Palakutta Aru	21	4	8
Yan Oya	1,538	832	636
Mee Oya	91	40	36
Ma Oya	1,036	366	384
Churiyan Aru	75	15	30
Manaweli River	10,448	1,003	4,306

Source: Arjuna's Atlas (1997) & Arumugam (1967), Dept of Agriculture, NEP

Mahaweli is the longest river (365 km) with the largest river basin (10, 448 sq. km or about a one sixth of the country's land area) in Sri Lanka. As its name implies, it is the Great Sandy River possessing the country's largest flood plain and carrying the largest annual discharge to the sea. The tributaries of the river feed 1,003 tanks. The waters of the Mahaweli Ganga have been intensively harnessed for generation of 470 MW of hydroelectric power and providing irrigation facilities for 365,000 ha of dry zone cultivations under the Accelerated Mahaweli Development Programme in 1978.

Yan Oya and Verugal Aru define district's North and South boundaries respectively. Verugal Aru, which is a tributary of the Mahaweli Ganga, overflows the banks spreading silt over lands bordering the banks and replenishes many minor irrigation tanks. Verugal Aru and Yan Oya are mainly attached to the tank network consisting of both major reservoirs and minor tanks. The water supply for the Trincomalee town and Gravets has been provided from the Kantale reservoir. There is plenty of water for the augmentation of water supply scheme of the Trincomalee urban and suburban areas.

Trincomalee district is dotted with about 250 ancient irrigation tanks and large part of these tanks is abandoned. Restoration of abandoned tanks is required to store rainwater for both development of agriculture and supply of water for domestic purposes. About 75 tanks in the district are under operation. There are 22 major irrigation schemes with an irrigable area of over 22,243 ha. About 80% of such lands are cultivated using the waters of Kantale, Allai and Morawewa tanks. Nearly 10,800 acres come under 22 small schemes catering for 200-1,500 acres.

b. Ground Water

Groundwater resides mainly in unconsolidated deposits overlying the hard rock. In weathered portions of hard rocks, fractures and cavities are there. Water table aquifers exist in these unconsolidated deposits. Highly productive and discontinuous aquifers are associated with 35.0% of the geological structure. Discontinuous and moderate to low aquifers in fractured rocks are associated with rest of the structure. Sandy alluvium has higher permeability while residual and clayey alluvial deposits have low permeability. Main natural ways of ground water discharges are by evapo-transpiration and movements to the surface in the form of springs, seepage and base-flow. Apart from this there is an inter-basin ground water movement. Ground water is extracted and used intensively for domestic purposes and agricultural activities as well. Natural salt-water intrusion been reported in many part of the district.

The first aquifer is in the coastal sandy belt between sea and the lagoons. The water table is at an average depth of 3.0 meters. The quality of the water varies depending on the proximity of wells to the coast. If wells are closer to 'Thonas' the water smells of algae and require treatment. Water in wells in close proximity to lagoons is saline.

The second aquifer is in the area from lagoons towards inland. The aquifer consists of alluvial deposits of silt, clay and sand. Depth of water table varies from 3 meters onwards during dry season in the month of July – September. The ground water available (aquifer) inland away from sea/ lagoon are with/ calcium deposits. Additional precaution is required before the use such as boiling and filtering.

c. Coastal Resources

Coastal Resources Management Plan (1997) defines the coastal zone as "the lying within a limit of three hundred meters landwards of the mean high waterline and of two kilometers seawards of the mean low waterline in the case of rivers, streams, lagoons or any other water body connected to the sea either permanently or periodically, the landward boundary shall extend to a limit of two kilometers inland along that water body.

Coastal Zone Management Plan for Sri Lanka (1990) prepared by the Coast Conservation Department defines scenic areas, as areas in the coastal belt constitute places that provide aesthetically appealing views of the beach, with uninterrupted vistas of seascape and landscape. Recreational coastal areas are traditionally used both by Sri Lankans and foreign visitors for activities such as swimming, diving, surfing, boating, sports, fishing, leisure walks, bird watching and relaxation. The entire coastal belt of the Trincomalee district is scenic area, which has a very high potential for the conversion into recreational areas. Table 2.4 shows the scenic and recreational sites available in the district.

Table 2.4

Scenic(s) and Recreational (r) Sites within the Coastal Zone of Trincomalee District

Place	Type	Grama Niladhari Division	Grama Niladhari Division No.
Clappenbergh Hill	S	Vellaimanal	229
Trincomalee Harbour area	s/r	Trinco town	244/244A/244B
Trincomalee beach road	R	Trinco town	244B
Nilaweli Beach	R	Kumpurupiddi	240/241/242
		Nilaweli	
		Sampalthivu	
Red Rock Beach	s/r	Kumpuruppiddi	240
Pirates cove	R	Kuchchaweli	239/237
Kokilai Lagoon	S	Kokillai	225

d. Costal Morphology

The trans-grading Sea during the Holocene period is thought to have submerged the Trincomalee coastal track. Many islands, bold ridges, low rises and plateaus rose above that forming the present pattern of estuaries, deltas, bays, head barrier, beaches and lagoons by the filling the lower Mahaweli valley, which was under water during the Holocene transgression.

The structure of the Precambrian rocks in this area has a transverse trend in relation to the coast particularly when it is formed solid crystalline rocks which are usually irregular in outline. The irregularity often results from variation along the coast. North of Trincomalee where the coastline is made up of rocks is having almost equal resistance to weathering such as quartzite, charnockites and pink feldspathic gneisses in which irregularities are rather on a small scale. The more resistive rocks (quartzite) form small headlands while the less resistive rocks are etched away to form small symmetrical bays in which bay head beaches accumulate.

Geographically Trincomalee coastal zone extends from Madura Oya at Kalkudah on the east coast, up to the Jaffna peninsula in north. However, the coast of the Trincomalee district is more than half of the entire length of the Trincomalee coastal zone. The most unique feature of the coastal zone of the District is the presence of a steep submarine valley, notched in the continental shelf off the Bay area. The canyon one of the steepest known is recorded to have an average slope of over 4^0 (Anon, 1985).

A special feature to be considered in respect of the producing of the water, which in turn influences the resource potential of the area, is the special bathymetric conditions in the Koddiyar Bay area. The narrowness of the continental shelf, the presence of a deep canyon and the accessibility to ocean currents should theoretically facilitate the process of upwelling in the Bay area. Another important factor, which could influence the hydrobiology of the marine environment in the Trincomalee area, is the macro-charges in the fresh water regime at the river outlets due to damming of River Mahaweli in the upstream. This could also bring about salinity transformations to coastal soils and could also lead to changes in the sedimentation pattern.

e. Coastal Ecosystems

There are diverse coastal ecosystems situated along a coastal stretch of 250 km. It is comprised of one of the best natural harbours in the world, 15 bays, 14 lagoons, 15 coastal islands, estuaries, mangroves, and salt marshes that promote fertile ecological systems. Extent of coastal habitats in Trincomalee district is 2,043 ha of mangroves, 1,401 ha of salt marshes, 671 ha of beaches, 18,317 ha of lagoons and basin estuaries, 1,129 ha of marshes and sand dunes.

f. Basin Estuaries and Lagoons

An estuary is a semi–enclosed coastal body of water which has a free connection with the sea, and within which seawater is measurably diluted by freshwater derived from land drainage. Normally these can be divided into two types as basin estuaries and riverine estuaries. Basin estuaries form where rivers discharge into relatively shallow expanded basins, which in turn connect with the sea. Rivers discharging water directly into the sea by way of relatively narrow channels form riverine estuaries.

Lagoons are coastal water bodies of containing brackish water which are either permanently separated from the sea or are connected with the sea only during part of the year.

Basin Estuaries and Lagoons of Trincomalee district are Kokilai, Nayaru, Kuchchaweli, Periyakaraichi lagoon, Sinnakaraichi lagoon, Uppuweli bay, Thampalagam bay, Koddiyar bay, Ilakkantai, Ullakkalie lagoon, Upparu lagoon and Vandeloos lagoon. All these lagoons have been identified as wetlands of national and international importance (Central Environmental Authority, 1999). The marked

exceptions to the very smooth shoreline of the Trincomalee district are the Koddiyar Bay at Trincomalee, with its unique bathymetry, and a number of indentations in the beach, forming lagoons. The two most important lagoons are ‘Kokilai’ near Pulmoddai and ‘Nayaru’ north of Pulmoddai. These two lagoons are very important fishing grounds and provide a livelihood for several hundred fishermen, both migrant and local.

Besides lagoons, there are also several, small, narrow intrusions of the sea into the land. These intrusions locally known as ‘Thonas’ support the growth of mangroves and cane thus for forming breeding grounds for the variety of aquatic life. The lagoons and Thonas are saline and brackish. The salinity varies according to the proximity to the sea. It is interesting to note that stretching from the sea outfall towards upstream, the variety of fish depend upon the salinity at specific locations in the lagoon. During the months of drought when the water level in the lagoon is low, seawater flows in is a very striking phenomenon in the nights. The surface of the lagoon glitters and becomes transparent showing clearly the movement of aquatic life in all their beauty.

g. Wetlands

Wetlands are places, which are temporarily or permanently covered with water. Under the International Agreement on the Conservation of Wetlands defines wetlands as "Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters (RAMSAR Convention, 1987).

According to the Wetland Atlas of Sri Lanka (Central Environmental Authority, 1999), Mahaweli Ganga flood plain systems, Kokilai lagoon, Periyakaraichi and Sinnakaraichi Lagoons and Ullackalie lagoon are four identified main wetlands in the Trincomalee district.

Kokkilai Lagoon

The extent of the Kokkilai Lagoon is 2,995 ha and located at the southeast of Nayaru Lagoon in the northeast coast. It is a large estuarine lagoon with extensive sea grass beds and some small patches of mangrove swamp and mudflats. The lagoon has been declared as a Sanctuary in 1951. It is a large estuarine lagoon with extensive sea grass beds and some small patches of mangrove swamp and mudflats particularly along the western and southern shores. The lagoon is fed by several small streams and is linked to the sea by a narrow seasonally tidal channel. A greater portion of channel is blocked by a sand bar. The maximum depth near the mouth of the channel is about four meters. It is known to be a very important site for a wide variety of waterfowl, including pelicans, cormorants, herons, egrets, storks, and migratory shorebirds. The lagoon was once famous as a wintering area for large numbers of great flamingos *Phoenicopterus ruber*. The

sanctuary is being used for prawn fishing, paddy cultivation and some shifting cultivation in surroundings areas. The fringe area of the lagoon is densely populated with many small villages. There are some threats for the existence of lagoon and its associated ecosystem. In some years the connection with the sea remains permanently blocked by a sea bar, preventing recruitment of penaeid post-larvae. Regular aquaculture destructs the lagoon and adjacent forest patches are being cleared for chena cultivation.

Periykarachchi Lagoon and Sinnakarachchi Lagoon

The extents of the lagoons are 650 ha and 780 ha and located at 13-20 km Northwest of Trincomalee town. The lagoon ecosystems are consisted of two shallow, brackish coastal lagoons with some mangrove swamps, sea grass beds and extensive mudflats, and seasonally tidal. The lagoons dry out completely during drought periods. Southern section of Sinnakarachchi Lagoon has been converted to saltpans and salt production is taking place. The lagoons support small subsistence fisheries. The lagoons have been used for fishing of finfish and prawn. Salt production, shifting cultivation and permanent cultivation of rice and coconuts are the land uses of surrounding area. Siltation is a threat for these lagoons. The wetland is an important area for migratory ducks and shorebirds

Ullackallie Lagoon

The extent of this wetland is 1,300 ha and located at Toppur, which is 25 km Southeast of Trincomalee. A large shallow, brackish coastal lagoon is an extensive mangrove area on the shores of the lagoon at its southern end. The lagoon is seasonally tidal. During the rainy season, the lagoon is connected to the Verugal River to the south by a seasonal channel of Uppu Aru. Seasonal floods along the Uppu Aru at the south end of the lagoon are particularly important for migratory water birds. It is an important site for large water birds, migratory ducks and shorebirds. The lagoon supports for subsistent fishery.

Mahaweli Ganga Flood Plain Systems

With an extent of 50,000 ha, the Mahaweli Ganga Flood Plains is located along the Mahaweli River form its mouths near Trincomalee South-Southwest. A 17,350 ha has been declared as a National Park. It is the most extensive flood plain of the county. The alluvial plain begins a few km upstream of Mahaweli River near the town of Mannampitiya. The deltaic plain commences with the first tributary of the Kandakadu Aru. The Mahaweli main river discharges water into Koddiyar Bay, which has sandy beach ridges of variable widths, with mangroves swamps fringing small lagoons and tidal creeks. This opens into the elongated and shallow Tambalagam Bay, which is surrounded by extensive mangrove swamps. These also occur along the main river up to 50 km inland form the mouth. The flood plains of rich alluvial soil flanking the river are characterized by numerous shallow marshy depressions known as “villus”. The prolonged periods of inundation of

these low-lying areas together with the nutrients carried in by the water are largely responsible for the exceptionally high levels net primary productivity. In addition to being flooded in the wet season, the villus are also inundated during the dry season, because the headwaters of the Mahaweli Gaga experience the southwest monsoon of every year. The flood plain is composed of a complex system of river channels, riverine marshes (or *villus*), their associated seasonally flooded grasslands, and freshwater swamp forests.

There are approximately 10,000 ha of freshwater riverine marshes occurring in association with the Mahaweli Ganga and its tributaries. Many of the *villus* are partly surrounded by freshwater swamp forest, which occurs on seasonally flooded soil, normally in a zone between the levees of the river and the *villu* marshes. The flood plain is of considerable value for fisheries production, livestock grazing and flood control. Livestock grazing is the principal land use activity throughout the flood plain. Many of the *villus* are used for fishing. Other widespread activities include cutting of reeds and cane, cultivation of tobacco on levee ridges, brick making and cultivation of paddy and other crops. The mangrove swamps and estuaries support important fishery resources in the Koddiyar Bay and nearby costal waters.

The wetlands of the Mahaweli Ganga flood plain system are extremely important for a wide variety of resident and migratory water birds. A large proportion of Sri Lanka's resident bird species (about 250) are found in the Mahaweli flood plains, and a further 75 migratory species have been recorded as winter visitors. The upper alluvial valley is particularly important for large mammals, especially the elephant *(Elephas maximus maximus*). The wetland serves as a migratory corridor between the wet season and dry season and their feeding grounds as well. The riverine marshes and associated swamp forests are said to support the greatest density of large mammals in Sri Lanka. A rear herb *Pentapente phoenicea* occurs in a few, very restricted locations in the freshwater swamp forest.

The Accelerated Mahaweli Development Project has brought major hydrological and ecological changes into the flood plain habitats. Lower river flow and reduction in frequency and magnitude of flooding have substantially decreased the area of the flood plain villu swamp. Lowered river flow has increased salinity intrusion at the river mouth. Return flow rich in pesticides and agrochemicals could lead to eutrophication of the villus. Overgrazing has led to the degradation of some of the villu grasslands and proliferation of undesirable weed species (See figure 2.4 for location of Environmentally sensitive areas).

h. Islands

There are fifteen islands belongs to district. They are Pigeon Island (1 ha), Naditivu (1 ha), Peytivu, Round Island (4 ha), Grommet Rock, Clappenburg (5 ha), Elephant Island (6 ha), Chapel Island (1 ha), Little Sober Island (7 ha), Sober Island (62 ha), York Island (2 ha), Powder

Island (1 ha), Mangrove Island (1 ha), Puramalai (1 ha) and Kokupeechiyakallu (1 ha). Most of these islands are located in the Koddiyar bay. Most of them are ideal nesting and breeding habitats for migrant aquatic birds (see figure 2.4 for coastal eco systems).

i. Coral Reefs

Coral reefs consist of a large rigid structural mass of calcium carbonate formed by the cemented skeletal remains resulting from the successive growth and development of hermatypic corals. Coralline algae also contribute to the more structural foundation of the reef. The corals constitute the more important component since they give vivid colour and impressive three-dimensional form to the reef.

The linear extents of the coral reef at Foul Point and Coral Point have been estimated as 6 km and 2 km respectively. The coral reefs have been identified at Pigeon Island and Sinnakarachchiya in the Nilawali area at 2 to 3 km in distance. The coral reef at Pigeon Island shows a diverse faunal-floral assemblage. The fringing reef along the northern shore of the island reported to consist of *Acropora / Pocillopora verrucosa* assemblage. Along the west, an assemblage of *Echinopora lamellasa* and digitate *Acropora* sp. have been reported while on the south a ramose *Acropora* sp. has been formed the under-water life and thus have made these locations popular with the tourists.

Trincomalee is also regarded as a spear-fisherman's paradise. Varieties are often hunted include Trevalley, Seer, Queen fish, Marlin, Barracuda etc. However, uncontrolled spear fishing could lead to depletion and decimation of the resident species of the reefs such as Grouper and Reef-cod. Coral reefs and their resident populations of fish are often irreparably damaged by dynamite fishing; a destructive fishing practice common in certain areas of Trincomalee. Dynamite fishing causes great damage to the reef and also kills the fish due to positive pressure shock waves accompanying rear-factions created as a result of the explosion.

j. Sea Grass Beds

Sea grass beds are composed of rooted seed-bearing marine plants (halophytes) with salt tolerant angiosperms. They occur in shallow, nearshore coastal waters that are sheltered from high wave energy, and in estuaries and lagoons. Width of the sea grass beds varies from 200 to 2,000 meters. They provide valuable feeding, breeding grounds and nursery area for fish and crustaceans. Sea grass beds are noticeable along the north east coast of Sri Lanka including Trincomalee district.

Most of the lagoons of the Trincomalee district provide the shelter for sea grasses. In Kokkilai area it has highly productive habitats for variety of aquatic organisms including many commercially important species. The blades of certain sea grass species provide substrate for plankton growth of which many fish and prawn species depend on food. Hence the plankton making sea grasses play a major role in the

food web of the lagoon. It is important in shore protection and stabilization as well. The sea grass beds are ideal sites for traditional brush pile fishing, which are not a destructive fishing activity. It does not affect on sea grass beds.

The Trincomalee coast is an important source of the seaweed *Gracilaria* that is exported to Japan in the unprocessed form. It is reported that about 250 tons of *Gracilaria verucosa* could be collected from the east coast.

k. Mangroves

Mangroves are salt tolerant, woody, seed bearing plants ranging in size from small shrubs to tall trees. They occur along sheltered intertidal coastal lines, and in association with estuaries and lagoons. Although mangroves occur on saline soils they have the usual plant requirements of freshwater, nutrients and oxygen. Since the tidal amplitude in Sri Lanka rarely exceeds 75 cm, mangroves occur as a narrow intertidal belt and extend less than a kilometer landward from the mean low water tidal level.

Most of the islands, which are situated in the lagoon outlet to the sea, are covered with mangrove vegetation. The most luxuriant and least disturbed mangals are found at the estuaries where they grow up to a height of about 15 m. Most of the mangrove forests along the edge of lagoons have been cut for brushwood and firewood.

l. Salt Marshes

Salt marshes consist of herbaceous, salt resistant plants growing in sandy or muddy tidal flats in arid areas, which are periodically inundated by seawater. Salt marshes are a common characteristic of coastal areas in the temperate region and they are generally replaced in the tropics by mangroves. The natural functions of the marsh of production, purification and buffering are important for the sustainability of the ecological integrity and productivity of the whole wetland and they are important for nutrient supply to near shore coastal waters, provision of habitats for migratory bird, supply of seed fish for coastal aquaculture and as a discharge area that absorb storm water runoff. Not only the lagoon, but also the marsh produces commercially important species of fish and shrimp although no estimates are available on the value of fish catch in the marsh area.

m. Barrier Beaches, Spits and Dunes

Barrier beaches are accumulations of unconsolidated sediment transported to shore by waves and moulded into a form that lies across a body of water and isolates it from the sea. Spits are essentially incipient barrier beaches that project from shore in the direction of dominant drift and are free at one end. Eastern coast is identified as most prominent spits of Sri Lanka.

Dunes are wind blown accumulations of sand and are distinctive from adjacent landforms such as beaches and tidal flats. Although they resemble beaches they differ mainly with respect to absence of tidal effect. Dunes are unstable unless covered by vegetation. The dunes are found at some places of the eastern coast of the Trincomalee district.

2.5 Fisheries

In 1983, Marine fish production in the Trincomalee district was around 13,506 tons and accounted for nearly 7.3% of the total marine fish landed in the country (Anon, 1983) being ranked as fourth in fish production below Jaffna, Puttlam and Mannar districts. The main fish varieties landed in the district are Shore seine varieties of small pelagic fishes (3,770 tons) and Rock fish (2,456 tons). The other important varieties include Skipjack (1,816 tons), Shark (1,243 tons), Caranx (1,217 tons) and Yellow Fin Tuna (931 tons).

Major fishing season in Trincomalee is January – April period. Heavy fish landings are also noted in September – October period as well. Most of the fish landed is sold in the fresh form and in 1983 only 461 tons of dry fish was produced in the district. This consisted mainly of Shore Seine varieties of fish.

According to the information provided by the Provincial Council of North East 51 main fishing villages and 13,804 fishing families are located in the district as indicated below:

Town & Four Gravets -	Sandy Bay (592), Pattanaththeru (452), Sally (304), Jamaliya (352), Weeranagar (254), Inner harbour (160), Thirukkadaloor (858), Pallaththoddam (178), Srima pura (683), Sinnakaddai (402), Cod-Bay (150), Sinnampillaichchenai (152)and Neerothumunai (92).
Kuchchaveli -	Salappaiaru (108), Kuchchaveli (485), Pudavaikkaddu (85), Kallarawa (50), Pulmoddai Arisimalai (559), Pulmoddai Jinnapura (1,765), Irakkandi (401) and Nilaweli (174).
Kinniya -	Kandaladiyoothu (220), Fizal Nagar (150), Annal Nagar (475), Maharoof Nagar (140), Mancholaichchenai (360), Mancholai (85), Rahumaniya Nagar (180), Kattaiaru (65), Sinnakinniya (220), Periyathumunai (160), Naduththeevu (125), Kurinchankerni (110), Kakkamunai (240), and Poovarasantheevu (60).
Mutur -	Ilakkanthai (72), Sampoor (176), Kadatkaraichchenai (138), Malaimunthal (95), Gankai, (32) Thakwanagar (680), Vadddam (299), Habeebnagar (172), Thahanagar (82), Palanagar (170), and Paddiyadi (322).

Eachchalampattu -	Ilankaiththurai (170), Ilankaiththurai Mukath (245), Verukal Mukaththuvaram (245), Punnaiyadi (65), Seenaveli (75).

However, the information submitted by the Ministry of Fisheries & Aquatic Resources indicated that only about 120 fishery villages are located in the district and 6,681 fishing households with 20,250 active fishers are in the area. Within the 210 km coastal stretch 54 fish landing points were identified.

According to the Provincial Council statistics the identified fisheries infrastructure in the district includes:

Anchorages -	Pulmoddai, Kokilai, Sirimapura, Habibnagar, Kinniya and Thakwanagar
Fish Landing Sites -	Within the district there are 53 fish landing centers of which the major landing sites are Weeranagar, Erakkandiya, Nadaitivu, Kuchchaveli, Pattiyadi, Salapearu, Jinnapuram, Sinnakade, Walli Sambalativu, Thirukadalur,and Sandibay.

No of Fisheries Cooperative Societies – 113.

As per the Ministry statistics the area has 60 fisheries Co-operative Societies.

The main fishing areas in the district are Trincomalee, Nilaweli, Kallarawa, Arakkandi and Podawakattuwa and the main fish types available are Kumbala, Hurulla, Balaya, Makanda, Kelawalla, Thora and Parawa.

The main fishing duration are April to October by FRP 18.5 feet long boats with fishing nets and throughout the year by one day fishing boats and trawlers.

The present fleet includes 1,274 FRP boats, 1,020 one day boats, and 103 trawlers.

In order to develop the fishery industry and infrastructure facilities, up-liftment of socio-economic status of the fishing community and promotion of investment is very essential so that the Ministry has identified following areas as priority areas for development in the fisheries sector:

- Development of Fishery industry and management
- Development of infrastructure facilities
- Development of fishery harbour, anchorage and fish landing sites
- Aquaculture development in inland fisheries and coastal aquaculture
- Social Development.

Inland Fisheries and Aquaculture

There are natural water bodies such as lakes and lagoons in the coastal belt. Man made water bodies of tanks and reservoirs established for irrigation purposes can also be observed in Trincomalee district. Inland waters cover about 204.6 sq. km (Approximately 20,000 ha), which accounts for 7.2% of the total land area of the district as indicated in the table below:

Table 2.5

Rivers and Connected Tanks in the Trincomalee District

Name of River	Area in km^2	No. of Tanks	Runoff 1000 Ac. ft Annual Total
Kantalai Aru	451	120	221
Palampotta Aru	70	101	46
Panna Oya	145	12	90
Pankulam Aru	381	164	223
Kunchikumban Aru	207	95	71
Palakutta Aru	21	4	8
Yan Oya	1,538	832	636
Mee Oya	91	40	36
Ma Oya	1, 036	366	384
Churiyan Aru	75	15	30
Mahaweli River	10,448	1,003	4,306

Source: Arjuna's Atlas (1997) & Arumugam (1967) 24

The major and minor irrigation tank network is a natural resource the district has to develop its inland fisheries. The areas of Kantale, Wan-Ela and Galmetiyawa are already used for the inland fisheries development. However the rest of the tanks are also having potential to develop on a planned manner. It is proposed to develop these reservoirs by introducing cultural based fisheries and introducing proper management measures involving communities.

Although it has large potential to develop aquaculture fisheries in the district because it ensures food scarcity, employment and additional income to fishermen it is mostly discouraged due to the tourism sector development.

The development will include formation/ reorganization of fisheries societies, strengthening of fisher societies, stocking of reservoirs with adequate number of fish fingerlings, provision of fishing crafts, and gear for needy villages, link to national development trust fund for micro-credit needs, and proper implementation of regulations. In addition to that two small scale fish seed production units are also recommended to establish and leave it to managed by fisher CBO's.

Mussel and Oyster Production

Traditionally Thambalagam Bay and Kokilai lagoons have been identified as good oyster grounds and have sustained important Oyster fisheries (Pearson, 1913). The 'Window Pane' Oyster fishery at Tambalagam Bay has yielded over 4 million Oysters in 1954. The value of the 'Window Pane' Oyster (Placuna Placenta) fishery in 1955 was estimated at Rs.35,000/-. However, the fisheries, which existed at Thambalagam and Kokilai, were totally destroyed during the period of 1957 - 1958 due to heavy floods. Over exploitation too may have contributed to the decimation of the oyster population.

In the Clappenburg and Inner Harbour area the naturally occurring species is the Pearl Oyster (*Pinctara margratifera*). Two species of mussel, namely Green Mussel (*Perna viridis*) and Horse Mussel are naturally found in the Clappenburg and Inner harbour areas.

The National Aquatic Resources Agency has engaged in studies in the bay area with the view to evaluating the feasibility of mollusc culture in the area. The techniques being studied are Reft Culture, Stake Culture and Stick Culture of mollusc. The Hydro biological Studies have revealed the area to have a tidal range of around 80 cm and the productivity of the water body to be medium, nevertheless, adequate for mollusc culture.

Studies revealed that certain areas of the Trincomalee Bay and some of the lagoons and estuaries along the coast of the Trincomalee district have appropriate conditions suitable for mullusc culture. The mollusc, especially the mussels, has a very high growth rate and achieves a remarkable size in less than 1 year. Unlike in the case of fish culture, there is no supplementary feeding needed in the case mussel culture. Hence, mussel culture could provide an extra income and a nutritious protein supplement for the local population. Being a specialty food it can also fetch a very price among the tourists.

The areas being studied for raft culture of mussel are Clappenburg Bay, Sung Cove, Orlando Cove, Railway Cove, Nicholson Cove and Thambalagam Bay. Sites being used for Stake Culture are Mangrove Island, Yard Cove and Mandathivu Island. Recently a Japanese firm established a facility for the culture of 'Pearl Oyster' at French Pass.

In addition to above activities Trincomalee district has a large potential for Mari Culture as it has large protected bays especially in Koddiyar and Inner harbour areas. In the west coast Kinniya showed wide sand beach formed at the monsoon waves in November. Opening in to the bay is creating a 2-3 m deep lagoon at Thampalagam bay forming fairly stable salinity water required for sea cage farming, sea weed farming, and bivalve farming and also for spiny lobster.

Even though Trincomalee area has a large potential for shrimp farming the proposed development programme not recommended to accommodate such activities within the Metro Urban Area.

The following potential Mari culture species has a very good export and local market which can be cultured in and around bay and lagoon areas:

- sea weed – euchema
- fish tuna fattening, cage farming for sea bass, grouper, pompano
- sea cucumber
- marine ornamental fish (crown fish, red shrimp, angel fish, sea horse)
- Bivalves oysters, clams and mussels.

2.6 Physical Infrastructure

2.6.1 Introduction

Infrastructure component covers both social and economic sectors that have implications for productivity. Education and health comes under social infrastructure while economic infrastructure comprises the following:

Water Supply & Sanitation
Road Network and Railway Network
Transport (Land, Sea & Air)
Power Generation, Transmission & Distribution
Telecommunication
Storm Water & Drainage
Solid Waste Management.

2.6.2 Pipe Water Supply & Distribution

Currently the National Water Supply & Drainage Board (NW&DB) provides the services of supply and distribution of drinking water to the district especially to the areas considered as urban main pipeline supplying water from the Palliyuttu tank which is not continuous. Water is treated and distributed to Trincomalee and its surrounding areas from the Kanthale Reservoir, which is located approximately 35 km southwest of Trincomalee town.

The Kanthale Reservoir receives its water from its catchment area during the north-east monsoon and also continuously from the Mahaweli River. The Mahaweli receives its water from the south-west monsoon. Thus, the tank receives water from both the north-east and the south west monsoons.

The daily consumption of drinking water is less than 0.03% of the total storage capacity of the Kanthale Reservoir and therefore, the drinking water requirement to Trincomalee and its surrounding areas do not noticeably reduce the irrigation water requirement from the reservoir.Taking water directly from the Mahaweli River is not considered because of the technical difficulties encountered as well as the risk of salinity intrusion.

The water supply from Andankulam tank (Navy Line) is continuous from which water is provided to Kanniya and Varothayanagar.

The water intake is located in the Kanthale reservoir and water is pumped to the Treatment Plant by means of a pipeline of 600mm in diameter and 1.6 km long. The pumping station (S1) delivers untreated water to the treatment plant.

The second pumping station (S2) located downstream of the treatment plant maintains the pressure in the water supply system.

The main water supply pipeline is approximately 34 km long and supplies water to the Pallaiyutu tank (R0). This tank has a total capacity of 4,500 cu.m. This pipeline is 600mm in diameter for the first 30 km and 450mm in diameter at its downstream end.

Water is supplied to the village of Kanthale by an auxiliary pumping station (S3) and water to the village of Tampalagamuwa is supplied from a branch of the main pipeline. Three secondary pipelines supply water to Kinniya, Trincomalee and Nilaveli.

The secondary water supply line to Nilaveli is connected directly from the mainline at point (D) and supplies water to the Mankanai tank (R1). This tank has a total capacity of 2,400 cu.m.Water is distributed from this tank (R1) to Nilaveli and the Tourist Areas.

Water supply to the Trincomalee town is supplied from the main pipeline supplying water from the Pallaiyuttu Tank (R0) to another tank that is located at Fort Frederic & Hill (R2), which has a capacity of 1,000 cu.m. The distribution of water to the Trincomalee town is made through a network of pipelines laid along the roadways. Water is also supplied from Fort Frederick Hill (R2) to another tank at Andankulam. The Navy and the Air Force receives their water supply from the Andankulam Tank.

The secondary water supply line to Kinniya is connected directly from the mainline at point © and supplies water to the Makkilutu tank (R3). This tank has a capacity of 4,000 cu.m. The total length of the upstream pipeline is approximately 13 km. A connection from this distribution network, upstream of (R3), delivers water to the Free Trade Zone (F1) and another connection delivers water to the Prima Flour Mill (F2). Water supply to Kinniya is delivered from the Makkilutu Tank (R3). A branch pipeline delivers water to the Southern Tourist Complex.

2.6.3 Storm Water Drainage

The Urbanization without proper planning of storm water drainage is causing significant problems in frequent inundation of roads, commercial establishments, residences and other buildings. The local community suffers due to recurrent flooding and associated environmental and health hazards as a result of non functioning of them, unauthorized filling of low lying area.

Unplanned urbanization also accounts for the discharge of wastewater effluent from industries and dumping of garbage to waterways. This causes severe pollution and environmental problems. The low-income communities who live around these waterways have to undergo severe hardships as a result at the rainy season.

The existing drainage system is in a highly dilapidated condition. The existing drainage scheme consists mainly of earth drains that lack hydraulic capacity to prevent inundation. Roadside drains some of which though lined are in a

dilapidated state and are not to a line and grade. Therefore, frequent inundation of commercial establishments, roads and other buildings in the area has caused severe damage and inconvenience to the people.

The drain system that is already in place in few locations of the Trincomalee town appears to carry both wastewater and storm water. The easy flow of storm water through most of the culverts is prevented, due to blockage and silting. The flooding prolongs mainly due to inefficient maintenance of the drain system and the absence of a planned storm water drainage system in the entire Trincomalee district. The improvement of storm water drainage within the town limits has to be identified as a priority project to be implemented in this development plan.

Any plans for the development of the Trincomalee Metro Urban Centre have to be reviewed by studying the development patterns on the storm water drainage system. A detailed survey will be carried out along the proposed canals and reservation areas to establish the encumbrances and their extent before making any plans for a master storm water drainage system for the proposed development plan.

2.6.4 Urban Sanitation - Sewerage Infrastructure

This is one of the challenging and important infrastructure services needed to maintain a healthy community, in an acceptable environment.

There is no central sewage collection system in the Trincomalee District or in Metro Urban Centre. The sewerage is collected in septic tanks. These tanks are regularly emptied and cleaned by the local authorities whenever they are requested to do so by the owners of commercial, industrial and other establishments. The households have the septic tank and soakage pit system.

2.6.5 Telecommunication

Presently this consists of one National Switching Centre in Colombo and District Switching Centers located in various districts of the country. Local exchanges are generally covered by the District Switching Centres. In addition I.D.D. facilities are serviced through the satellite network situated in Colombo. All I.D.D. facilities are routed through the National Switching Centre in Colombo.

Presently the Trincomalee District is serviced by one District Switching Centre with subscriber trunk dialing facility situated in the Trincomalee Town. This is connected to 8 rural switching units situated in Chinabay, Kanthale, Nilaweli, Padavisiripura, Muttur, Seruwila, Pulmuddai and Moraweva. These rural switching units service the peripheral areas in the district and some manual switchboards.

There are 3 repeater stations at Fort Fredrick, Pulmudai and Madukanda. The District Switching Centre is also connected through a microwave link to the National Switching Centre in Colombo and Anuradhapura. The present exchange has facilities for 9,000 consumers, which allows additional 1,900 subscribers to be given telecommunication facilities. However as at date there

are more than 2,000 subscribers are in the waiting list. The demand for telecommunication facilities has grown from 1985 to 2000 by a factor of almost 100% every 5 years.

Even though wireless privately owned telecommunication systems like Suntel and Lanka Bell are presently functioning in Colombo and suburbs, there is no planned expansion of these into the Trincomalee District. Some of the cellular services do function in a few areas of the Trincomalee District but, they are not very reliable.

2.6.6 Electricity

The power from the national grid is distributed through out the country through local substation and distribution systems, finally bringing the power to the consumer. This distribution is mainly handled by the Ceylon Electricity Board.

Presently there are no generating facilities in the Trincomalee District. A major coal power station was planned to be commenced in the Trincomalee District by 1990 but, due to the ongoing conflict situation and opposition of environmental activists this proposal has been abandoned.

Trincomalee District gets its power from the national grid through a main grid substation 132/33KV of capacity 2 x 31.5MVA situated in the Trincomalee Town. From the above mentioned grid substation transmission lines distribute the power at 33kv and 11kv throughout the Trincomalee District. There are 391km of 33kv transmission lines, and 32 km of 11kv transmission lines. These HT lines are then transformed out to LT and distributed to the ultimate consumers. There are 740km of 3 phase, LT distribution lines and 432 km of single phase 230 distribution lines. In Trincomalee town there are 11,800 residential consumers, 850 commercial consumers and 50 industrial consumers. Out side Trincomalee Town there are 19,300 residential consumers, 825 Commercial consumers and 180 industrial consumers.

The Grid Substation at Trincomalee is presently supplied by a 132 kV line from 220/132 kV Switching Station at Anuradhapura. The length of the 132 kV transmission line within Trincomalee District is 58 km.

2.6.7 Solid Waste Management

With the continuing urbanization, solid waste management has become a major issue in all parts of Sri Lanka. Trincomalee is no exception. In the district of Trincomalee, solid waste management has become a critical issue in urban centers of the district. Lack of resources and the absence of proper disposal facilities have aggravated the situation.

In order to understand the existing situation, it is necessary to gather information on amount of solid waste generated and collected within each local authority and also the characteristics of the generated waste.

In rural areas, most of the waste generated is either buried within compound or thrown to a corner of the premises. In urban areas such as Trincomalee UC and Town & Gravets , the situation is different. Since land is not available for burying of garbage, people throw it to public places such as roads, canals, lagoon, river, marshes, sea or similar places, if local authority does not collect garbage properly.

GTZ has done a elaborate study in solid waste management and the reports were are already made available to North East Provincial Council. Apart from GTZ others also have proposed effective and efficient ways for solid waste management. Hence the authority has to take appropriate action to control solid waste disposal which is not happening at present.

All local authorities have been continuously requesting the North - East Provincial Council to increase their cadre and provide more vehicles to improve collection of garbage. No local authority has a proper disposal facility. All sites are either low-lying marshes or riverbanks. Canals running through Trincomalee town flow into the sea carry a lot of dirt which ultimately pollute the harbour. This has become a real problem to the authorities in maintaining the environment.

Hospital waste:

The present system of sewerage disposal of Trincomalee General Hospital is not satisfactory. The sewerage is collected in septic tanks and those have been connected to the master main tank. From the main tank it is pumped to the sea. It is advisable to have different design prepared using new technologies in order to avoid overflowing and to reduce health hazard, or to be connected to central sewerage disposal system in future.

Major operations are being performed only at the Trincomalee General hospital. There is no facility to treat clinical waste at present. There is a big public outcry about disposing hospital waste together with normal garbage. Urban council collects about 0.25 tons per day.

Industrial waste:

There are two major factories in the district. They are the cement factory and the flour-milling factory. Although there is no major problem at present with toxic waste from industries, it has a problem of floating dust particles from the chimneys. This issue has to be addressed seriously when Special Economic Zone is established in the area.

Market waste:

At present, market waste is also collected and disposed together with normal garbage. The fish wholesale market is found in the town area closer to beach and all waste and cut pieces are thrown into the sea create problems.

2.7 Social Infrastructure

2.7.1 Introduction

Social infrastructure facilities are essential elements for sustainable human development. Particularly it is a human right to enjoy basic health, education and leisure for a safe and undisturbed lifestyle. Therefore provision of sufficient social infrastructure facilities to the people required careful planning and implementation. Although the term social infrastructure denotes wide range of institutional and physical arrangements, here we focus only on health, education and recreational aspects.

2.7.2 Health Services

Data on human development indices suggest an improvement in the physical quality of the life of the people in general in the district. However the reports from development agencies suggest that the ground situation on health and sanitary conditions is rather unsatisfactory. Particularly demand for the health services in urban centers have increased heavily due to influx of displaced people from remote areas and other districts. On the other hand number of displaced persons, disabled people, mentally deprived persons and female-headed households are on the increase. This situation has created additional cost and burden to the health authorities. Nevertheless due to the government's free health and local level counseling through family health workers, the general health conditions have improved over the past years.

Compared to other districts, health facilities in Trincomalee district are generally poor. Health indicators and primary health care services available in the district are far below the national level. A crucial problem faced by the health services in the district is inadequate delivery system of health care facilities in rural and remote areas. The spatial distribution pattern of health facilities are shown in Table 2.6.

Table 2.6

Medical Institutions and Bed Strengths in 2006 - Trincomalee District

Type	Place	No of Beds
General Hospital	-Trincomalee	-360
Base Hospital	-Kantale	-101
	-Muthur	- 81
District Hospital	-Kinniya	- 24
Peripheral Units	-Padavisiripura	- 45
	-Thampalagamuwa	- 54
	-Pulmoddai	- 34
Rural Hospital	-Gomarankadawala	- 27
	-Kuchchaveli	- 13
	-Serunuwara	- 36
	-Nilaweli	- 26
	-Kiliveddi	- 38
Central Dispensary & Maternity Homes	-Mahadivulwewa	- 12
	-Wanela	- 19
	-Seruwila	- 20
	-Morawewa	
Central Dispensaries	-Ichchalampattai, Kachchakodithivu, Mollipotana, Thiriyaya, Thoppur, China Bay, Sampalthivu, Selvanayagapuram, Kantalawa, Kappalthurai, Sampur, Sampoor, Manalchenai, Baddukachchiya	
Chest Clinic	-Trincomalee	
STD Clinic	-Trincomalee	
Gramodaya Health Centres	-Abeyapura, Sangamam, Vellamanal, Vendarasanpura, Kiliveddy, Agbopura, Anpulipuram, Sampur, Mahroof Model Village, 9th Colony, Meeranagar, Mollipothana East, Pulmoddai, Vaddam, Ayiliyady, Sooranakal, Ralkuli, Ilankaithurai Mugathuvaram, Kanniya, Peraru East	
School Dental Clinics	-St.Joseph's College, Muslim MV, Agrabodhi MV, Hindu College, Sinhala MV, Vidyaloka MV, Shanmga Hindu LC	
MOH Office	-Trincomalee, Kanthale, Kinniya, Muthur, Seruvila, Thmpalagamuwa, Padavi Siripura, Kuchchaveli, Gomarankadawala, Morawewa, Ichchilampattai	

Source: Ministry of Health and Indigenous Medicine, NEP

Problems and Issues related to Health and human development

- Inadequate delivery system of health care facilities in rural and remote areas.

- Health indicators and primary health care services available in the district are far below the national level. Rapid increase of population due to high growth rate and in migration due to the civil disturbances is a serious problem in delivering effective health services to the people.

- Further aggravates the situation due to poor sanitary condition, poor supply of safe drinking water and high rate of malnutrition.

- Health institutions do not have sufficient amount of modern equipment and facilities.

- Availability of health staffs is always below the minimum cadre level.

Cadre Categories	**Cadre**	**Present**	**Vacancies**
All Island Service	218	120	99
Special Post	33	14	19
Para Medical Service	632	370	262
Middle Level Service	77	44	33
Combined Service	102	92	10
Other Services	775	546	235
Grand Total	**1,837**	**1,186**	**658**

- Relatively large number of people those who live in rural and remote areas do not have proper access to the existing health services. Prevailing disturbances (in uncleared areas) and sudden uprises have created enormous hardships to the poor and displaced persons.

2.7.3 Educational Services

According to the educational statistics in 1981, the literacy rate for females of the district was 73.1% as against the National Average of 83.2%. The literacy rate of males was 84.9% as against the National Average of 91.1%. So, the literacy rate of the district in 1981 was 79.5% as against the National average of 86.5% which indicate that the status of education vis-à-vis the national average.

The education sectors have been very badly affected after the ethnic disturbances; Shortage of staff and shortage of physical resources like buildings, furniture, vehicles and equipment prevail in almost all the schools.

There are total of 291 schools in the district at present of which large number of schools is located in the Muthur education zone. However, most number of schools with all facilities (1AB type) is located in Trincomalee zone.

Ethnic wise there is 89 Tamil Schools, 74 Sinhala Schools and 128 Muslim Schools in the district. About 5 Tamil schools, 7 Sinhala schools and 4 Muslim schools are temporarily closed down in 2006. Of the 291 schools five are male schools, five are female schools and 281 are mixed schools. There are no private schools in this district. 21 Schools are situated in urban areas and the balance 216 schools are in rural areas.

There are only 10 schools with A/L Classes with Science in the district. The other 227 schools provide conventional education such as Arts and Commerce streams and the basic education. This situation indicates that the opportunities for higher education to suit the requirement of the 21st century is not available for the children in the district.

Present total student population is 104,853. Out of this more than 60.0% of the students are studying in the schools at Town & Gravets, Kinniya and Muthur DS divisions. These are urban areas which are having relatively good teachers and facilities.

Most of the relatively best facilities schools and with trained teachers are centered on Trincomalee zone. Muthur, though large number of students is enrolled in primary schools they have less number of teachers and other facilities. Table No 2.7 indicates the details of the teachers and student population in 1999.

Table 2.7

Total Number of Teachers and Students by A.G.A/ Divisions-1999

Educational zone	Total school children Year			No. Of school			Teachers	Total Students
	1-5	6-11	12-13	N	P	T		
1. Trincomalee	14,250	14,509	2,196	6	72	78	1,614	30,955
2. Muthur	21,950	17,760	1,401	2	120	122	1,270	40,611
3. Kantale	8,996	9,735	637	1	68	69	989	19,368

Note : N – National School, P- Provincial Schools

2.7.4 Road Network

At present the road system in Trincomalee District radiates from Trincomalee Town centre. The vehicular traffic in the major roads in the district is very low and there is only marginal increase in the major roads during past 10 years mainly due to the insecurity and instability of the district. Generally the present traffic consists of mainly bicycles, motorcycles, trucks and buses due to low car ownership in the district.

The Trincomalee district comprises of over 3,100 km of road network. Majority of these roads are rural roads and only about 330 km falls into the category of National roads. There are four important roads radiating from the city of Trincomalee. They are: Ambepuss – Kurunegala – Trincomalee road (A6), Trincomalee –Thirukonamadu Batticaloa road (A15), Trincomalee – Anuradhapura – Puttalam road (A12) and Trincomalee – Pulmuddai –

Mullaittivu road. There are number of ferry crossings on some of these main roads as listed in the Table 2.8. In addition to these a boat service is in operation from Trincomalee to Muttur across the lagoon.

Table 2.8

Details of Roads – Trincomalee District

Name of Road	RDA Classification	Length km (within the District)
Ambepussa – Kurunegala – Trincomalee	A6	51.3
Trincomalee –Batticaloa Rd	A15	54.5
Trincomale – Anuradhapura – Puttalam	A12	36.5
Trincomalee – Pulmuddai – Mullaittivu	B424	55.2
Thampalagamuwa - Kinniya Rd	B541	15.6
Palathoppur –Seruvila Rd	B347	7.6
Allai – Kantale Rd	B10	41.0
Majeed Mawatha	B196	3.0
Perkar Rd	B626	2.4
Bogahawewa – Pulmudai Rd	B624	15.5
Nilaveli Saltern Rd	B623	1.6
Power House Rd	B375	1.6
Orr's Hill Circular Rd	B340	3.4
Inner Harbour Rd	B140	0.82
Dockyard Rd	B140	1.4
Dutch Point Rd	B140	0.5
Fort Fredrick Rd	B140	0.7
Beach Rd	B140	0.7
Love lane Rd	B140	1.5
Approach road to admiralty building		28.4
Vilgam Vihara Rd	B447	4.2

Table 2.9

Ferries on National Roads

Ferry	Road	Length (m)
Verugal	A15	90
Killiveddy	A15	100
Muttur	A15	150
Gangai	A15	200
Upparu	A15	77
Kinniya	A15	550
Pudavaikkaddu	B424	275
Yan Oya	B424	92

2.7.5 Railway Network

There is 70.2 km length of railway track and 8 stations/halts within the Trincomalee District. The main stations with siding facilities are Trincomalee and Kantale. At present only two up trains and two down trains are operating between Trincomalee and Colombo. The present train schedule is given in Table 2.10. A passenger train takes 8 hours to reach Colombo form Trincomalee. This is mainly due to the poor track condition and lengthy route via Maho to Colombo.

Table 2.10

Present Passenger Train Schedule

	Departure		Arrival	
Train No.	**From**	**Time**	**At**	**Time**
81	Colombo	0610 Hrs	Trinco	1410 Hrs
82	Trinco	0945 Hrs	Colombo	1745 Hrs
51A	Colombo	2230 Hrs	Trinco	0815 Hrs
50A	Trinco	1730 Hrs	Colombo	0430 Hrs

The Trincomalee Railway Station is located away from 1.5 km on Station road, which starts from 198km post of Colombo-Trincomalee Rd.

2.8 ENVIRONMENT

2.8.1 Conservation

According to historians, Trincomalee has been an international sea-port since the 6th Century B.C. The discovery of several Pre-Christian inscriptions and a large number of ancient sites with remains of buildings from the Trincomalee Fort area, hear witness to the fact that the area around the port and the city had been colonized as early as the 3rd Century possibly in the 5th Century BC.

A large number of items of archeological interest, discovered from various sites of excavation in the district are exhibited. But there are more places to be excavated and explored for archaeological discovery. The ancient temple in the East Sri Koneswara Kovil at Swami Malai area were not explored fully by Messers and Clerk and Wilson have discovered only a few items from sea bed. Similarly the Kanniya Hot Wells areas were not excavated for treasures, which can speak in the ancient culture of the island. Ahathiya Sithampanam at Mutur and Verugal Temple in Trincomalee South have leg ending stories and worthwhile of considering for explorations to get details about the civilization during the civilization during ancient period in this.

Trincomalee also has a large number of sites of historic value, eg. Seruwila, Galmetiyawa, Tiriyaya, Eramaduwa, Periyankulam, (Velgam Vehera), Etabendiwewa, Gantalawa (Sri Agbo Raja Maha Vihara), Pankulama (Sri Gajaba Vihara) etc,

The coastal zone of Sri Lanka contains many and diverse sites of archaeological, historical and cultural significance. These sites provide valuable evidence of the pattern and progress of Sri Lankan culture and represent part of Sri Lanka's common heritage.

Sites of archeological significance are all ancient sites, buildings and other structures, artifacts and cultural sites datable to the year 1850 or earlier, which are already declared as archeological sites and monuments. Historical sites are all ancient sites, buildings and other structures, artifacts and other cultural property which are more than 50 years old. These include all archeological reserves and sites, which are eligible to be declared as reserves, but still are functional. All archeological and historical sites and monuments are by definition deemed to be cultural sites as well. Places where rituals or other cultural events are enacted are also considered as sites of cultural significance.

Table 2.11

High Priority Archeological (a), Historical (h) and Cultural (c) sites located within the Coastal Zone of Trincomalee District

Place	Type	GS Division	GS Division No
Illangaturai Port	a/h	Eachchilampattai	214
Monastic Site	A	Nawathkanikadu	215B
Tampalagama	A	Tampalagama South	228A
Thirukoneswaram	a/h	Trinco Town	244B
Fort Fredrick	a/h	Trinco Town	244B
Fort Ostenberg	a/h	Trinco Town	244B
Kuchchaweli	A	Kuchchaaweli	239
Sithi Vinayagar Kovil	c/h	Kuchchaaweli	239

Scenic and Recreational areas

Scenic areas in the coastal belt constitute places that provide aesthetically appealing views of the beach, with uninterrupted vistas of seascape and landscape. Natural coastal areas are traditionally used both by Sri Lankans and foreign visitors for activities such as swimming, diving, surfing, boating, sports, fishing, leisure walks, bird watching and relaxation.

Table 2.12

Scenic (s) and Recreational (r) sites with the coastal zone of Trincomalee District

Place	Type	GS Division	GS Division No
Clappendergh Hill	S	Vellaimanal	229
Trincomalee Harbour area	s/r	Trinco Town	244/244A/244B
Trincomalee Beach Road	R	Trinco Town	244B
Nilaweli Beach	R	Kumpurupiddi	240/241/242
		Nilaweli	
		Sampathivu	
Red Rock Beach	s/r	Kumpurupiddi	240
Pirates Cove	R	Kuchchaweli	239/237
Kokilai Lagoon	S	Kokillai	225

b. Terrestrial Ecology (Forests and Wildlife)

Forests

Trincomalee district has a very high forest cover. According to the provincial statistics in 2006, ha which accounts for % of the total land area of the district is under forest cover as indicated below:

Forest Type	Extent (ha)	% to Total
1. Moist Monsoon Forest	3,089	2.31
2. Dry Monsoon Forest	110,495	82.79
3. Forest Plantations	6,782	5.04
4. Riverine Dry Forest	1,826	1.37
5. Mangroves	11,340	8.49
Total	**133,532**	**100.00**

Out of which, 62.0% is natural forests. 25.0% of the forest cover in the district is scrubland and grasslands. Mangroves and marshes cover another 13.0%. However, 23.6% of the total extent of the district (which equals to 49.0% of the district forest cover) is under natural dense forests. Natural vegetation in the district consists of five major types, viz. Dry Mixed Evergreen Forest, Riverine Forest, Lowland Savanna (Damana), Wet grasslands (villus) and mangrove swamps or salt marshes. Because of the vast extent of forests declared as Forest Reserves and Proposed Forest Reserves, the Forest Department designates Trincomalee district as a separate forest range.

Dry Monsoon (Mixed Evergreen) Forest

The Dry Monsoon (Mixed Evergreen) Forest is a secondary forest that has been developed after about 1,400 AD, which marked the end of the long period of early civilization. With an extent of 110,495 ha, this is the dominant forest type in the district. The dominant species that form the canopy of these forests are Weera (*Drypetes sepiaria*), Palu (*Manilkara hexandra*), Satin (*Chloroxylon swietenia*), Kaluwara or Ebony (*Diospyros ebenum*), Kalumediriya (*Diospyros quaesita)*, Milla (*Vitex pinnata*), Halmilla (*Berrya cordifolia*), Hulanhik (*Chukrasia tabularis*), Sooriyamara (*Albizia lebbeck*), Mora (*Euphoria longana*), Thimbiri (*Diospyros malabarica*). All these are highly valuable hard wood timber.

Riverine Forest

The riverine forest is grown on banks of the rivers in the district mainly along Mahaweli Ganga. With an extent of 1,826 ha, the riverine forest is characterized by the presence of species such as Kumbuk (*Terminalia arjuna*), Halamba (*Mitragyna parvifolia*), Mee (*Madhuca longifolia*).

Villu

Villus occurs along the Mahaweli Ganga. The surface area of a villus generally consists of two portions; the ponding area or pool and the flood plain area seasonally inundated by water. During the time when river is high, the water will flow into the villu through an interconnecting small channel and then inundate the floodplain. But during the rainy season where villus receives water from the rain, the water level in the villu increase and the water will flow into the river through channels. The channels are usually small and shallow, which make a certain amount of water, remained in the villu. But, there are also villus which become dry for a short period of time, but the soil will keep wet. Tirukonamadu villu, Meen villu and some of the villus are located along the Mahaweli Ganga in Trincomalee district.

Saturated soils and flooding prevent tree growth and enhance the growth of water tolerant grasses and aquatic plants. The vegetation of the villus shows definite pattern of zonation with creeping grasses such as Cynodon dactylon and essentially terrestrial annual plants of the margin in hydrophobic species and grasses; further inwards floating plants in the deepest water. The villu consist of specific grass species, which are adapted to the local conditions. Trees that grow around the villu are Mara (*Samanwa saman*), Eramudu (*Erythrina* sp.), and Nebada (*Vitex lecoxylon*). Many species of the grasses are important as grazing sources for cattle as well as wildlife.

Damana Grasslands and Scrubland

Damana grasslands are found extensively in the Kantale DSD. The major species found are Madan (*Syzigium cumini*), Daw (*Anogeissus latifolia*) and Aralu (*Terminalia chebula*).

The dry scrub is characterized by shorter physiognomy than the high forest. The trees grow in this area usually thorny trees and scrubs.

Mangroves

Mangroves occur along sheltered intertidal coastal lines, and in association with estuaries and lagoons as a very narrow inter tidal area on the edge. Trincomalee district consists of 11,340 ha of mangroves and district itself famous for most extensive mangrove in the country.

Forest Plantations

The forest plantations of the district consist of Eucalyptus and Teak. Although the extent under plantation forests is mentioned as 817 ha in 1988, at present it is 6,786 ha (Trincomalee District Forest Ranger's Information, 2001). Most of the plantation forests along the main roads have been cleared for security reasons.

Wildlife

The wildlife habitats in the district include Dry Mixed Evergreen Forest, Riverine Forest, Damana Grasslands, Villus and Salt Marshes or Mangrove Swamps. The Dry Mixed Evergreen Forest that accounts for a large share of the wildlife habitat offers food to a wide range of animals including frugivorous birds, deer, monkeys, wild boar and elephants. The Riverine Forest, which is mainly found along the Mahaweli Ganga, is a high quality habitat of Elephants, wild buffaloes and wild boar. Wild elephants favour the grasslands both in Damana and Villu. They take shelter in the adjoining forest and move into grasslands in the evening. Villus is also provided nesting and feeding grounds for numerous migratory bird species. Wildlife sector in the district includes national parks, nature reserves (282 sq. miles) and sanctuaries of both forest and marine.

As mentioned in the previous chapters, there are a wide variety of animal life inhabited the project area, their occurrence are supported by the high quality habitat. There are many species of fish, amphibians, reptiles, birds and small as well as large mammals. This rich fauna species added by the seasonal visitation of migrant bird species. There are about 75 bird species migrate into the area from Europe and other distant places. Fresh water fish is another important category of fauna in the district. Fish fauna can be found in irrigation tanks, rivers, villus and in the flooded paddy fields. A wide range of fish species are found in the major rivers especially Mahaweli Ganga. The common species in villu are Thilapia, Labeo, Freshwater Shark and Butter Catfish. Paddy fields also serve as large areas of open water where many fish

species breed. A considerable number of small sized fish are found in this habitat.

Wildlife Diversity

The aquatic and terrestrial ecosystems in the district contain a wide variety of animals. The vertebrate fauna alone consists of several species of fish, amphibians, and reptiles, a majority of the 251 resident bird species found in Sri Lanka, and large mammals, such as the elephant, leopard, bear, deer and sambhur. In addition, during the winter months, about 75 bird species migrate into this area from Europe and other distant places. Nearly 20 of these species belong to a single family but the full complement of migrants represents over 25 bird families. Almost all the migrant bird species are found in the natural ecosystems, which are part of the protected areas declared under Accelerated Mahaweli Development Programme.

Consequently, these visitors increase the variety of the already abundant fauna found in the different habitat types. Winter visitors such as sandpipers, plovers, ducks, terns and gulls take up residence close to water especially in villus. A large number of migrant wagtails occupy riverine forests while flycatchers, warblers and thrushes utilize dry zone forests and dense scrub. The kingfishers live in swamps and lagoons, and the harriers' frequent open marshes.

Protected Areas

Forests in Sri Lanka have been given conservation status by the Forest Ordinance in 1907 and Fauna and Flora Protection Ordinance in 1937 under the jurisdiction of the Forest Department and Department of Wildlife Conservation (DWLC) respectively. The forest areas declared under the Forest Ordinance are Forest Reserves. In addition, there is a list of forest areas named as Proposed Reserves selected to be given the conservation status. There are six categories of protected areas under the DWLC; Strict Natural Reserve, National Park, Nature Reserve, Jungle Corridor, Intermediate Zone and Sanctuary. Most of the forest areas in the district have been designated as protected areas. Most of the unprotected areas under dense natural forests that remain in the district have also been identified as Proposed Reserves.

The conservation status and objectives of the protected areas are different from one another. National park is reserved for wild life. A person may enter on a permit issued by the Director or an authorized officer of DWLC to study or observe the fauna and flora. Although Nature Reserve is also reserved for wild life, limited human activity is permitted under the conditions in the permit. A Sanctuary may include state land or private land. Protection is given to wildlife but human activity is also permitted. Trincomalee district has a network of protected areas. Table 2.13 indicates a list of protected areas under the DWLC and Forest Department.

Table 2.13

Protected Areas in the Trincomalee District

Name of the Protected Area	Nature of Protected Area	Extent (ha)	Year Notified
Mahaweli Ganga North & South	Forest Reserves	8,650	
Vappiah-Verugal	Forest Reserve	4,350	
Chundankadu	Forest Reserve	4,350	
Omunugala	Forest Reserve	53,665	
Koralai	Forest Reserve	7,710	
Kantalai	Forest Reserve		
Somawathie Chaitiya	National Park	37,762	1986
Flood Plains	National Park	17,350	1984

Source: Forest Department, Department of Wild Life Conservation

2.9 ECONOMY

2.9.1 Introduction

Trincomalee district has been receiving increasing attention from respective governments since early 1980's with a view to promote accelerated economic development in the district. This attention is due to its natural resource potential, locational advantage and the importance of the harbour. A number of development plans have been prepared during the last 20 years to promote industrialization, harbour related economic development and agricultural diversification including livestock production for the enhancement of regional economy. However, these proposals have not been implemented partly due to the ethnic conflict, which made the district less secure for implementation of development projects, and partly due to lack of public sector funds for development. While the international lending organizations were also not interested in committing funds for development in the region due to uncertainty, most of these international private capital attracted to the districts in the Western, Southern and Central regions of the country.

The task of developing a comprehensive development plan for the Trincomalee Metro Urban Centre is a challenging one, particularly given the time constraint and the complexity of the issues involved. As will be discussed in little more detail in subsequent sections, the Trincomalee district is relatively less developed in comparison with most other districts in the country in general. The regional economy is largely agricultural based with paddy as the main agricultural crop. Although its Maha cultivation is fairly successful, with relatively high yields as well, the area under paddy during Yala is reduced substantially due to lack of irrigation facilities. As a result, the overall cropping intensity is low relative to most other districts in the Dry Zone. However, the district contributes a substantial surplus of paddy annually. The domestic trade related to paddy provides the main source of regional income of the district.

Although a number of subsidiary food crops are grown in the region, they do not provide a marketable surplus of considerable volume except red onion. About 136 ha was cultivated with the production of 1,315 mt in the district during Maha season of 2005/2006. District requirement is only 570 mt and the balance is sent to other districts. Accordingly, there is very limited revenue generating potential from these agricultural products at present.

Apart from Prima Flour Milling Factory and Tokyo Cement Factory, there is very little industrial activity in the district making the industrial sector's contribution to employment and income of the region relatively limited and stagnant.

Although Trincomalee harbour has been classified as one of the largest natural harbours in the World, it has not been developed to take advantage of this potential. A study carried out by a Japanese Team, focusing on its potential as a commercial harbour, reported that the existing infrastructure facilities are highly inadequate to expand the harbour's capacity to operate as a commercial port.

The Trincomalee district also lags behind in infrastructure facilities as well. Water supply, both irrigation and drinking water supplies, roads and highways, telecommunication and social infrastructure are inadequate at present and substantial amounts of investments are needed to develop these facilities to support a strong economic base.

Relatively low rate of economic growth is also reflected in high unemployment and under employment in the district. The number of families dependent on welfare programs such as Samurdhi and Janasaviya are fairly high.

In Kuchchaveli and Thiriyaya area the soil is so fertilize and good for cadju plantation. Hence commercial crops like cadju plantation shall be promoted.

No value addition process takes place for agricultural products and fisheries products and the district is a loser and the people loose opportunities to engage in employment. Value addition projects shall be launched in agricultural areas and near fisheries landing points for value addition projects.

The topography and agro climatic condition of Trincomalee district are ideal for livestock development. Livestock sector contributes immensely to rural economy by the way of production of milk, meat and eggs. Further this sector is labour intensive and promotes opportunities to rural women and contributes to family labour. Cattle, goats, and poultry are being reared extensively in the district producing 20,665 litres of milk, 71,000 eggs and 5,200 kg of poultry meat. Improvement of marketing, processing and value addition facilities for livestock produce including milk, meat and eggs and improved veterinary extension services are identified as thrust areas for development of this sector. In addition promotion of organic farming and development of agro tourism will bring considerable foreign exchange and investment to the district.

The above is a brief description of the existing economic situation in the Trincomalee district. It is clear that the development plan for Trincomalee requires substantial efforts to develop policies and strategies to solve the existing shortcomings and deficiencies. Without these efforts the likelihood of promoting economic diversification with particular focus on value added economic activities in agriculture, industry, tourism and port related activities remains fairly difficult.

2.9.2 Regional Economy in the National Context

Trincomalee district covers a large geographical area relative to other districts. In terms of geographical area, it ranks 8th largest district, out of 25 districts. Only 8 districts in the country have more geographical area than Trincomalee district. Trincomalee also is one of the districts with low population density in the country. In terms of population density, it ranked 17th which means that there are 8 districts with less population density than Trincomalee. This shows that Trincomalee is fairly sparsely populated district with low man land ratios.

A comparison of the Trincomalee district's regional economy with the rest of the districts in the country is made by employing few economic indicators such as agriculture and industry in the regional economy in relation to their contributions in other districts. Road network is also used in this comparison since a better road network becomes an important consideration when projects are identified for implementation. In addition, the cargo handling in the Trincomalee harbour is also reviewed briefly since it has been reported in many studies that the Trincomalee harbour has great potential to develop as an important commercial harbour in the Asian region.

The regional breakdown of the Gross Domestic Product (GDP) is a useful to measure the economic strength of regions relative to other regions. The Western Province is predominantly the most important region in the country in terms of the concentration of economic activities. Even the Central Province which ranks second has only about 25.0% of the regional product compared to the Western Province. The contribution to GDP by northern and Eastern Provinces is relatively very small with the shares of 3.75% and 5.05% respectively. The breakdown of the GDP within the Eastern Province, based on various other economic indicators, suggests around 25.0% of the contribution from Trincomalee district, 30.0% from Batticaloa district and 45.0% from Ampara district. On that basis, the per capita income in the Trincomalee district works out to Rs 21,459 for 1995 compared to the national average of 31,490. Accordingly, the average income in the Trincomalee district in 1995 was only about 61% of the national average and about 34% of the average of the Western Province.

2.9.3 Port related Economic Development

Trincomalee is the second largest port handling cargo in the country after Colombo. The volume of cargo handled by Trincomalee in 1999 amounted to 1,731 MT, which is approximately 7.0% of the total cargo handled by the three ports. As shown in Figure 2.1, the total cargo handled by all three ports has remained fairly stagnant. This stagnation has affected all three ports, but

Trincomalee has gained slightly at the expense of the Colombo port. However, compared to 1995, the year which recorded the highest volume during the 1990- 1999 period, the 1999 volume was still 7.0% lower.The Trincomalee port appears to operate with a low capacity and if full potential of the port is reached it will help not only the district economic development but also the overall national economic growth.

Figure 2.1

Trends in Cargo handled by Colombo, Galle and Trincomalee: 1990-1999

At present more than 70.0% of cargo volume handled by Trincomalee is inward bound cargo. The insignificant outward cargo from Trincomalee port is clearly a sign of non-availability of products from the region to export markets. The inward bound cargo is not likely to experience a rapid growth in the near term since nearly 90.0% of Mahaweli construction is over. The region is less populated and this makes the growth of inward cargo volume very limited. The only strategy to develop the port is to implement projects that can directly utilize the facilities of the natural harbour and to promote economic activities in the hinterland, with industrial sector as the basis of this effort, to generate more exportable products.

2.9.4 Labour Force, Employment and Unemployment

According to Central Bank estimates, Trincomalee district reported a population of 356,000 in 1999. On the basis of the ratio of 33.0% of the labour force to the total population, the labour force estimated as 119,150 in 1999, with male and female composition representing 79,830 and 39,320 respectively.

There is no more recent information, however, regarding the utilization of the labour force or the level of unemployment. The most recent published data refers to 1985/86 released by the Department of Census Statistics, compiled from sample surveys, and Table 2.14 reproduces the employment figures from this source.

Table 2.14

Classification of Employment by Major Categories

Employment Category	Number Employed	Percent
All groups	72,717	100.0
Agriculture, Housing, Forestry & Hunting	31,687	43.6
Mining & Quarrying	2,062	2.8
Manufacturing	3,781	5.2
Electricity, Gas & Water	437	0.6
Construction	988	1.4
Whole Sale, Retail Trade	12,619	17.4
Transport & Storage	7,745	10.6
Insurance & Real Estate Business	1,211	1.7
Community and Social & Personal Services	9,683	13.3
Not Adequately Described	2,510	3.5

Source: Department of Census & Statistics

As shown in the table, about 44.0% of the population was dependent on agriculture during the 1985/86 period. Most of them would have been employed in the paddy sector as it is the main agricultural activity in the district. Wholesale and retail trade accounted for 17.0% while community services and transport and storage accounted for 13.3% and 10.6% respectively. Manufacturing's share in 1985/86 estimate has been only 5.2%.

A careful analysis suggests that the district has very limited employment potential, given the less diversified economy largely based on agriculture. Although the agriculture provides the highest employment in the district, it offers very limited regular employment as most of the work related to paddy is limited to land preparation, planting and harvesting. During the rest of the year most of the people are likely to be unemployed.

Given the relatively weak economic base, Trincomalee district is very likely to be one of the districts in the country with high unemployment and under employment. It is also difficult to explain how the increase in labour force from 1985/86 period to 2006 period, which amounts to approximately 46,000, was absorbed as there are no growing sectors in the district.

2.9.5 Urban Development

In 1971, the Trincomalee district reported an urban population of 38.0% of the district's population making it the district with the second highest urban population after Colombo district.

Although the share of the urban population has declined since 1971, it still has a share of 32.0% of the district population while still maintaining its position as the district with the second highest urban population. However, it is difficult to envisage that the urban population in Trincomalee district enjoys

the same facilities in physical and social infrastructure comparable to Colombo district or any other district such as Kandy or Galle. The urban services such as water supply, sewerage, markets or sanitary and health facilities are certainly not up to the standard of other urban areas in more developed districts in the country. In addition there are substantial deficiencies in road net work, housing for all categories of income levels and transportation.

These deficiencies that presently exist in urban areas in Trincomalee district needs to be corrected which in turn will require substantial amount of investments.

2.9.6 Promotion of Foreign Investment

By mobilizing local investment, increasing the inflow of foreign direct investment and by maximizing the use of resources it intends to achieve higher rate of growth in all forms of economic activities in Trincomalee Metro Urban Centre which is the path to economic growth in the district.

The district also possesses several unique natural resources which have hitherto remained untapped and for which the potential for development exists by tapping potential foreign and local investors and international donor organizations and obtain their assistance in the development of these resources.

The purpose of preparation of an Integrated Urban Development Plan for the Tromcomalee Metro Urban Centre is to identify economic areas which have the greatest potential for mobilizing foreign / local investors and potential donor agencies. Thereafter a strategy of how best these target areas could be promoted among investors and aid agencies is proposed for each economic sub sector.

2.9.7 Current Status of Investment:

* At present major industries operating with foreign investment consist of:

  - Cement
  - Flour milling
  - Garments

Tokyo /Fuji Cement with investment from Japan operate from Cod Bay, Trincomalee, manufacturing cement from clinker.

Prima Ceylon Limited, with investment from Singapore operates a flour milling complex.

Both companies are well established.

* In addition to these plants, three garment factories operate under the aegis of the BOI. They are:

- MSK Garments located at Uppuveli
- Osprey Clothing (Pvt) Ltd at Kantale
- Serendib Clothing Lanka (Pvt) Ltd at Kinniya

* A project for the culturing of pearls, by Kaneko Lanka (Pvt) Ltd, with investment from Japan was closed down as a result of the security situation.

* Approvals given by BOI for a deep-sea fishing project and for the construction of 103 luxury apartments were cancelled as they failed to materialize.

* Projects in the pipeline consist of another garment factory to be located in Uppuveli, with investment from Australia/Egypt/Sri Lanka

* Other major industries in the district are:

  - manufacture of paper
  - processing of sugar at Kantale
  - hotel & tourism industry

3.0 Review of Previous Planning Proposals of Trincomlaee

3.1 Planning Proposals

The previous development plans formulated for the Trincomalee District, Eastern Province and for the North and East Provinces considering the national and regional context by the Urban Development Authority and the National Physical Planning Department were the available main resource documents to analyze the historical pattern of the development initiatives to the area. This chapter briefly outlined the major findings and the proposals made to the development of Trincomalee District in order to understand the background of the development. The planning documents includes: the Trincomalee Integrated Development Plan (Trincoplan -1991), Draft Development Proposals for Trinco (1995), Trincomalee District Development Programme, Preliminary Proposal for the Development of the Colombo – Trincomalee Rapid Transit Highway, National Physical Planning Policy and the Plan (NPPD-2000), and the Eastern Regional Physical Plan (NPPD -2001).

3.2 Urban Development Authority

Urban Development Authority in time to time declared certain areas of urban centers in the Trincomalee District and the entire district too as an Urban Development Area. The chronological order of such declarations is as follows:

Area Declared	**Date**	**Gazette No.**
-Trincomalee UC	01.06.1979	38/16
-China Bay (Outside of Trincomalee UC)	13.11.1981	166/21
-Claphenburg (Outside of Trincomalee UC)	13.11.1981	166/21
-Trincomalee District	26.11.1991	690/3

Under the auspicious of the UDA following development plans were prepared to the entire District:

- TRINCO PLAN – January 1991 by a Technical Committee appointed by the Cabinet
- Integrated Development Plan for Trincomalee District – June 2001 by UDA with a Team of Individual Consultants
- Trincomalee Town & Gravets Pradeshiya Sabha Development Plan by UDA on the request of the relevant Pradeshiya Sabha – October 2003

Fig 3.1 to 3.2 shows the development proposals made by these plans.

3.3 National Physical Planning Department

In 2000, National Physical Planning Department formulated a National Physical Planning Policy and a Plan which encouraged to develop a second Metropolitan Region in the east coast covering four major urban centers such as Trincomalee, Anuradhapura, Dambulla and Polonnaruwa in the eastern province and north central province. These four main urban centers were identified to promote to the level of Metro Urban Centres to play a major role in physical development in the region to create employment opportunities and service capacities of the urban system. Fig 3.3 indicates the major physical changes proposed by the national policy.

Based on the directives of the National Policy document and the plan the Department initiated the formulation of regional structure plans for all the regions. In 2004 NPPD formulated the Regional Structure Plan for Eastern Province as shown in Fig 3.4.

3.4 Ocean City Development Plan – ICOMOS

In relation to the structure plans prepared by these organizations various other institutions has taken action to detail out selected areas of the district in relation to its potential. One such initiate was the formulation of a plan for tourism development covering Middle Peninsula area of the Trincomalee harbour by ICOMOS. It was basically addressed the integration of marine habitat and wild life habitat by promoting green development to conserve the Trincomalee harbour and the lagoon.

Fig 3.5 indicates the zoning plan prepared for the Middle Peninsula area.

3.5 Sri Lanka Ports Authority

In 2005, Sri Lanka Ports Authority has formulated a Conceptual Plan to develop the area of authority of the Sri Lanka Ports Authority as Industrial Zone and Tourism Zone. As shown in Fig 3.6 and 3.7 the detail zonal plans were formulated and called for expression of interest from the individual investors to implement the programme.

3.6 Board of Investment of Sri Lanka

In relation to the above conceptual plan, the Board of Investment of Sri Lanka also developed a conceptual plan for the establishment of Special Economic Zone in Trincomalee covering an area of Kappalthure and the Trincomalee and Sampoor area. According to the plan number of development zones was identified around Trincomalee harbour area for various types of development as shown in Fig 3.8.

3.3 Road Development Authority

Road Development Authority has prepared a trace for Outer Circular Road encompassing the proposed zoning areas of the Special Economic Zone of Trincomalee as shown in Fig 3.9. This 69 km length road is connecting Illankanthai of Sampoor area with Nilaweli in the northern part of Trincomalee using existing road network as well as new connections. As per the proposal it will be constructed initially as a jeep track and finally developed to a four lane road.

With a view to create a new era for Trincomalee with mega scale physical development the Government of Sri Lanka made an initial steps to formulate a comprehensive development plan for Trincomalee to optimum utilization of land while conserving environmental and other strategic locations.

The Presidential Secretariat initiated this effort and the Urban Development Authority was entrusted to formulate the development proposals by considering the programmes and requirements of the other stakeholders as well as needs of the provincial and local government institutions and public at large for the development of Trincomalee Metro Urban Centre.

4.0 Situational Analysis

4.1 Demarcation of Trincomalee Metro Urban Centre

Trincomalee Metro Urban Centre consists of Trincomalee Urban Council Area (UC), Kinniya Urban Council Area (UC), Divisional Secretariat Divisions of Towns & Gravets, Mutur, Thambalagamuwa, and Parts of Kuchchaveli, Kantale, Seruvila, Verugal, Morawewa DS Divisions (Fig. 4.1) which expands over an area of 136.2 sq.km or 136,250.3 hectare and it is divided into 174 Grama Niladhari Divisions. Trincomalee is the District Capital of Trincomalee District.

The corporate area of the Trincoemalee Metro Urban Centre comprises more than 50.0 % of the total land extent of the district as indicated in Table 4.1.

Table 4.1

Extent of DS Divisions falling under Trincomalee Metro Urban Centre

DS Division	Extent (ha)	No of GN Divisions
1.Trincomalee UC area	1,378.5	19
2.Town & Gravets	11,838.2	24
3. Mutur	19,610.4	42
4.Thambalagamuwa	27,187.9	12
5. Kinniya	15,295.6	31
6. Part of Kuchchaveli	15,504.6	14
7. Part of Kantale	16,667.7	16
8. Part of Seruwila	6,427.1	7
9. Part of Morawewa	19,541.2	6
10.Part of Verugal	2,795.5	3
Total	**136,250.3**	**174**

Source: Urban Development Authority

4.2 Physical Characteristics

The study area is totally having a flat terrain except few undulated landscape with few isolated hills. More particularly, the coastal fringe is generally flat except in Trincomalee Town and Gravates DS Divisions. Accordingly the elevation varies between 600 m at hilly region and 3 m MSL at coastal belt. The hilly area is insignificant in extent by covering about 5% of the total land area of the district. The coastline of about 210 km is characterized with wide sandy beaches that have been created through littoral drift of sand brought along the Mahaweli Ganga. The beach is also enriched with extensive lagoons, estuaries, mangroves, coastal marshes and dunes; and the seaward is enriched with coral reefs, sandstone and shallow beds of coastal and estuarine sea grasses as explained elsewhere in this report.

Out of 11 rivers with a basin area of 14,463 sq. km decorate the coastline with a radial pattern of drainage. Makarachchi Aru, Mahaweli, Kanthale Aru, Palampotta Aru, Palkutti Aru and Yan Oya basins are fully or partly located within the area.

Entire district has 15 large bays and 14 lagoons of which following bays and lagoons are located in the project area:

Bays (14)	-	Back Bay, Dutch Bay, Yard Cove, Mud Cove, Cod Bay, Malay Cove, China Bay, Snug Cove, Thambalagamuwa Bay, Koddiyar Bay, Marble Bay, Sweat Bay, Deadman's Cove, Nichcolson Bay,
Lagoons (7)	-	Kuchchaveli Lagoon, Periyakarachchi Lagoon, Sinna karachchi Lagoon, Uppuveli Lagoon, Kokkadiwettai Lagoon, Ilankanthai Lagoon, and Illakkale Lagoon
The ferry services	-	Koduwaikattu ferry, Kuchchaveli ferry, Kaddaparichchan ferry.

Out of 75 operating inland tanks of the district, 8 are classified as major irrigation tanks and 18 as medium tanks. Kantale Tank and Wendarasanpura Tank are the two major tanks in the study area. Andankulam, Periyakulam, Ethandamurippu tank, Maduwa kulam, Periya Elumpurukki Tank, Paravipanchan Tank, Galmetiya Tank, Illakkanthai Tank, Ullaikulam, Kurankupanchan Tank are the medium tanks located in the area. The district comprises of unique landscape features due to the uniqueness of its topography.

Trincomalee bay is one of the largest natural deep harbors in the world and it gets connected to the Indian Ocean through a submarine canyon (900 m deep) that cuts through the continental shelf of which the average depth is about 70 m. The bay is enriched with 11 islands, which are providing excellent habitats for aquatic birds. The riverine environment created with Mahaweli Ganga, the largest river in the island flows through the area and falls into the Indian Ocean at Trincomalee bay (See Fig 4.2 for details).

4.3 Land Use Distribution

The land use pattern in 2006 in Trincomalee Metro Urban Development area is given in Table 4.2 and Figure 4.3.

Accordingly the major share of the corporate area, which is about 44.2 percent is occupied by forest. The second and third largest occupiers are scrubland and paddy. The other land uses which occupied a considerable share of the area are abandoned paddy, residential and unimproved open spaces.

Individual area land use distributions are given in Fig 4.4 to 4.13. The dominant land users in each of these divisions are vary according to the location of these areas. The individual land distributions are given in Table 4.2. As per the table the dominant land use in Trincomalee UC is residential (40.0 %), in Town & Gravet areas forest is more dominant and it occupies about 51.0 percent of the total area. In Kantale forest areas occupied a larger share (45.0%), in Muttur abandoned paddy occupied about 35 .0 percent of the total land. In Kinniya and Sampur areas the largest land users are forest and abandoned paddy respectively. Forest occupies about 49.0 percent in Kuchchaveli DS Division.

Since the Metro urban centre has more environmentally sensitive areas it is necessary to consider the economic returns of some of the areas located closer to more potential development sites. Some of these existing land uses need to be transformed into more urban activities considering these physical development is essential components in the future development of Trincomalee Metro Urban Development area.

4.4 Population Distribution

Trincomalee Metro Urban Centre is the first order Centre in the hierarchy of population in Trincomalee District and it is recorded as the largest populated urban agglomeration in the district. According to the Census of Population and Housing of the Department of Census and Statistics, Population in the Trincomalee Metro Urban Centre is 337,711 in 2006 covering about 81.6% of the total district population of 413,719.

Table 4.3

Population Distribution Pattern - Trincomalee Metro Urban Centre -2006

DS Division	Population In DS Divisions	Population in Metro	%
Town & Gravets	110,826	110,826	100.0
Thambalagamuwa	32,078	32,078	100.0
Mutur	64,668	64,668	100.0
Kinniya	75,123	75,123	100.0
Kantale	48,632	32,265	66.3
Kuchchaveli	29,990	13,003	43.4
Seruvila	13,886	4,365	31.4
Morawewa	7,762	1,943	25.0

Eachchilampattai	11,923	3,440	28.9
Total in DS Divisions	394,328	337,711	85.6
Total District	413,719		81.6

Source: North East Provincial Council, 2006

Trincomalee Urban Council (UC) had 93,748 population in 2006 recording a very high average annual growth rate. Its land area is about 1,466 hectares and gross population density is about 64 persons per hectare. The Trincomalee UC has a sub-regional role to play as the highest order commercial and administrative center in the District. Its service area extends up to District of Jaffna, Mannar, Killinochchi, Vavuniya and Mullaitivu of Northern Province. The daytime population is at present drastically reduced due to the crisis. The total population of Towns & Gravets had 110,826 with 25,997 families.

Kinniya UC is located away from Trincomalee major urban center. Kinniya was upgraded to an Urban Council area in 2006 and the total DS Division is included into the Metro Urban Centre which had a population of 64,668 in 2006. Gross population density is 5 persons per hectare, which is very similar to the situation of Trincomalee town. Highly populated areas of the Metro Urban Centre are located in Kinniya and Muthur DS Divisions. In 2006 these two DS Divisions had a total population of 75,123 and 64,668 respectively. The total number of families was 16,438 and 16,448 within these two DS Divisions in June 2006

As per the available statistics for the year 2006, the total number of housing units in the area is 67,500. Housing sector was affected by Tsunami waves as well as due to civil disturbances in some of the areas located closer to vulnerable areas.

The existing housing units are more in permanent nature but those of semi-permanent and temporary structures to be replaced by permanent housing in the future. Further that there is a necessity of relocating some of the existing housing areas as a result of proposed major development projects. These housing units also to be constructed in the areas identified for such purposes.

4.5 Physical Infrastructure Facilities

4.5.1 Pipe Water Supply & Distribution

The existing water supply scheme extracts water from the Kantale reservoir and mainly serves the Trincomalee and Kantale towns and several suburban areas. The water is treated at the Kantale Treatment Plant running at capacity of 5.5 Mn gallons per day (25,000 cu.m/ day) at present and the treated water is pumped to Trincomalee area through a 40 km treated water transmission line which feeds Kinniya, Trincomalee and Nilaweli areas. The population currently supplied with water is approximately 140,000 and several established industries in Trincomalee too are being served. However,

NWS&DB is currently facing a constraint in providing more connections due to the limitation of the capacity at the Kantale treatment plant.

In addition to the above main schemes a few rural schemes based on ground water, are also in operation, where only a limited number of connections have been provided. At present the service level of all of the above schemes are low and only 6 hour of water supply could be provided on the average.

In order to improve the situation two major water supply projects have been formulated in the Trincomalee District funded by ADB and the Government of France with a view to improve the production capacity and to expand the coverage.

The Greater Trincomalee Water Supply Project under French funding includes the rehabilitation and augmentation of existing Trincomaleee Water Supply Scheme; expansion and rehabilitation of water supply facility to Nilaweli, Gopalapuram and Irakkandy, new pipeline from Thambalagamuwa to Kinniya. This project will also include two isolate water supply schemes in Pulmoddai, and Eachchalapattu areas. Upon implementation of this scheme the total capacity will increase up to 56,000 cu.m per day.

Muttur Water Supply Project is the second project in the area which covers Muttur town and 42 Grama Niladhari divisions within Muttur DS Division. The Nalloor and Paddalipuram areas which was under unclearead areas previously too are covered under this project. Basically following areas are covered by the Muttur project. Thaha Nagar, Pala Nagar, Alim Nagar, Jinna Nagar, Jaya Nagar, Kaddaparichchan Peruveli, Barathipiuram, Palathoppur, Thippur, Iqbal Nagar, Allai Nagar, Pallikkugiyiruppu and Paddithidal areas. With the implementation of the project the water production to Muttur town and the above mentioned areas will increase up to 8,500 cu.m per day.

In addition to these projects several Tsunami assisted projects which are being implemented in the Trincomalee District for the improvement of the distribution system.

As indicated in the Fig 4.14 in the following areas, the total capacity will increase after the implementation of these two projects:

	Present Capacity	After Augmentation
Greater Trincomalee Scheme	25,000 cu.m/ day	56,000 cu.m/day
Muthur Division	Ground Water	8,500 cu.m/ day

Water requirement of the mega projects planning today is not considered by these augmentation projects so that these requirements to be evaluated at the future plans of the NWS& DB. Formulation of projects to cater these very high demands could take a considerable long period of time.

Table 4.4

Water Consumption Pattern in Kantale PS area is as follows

Type	No of Connection	Water Consumption (daily)
1. Domestic	3,263	1,917
2. Hostel	3	0.6
3.School	10	45
4.Government Hostel	81	47
5.Water Towers	4	2
6.Government Institution	29	20
7.Defence	3	28
8.Police	14	64
9. Hospital	2	101
10. Commercial	118	75
11.Religious	17	19
12. NWS&DB	1	0.2
Total	**3,545**	**2,318.8**

Source: NWS&DB

Mahaweli River flows millions gallons of fresh water in to sea. Major water supply scheme to meet the future requirement of Trincomalee and Muttur areas could be launched upstream to avoid salinity by applying different techniques of siphon action or dug wells in future.

4.5.2 Storm Water Drainage

The existing drainage discharges into harbour area, without any purification or filtrations. Thus the oily substances like crude oil, grease and other waster materials enters harbour area and the marine life in harbour is in danger. This has to be taken into consideration when the new development plans formulated for the area by introducing a filter before discharging into harbour.

4.5.3 Road Network

Among the National roads A15 – Batticaloa- Trincomalee road traverse through Kinniya to Muttur for about 08 km was eroded by sea. A new road trace to be located inland in order to protect the national linkage from future erosion. Similarly the stretch of road for about .5 km on both sides of Salapai Aru Bridge was eroded by sea along the National road and B 424 – Trincomalee –Pulmoddai Road. The road and bridge needs relocation inland.

Within Trincomalee town the paved roads are very narrow and do not have drainage facilities. Hence many of the roads need widening to accommodate drainage which is very important for the protection of the surface.

4.5.4 Air Transport

Trincomalee airport is located in China Bay area closer to the Trincomalee town at 83^0 22' 03" N and 08^0 11' 57" E, coordinates. The present operator of the airport is Sri Lanka Air Force. This airport has a 2,225 m long 14 m wide bituminous runway with flight path 06/24. The following Table will give the details of aircraft types that can be operated from this airport.

Table 4.5

Aircraft types that can be operated from Trincomalee

Air Craft	Landing length (m)	Takeoff length (m)
An 24	640	1,590
Y 7	620	1,398
An 26	730	1,240
An 32	760	1,200
Hs 748	620	1,237
Boeing 737-200	1,500	1,800
Boeing 767-200	1,300	1,800
Boeing 767-300	1,510	1,760

Presently there is no civil aviation domestic flight operating from the Trincomalee airport.

Ground access to the airport is from the A15 Trincomalee – Batticaloa road. It is located about 5 km from the junction near 4^{th} milepost on A6 road. The access road is in bad condition at present and the airport is not accessible for citizens due to security of the district. The run way needs rehabilitation. The airport has only a small terminal building, which is not sufficient for scheduled flights.

4.5.5 Port

Sri Lanka has 3 main commercial harbours viz, Colombo in the West, Galle in the South and Trincomalee in the North East. Colombo and Galle are man made while Trincomalee commands a large natural and a wide body of sheltered waters.

Trincomalee Harbour , which has formerly a British Naval Base was taken over by the Sri Lanka Government in 1956 to be developed as a Commercial Port.

The harbour itself has 2 sectors, Inner Harbour and Outer Harbour. The Outer harbour is composed of the Trincomalee Bay which has the approaches to the Harbour and Koddiyar Bay into which the Mahaveli drains. At the place where the Mahaveli flows into the bay there is a deep submarine canyon which runs into a depth of 400 m in about 4,000 ft. from the shore. Depths of 10 m are reached at a distance of less than 1,000 ft from the coast.

The Inner Harbour is defined by latitude 8^{o} 30' N and longitude 81^{o} 15' E and commands a **water area of approximately 2,023 ha acres and a land area of nearly 5,099 ha**. The harbour is flanked by high cliffs on the sea side. It is therefore, well protected from the monsoon winds. The sheltered waters of the harbour is capable of accommodating a large number of vessels and offer water depths that is suitable for movement and berthing of small, medium sized and large deep drafted cargo ships, oil tankers and supertankers (See Figure 4.15).

The harbour infrastructure includes road and rail road facilities, linking and providing access to and from other regions of the Island.

At present the Sri Lanka Ports Authority (SLPA) is in complete administrative control of the harbour and the environment except for the Naval Yard in the northern slopes of the Ostenburg Ridge and a few pockets in the town and China Bay occupied by the Army and the Air Force. In 1983 some 6,000 acres of land, mainly crown land, bounded in the North by the Dambulla-Trincomalee highway, in the West by the Palampattar waterway and in the South and the East by the sea up to southern edge of Yard Cove had been vested with the SLPA. The same area now vested to the Board of Investment of Sri Lanka with the intension to implement a Special Economic Zone.

The Ministry of Shipping, Ports, Rehabilitation and Reconstruction under whose purview the running and the development of the ports in Sri Lanka were, promulgated in 1997 the National Ports and Shipping Policy. Under the caption "Ports and Infrastructure" the policy spells out the Development and the Expansion of the Port of Trincomalee as well.

The plan for deep water harbours with heavy industrial base is mainly for Colombo Port with its planned South Harbour extension with ADB funding, Galle Port with the planned expansion with JBIC funding and proposed Hambantota harbour with Chinese Government funding including cement plant, refineries, ship yards etc.

It is envisaged to develop the following activities in the Port of Trincomalee :

* Tourism – related marine activities such as marinas and pleasure craft.

At present the overall administration is handled by the Ministry of Shipping and Aviation and the Port of Trincomalee handles 6.23% of all cargo handled in the ports of Sri Lanka which was 8.76% a decade ago.

Town Jetty and Muttur Jetty

In ward 3 of the Trincomalee Town, the SLPA has constructed the Town Jetty (167' x 30') for the passengers who travel by boat between Trincomalee Town and Muttur. The Jetty is a concrete piled construction and was built in 1970. The depth at the jetty is approximately 8 feet and is quite sufficient for the passenger vessels which ply between Trincomalee and Muttur. Two passenger vessels, one owned by the SLPA and the other owned by the CTB operate the service. In the yard space between the jetty and Inner Harbour Road are housed the Harbour Police and the Customs. In 1998 the end bay of the jetty

was damaged due to the blasting of a private passenger vessel moored alongside the jetty. Notwithstanding this damage the jetty is continued to be used for the passenger traffic as it is the fastest and the safest mode of transport available to reach Batticaloa via Muttur.

The passenger jetty at Muttur (700' x 9') is a steel pile construction with a timber sleeper decking. The depth at the end of the jetty is 10'. The structure had been built by the SLPA 30 years ago and is maintained by them. The Muttur Jetty by virtue of its location in the Koddiyar Bay is exposed to the ravages of the N/E monsoon. It has sustained substantial damages due to the 150Km/h cyclone which swept across the island in December 2000.

At present as the Trinco-Muttur passenger launch service is the fastest, safest and the most economical mode of travel available between Trincomalee and Muttur, the repair of the Town Jetty in Trincomalee and the **construction of a robust cyclone resistant jetty in Muttur must be undertaken on a priority basis**.

The port activities in Trincomalee Harbour are confined to the deep waters in Cod Bay, China Bay, Malay Cove and Clappenberg Bay.

In order to facilitate the Port activities for possible industrial development in Mutur area a rubble filled groyne cum jetty to be constructed as the existing jetty is exclusively used by the defence and civilian transportation work.

Cod Bay

Three installations are in Cod Bay viz. Mud Cove Jetty, Cement Plant and the Fisheries Wharf.

(a) Mud Cove Jetty

This is a gravity type structure having a berthing length of approximately 68 ft and 5m water depths connected to the land by a concrete bridge. This is presently being used by the SLPA for servicing their floating craft such as Berthing Tugs, Tanac Tugs and Launches. The shore facilities at this jetty consists of 3 hangar type structures of 7,500 sq. ft. used for workshops and stores facilities, an office block and a 100 T slip way presently de-rated to 50 T. All the SLPA vehicles and plants are maintained at this point. The jetty had been built by the British and is in a state of disrepair. The access to the jetty from the Dambulla - Trincomalee highway is good. Although the access to the jetty is through a vast tract of crown land, no major port related industries could be recommended owing to the limitations in the Mud Cove and its close proximity to the city centre.

(b) Cement Plant

Tokyo Ceylon Lanka Ltd. has installed two crushing, mixing and bagging plants (Mitsui and Fuji) in Cod Bay producing approximately 500,000 Tons of cement annually. The bulk of the cement is

dispatched mainly to Colombo. A small quantity is sent to the Jaffna peninsula via KKS Port by coasters.

The Clinker and the Gypsum required for the plant are brought by 12,000-15,000 DWT bulk carriers which are berthed with the aid of 2 mooring buoys. The clinker is discharged on to the conveyor by grabs operated from the bulk carrier. The depth alongside the dolphin berth is 10 m.

The generation of dust while discharging clinker has created an environmental issue. Although the market for the production from this plant is assured, the transportation of the bagged cement to Colombo and other parts of the Island by lorry is expensive.

With the possible development of the region envisaged in the near future the demand for cement will increase and hence, the prospects for the industry are good. However the economics in the importation of bagged cement, cement imported in bulk and bagged in Sri Lanka, the manufacture of cement with clinker imported and the manufacture of cement with our own raw materials need to be examined. From the data available, the prospects of obtaining raw material from the district for the production of cement are very low.

The power required to operate the plant is obtained from the main grid. The plant has its own generator to supply their full requirement when the main power supply fail.

Power is a prime requirement for the development of the cement industry, and is presently in short supply.

(c) Fisheries Wharf

The Fishery Harbour Corporation has a quay wall of 175 m in length at a depth of 5m. The shore facilities consist of a defunct ice plant, defunct cold rooms, a fully fledged workshop which is presently operational and a 150 T slipway. The water area is sufficient to moor 500 to 600 multi-day fishing vessels.

At present the harbour facilities are under-utilized with only 30 multi-day boats using the harbour. Some 300 multi-day vessels of migrant fishermen who have come from the South and the North are unable to use the harbour due to security restrictions. Presently the quay wall is used by the vessels chartered by the Sri Lanka Government to transport passengers and goods between Kankesanturai (KKS) and Trincomalee. These factors have resulted in the Fishery Harbour Corporation, a self financing state organization running this Fishery Harbour at a great loss.

Presently the fishing crafts, both coastal and multi-day vessels, operate from the coast adjacent to the Trincomalee fish market.

The potential for coastal fishing is very low as intensive fishing in coastal waters and lagoons have depleted the fish stock resource. Hence coastal fishing should be discouraged. On the other hand, the potential for deep sea fishing in this region is tremendous and should be encouraged by commissioning the Ice Plant, the Cold Rooms, the Slipway and permitting more multi-day fishing vessels to use the harbour. In addition to the above, incentives should also be given to entrepreneurs to use 30 m vessels for deep sea fishing. Such vessels could use the present harbour quite effectively and bring more income to the Fishery Harbour Corporation.

However, with these developments envisaged, action will have to be taken to protect the Mangrove stretch in Mangrove Cove on the Eastern side of the fishery Harbour from destruction as it is the only available Mangrove in Trincomalee.

China Bay

Four port installations exist in China Bay viz, Burma Camp, Trincomalee Tea Administration (TTA) Wharf, Ceylon Jetty and the Ceylon Petroleum Corporation Installation.

(a) Burma Camp

A derelict concrete slipway and two guide jetties, built by the British existed at this location. The single story buildings in the premises are being used by the SLPA to house their Security Staff.

At present the SLPA has embarked on the construction of a 253 m x 89m pier to berth 40,000 DWT vessels. The water depth at the pier is 13m and it is to be connected to land by a 440 m long and 23 m wide earth embankment. A 23m wide roadway of length 0.5 km will also be constructed to connect the pier to the Trincomalee – Kinniya main road at a point which is approximately 1.5 Km from the Dumbulla-Trincomalee highway. The pier which is the biggest and the deepest structure built in Trincomalee was commissioned in January 2002.

Not much usable land in the vicinity of the proposed pier is available for port related development. **Approximately 0.5 km from the pier is a large tract of crown land on either side of the Trinco-Colombo rail track and the Trinco-Kinniya main road occupied by squatters which could be developed for activities connected with the pier**. A rail mounted wharf crane would be installed on the pier for bulk and break bulk cargo handling purposes. The two 90m and 89m having water depths of 9 and 10m could used as coaster berths.

(b) TTA Wharf

The TTA wharf (620’ X 10’) had been built by the British and was used by them for the export of tea. The structure is weak and needs extensive repairs. The water depths at the wharf do not exceed 3 m. The yard area has nearly 6,000m^2 of warehouse space. The 5

warehouses are usable and need minor repairs. The SLPA who owns the warehouses have not put them to much use except for two. One is used as a transit shed for agricultural produce brought by sea from the Jaffna Peninsula and the other as a transit shed by the Mineral Sands Corporation.

The wharf is presently used by the SLPA to house their Navigation Section.

(c) Ceylon Jetty

Ceylon Jetty had been built by SLPA some thirty years ago as a lighter jetty. It is 100m in length and 10m wide. The water depth at the end of the Jetty is 3m. The jetty has been designed to take loaded 10T lorries and a crane.

It was originally used to bring ashore, goods from ships by lighter. Since of late this practice had been abandoned and now it is being used to berth the passenger vessel 'City of Trincomalee' transporting passengers between KKS and Trincomalee.

The chances of the jetty being used for the purpose it was built is remote as the use of lighters for cargo handling is on the decline. **However the jetty could be profitably used for ship breaking, taking into account the availability of land in the vicinity of the jetty for this purpose.**

(d) The Ceylon Petroleum Corporation Installation

The Ceylon Petroleum Corporation, (CPC), owns an Oiling Berth and two jetties viz. Boom Jetty and Lighter Berth.

(i) The Oiling Berth

The Oiling Berth consists of 3 concrete dolphin like piers joined to each other and the land in the form of a T by steel catwalks. The water depth at this berth is 10m and could accommodate a loaded tanker of 30,000 DWT. The tanker is moored with the help of two mooring buoys on either side of the berth and to the dolphin structure itself. The fuel is discharged into the storage facility located in the premises through a 12'' oil pipeline. This berth also provides bunkers to all the merchant vessels that call at Trincomalee, the naval crafts, the berthing tugs of the SLPA and supplies fuel to the 1,000T tanker, which operates regularly between Trincomalee and KKS taking Diesel and Kerosene to the Jaffna peninsula.

(ii) Boom Jetty

The Boom Jetty is a concrete structure 100m x 10m built by the British. The Jetty is in a reasonably good condition and has a 7 m water depth at the end. It is hardly used other than to moor

small crafts which occasionally sail into the CPC premises. It could be profitably used to issue bunkers to smaller craft calling for bunkers by restoring the fuel pipe line which had been disconnected.

(iii) Lighter Berth

The Lighter Berth is a 10m wide steel jetty which extends 350m into the harbour. At the extremity it has a water depth of 11m. The jetty had been built by the British. Due to negligence and lack of maintenance, the structure has corroded and the jetty is not usable. **With such depths available at this jetty it is worth repairing same and putting it to better use**.

The Ceylon Petroleum Corporation in addition to the three port structures mentioned above has an excellent tank storage facility at China Bay for petroleum and diesel fuel up to a capacity of 1,237,500 T. Ninety nine storage tanks of capacity 12,500 T each located between elevations 6 and 27 m above mean sea level (MSL) are connected with three 12" pipelines via the

Oiling Berth for loading and unloading. **Of the 99 storage tanks the CPC uses only the 15 tanks which are in their premises at China Bay**. The balance is presently used by Indian Oil Company.

This tank farm had been built by British during the 2nd world war and has been in disuse for a considerable period of time. Ceylon Petroleum Corporation is unaware of the condition of the tanks other than the 15 used by them.

The annual imports of fuel to Trincomalee averages to a mere 30,000 T which is insignificant when compared to the capacity of the storage facility. On the other hand, the Oiling Berth is also busy supplying bunkers to all types of crafts presently using the Trincomalee Harbour.

The nearly 1 million tons of the spare storage capacity could be profitably used for storage and bunkering by the installation of an oil Tanker Berth at a minimum depth 20m in the harbour and connected to the Storage Facility.

200,000 DWT tankers which could bring fuels at competitive prices could moor on to the Tanker Berth and discharge their fuel cargo into the Storage Facility. Vessels requiring Bunkers could get their fuel tanks loaded from the Storage Facility on a off-shore basis or through the Tanker Berth by mooring on to it.

If an efficient, cheap and a fast turn-round operation are provided, shipping lines en-route between the Far East and Europe would take this least cost deviation from the

international navigation lane to take bunkers from Trincomalee. **In order to make this a success it is necessary for the Government to liberalize the bunkering industry and allow other parties in addition to the CPC to import and store both offshore and onshore oil for purpose of bunkering**.

Malay Cove

Malay cove has only two installations. They are the Wheat Milling Complex owned by Prima (Ceylon) Ltd. and a boat building yard owned by Constellation Yachts Ltd.

Prima (Ceylon) Ltd

In Malay Cove, Prima (Ceylon) Ltd. owns a 257m x 8m piled jetty at a water depth of 13m. The jetty is connected to the quay by a bridge of 15m wide and 15m long.

The main jetty could accommodate bulk wheat carriers up to 60,000 DWT, which are moored to two mooring dolphins located on either side of the jetty.

The inner quay has been designed for 5,000 DWT vessels which are mainly coasters.

On land 1,100,000 T capacity wheat milling plant with silos are located. Not far from the plant on a hillock in Round Point overlooking the harbour, the housing estate of the executives of the company is also located in the same area.

In the year 2000, 908,007 T of wheat were discharged at this jetty, 157,086 T of wheat flour and 175,720 T of wheat bran were loaded.

Two loaders of capacity 500 T/hour do this operation.

The Prima Wheat Milling Complex is one of the biggest wheat Milling plants in South Asia and South East Asia.

Constellations Yachts Ltd

On the southern edge of the Malay Cove, Constellations Yachts Ltd. has a fiber glass boat building yard. This facility was established some 20 years ago and had produced number of fishing boats, launches and pleasure crafts. At present there seems to be no activity at this boat yard perhaps due to the unsettled conditions prevailing. The installation has a slipway and a sizable hanger.

The prospects for this industry in Trincomalee are excellent and therefore should be revived.

Clappenburg Bay

Clappenburg Bay has one port related installation such as Clappenburg Wharf and an oyster bed in French Pass.

(i) Clappenburg Wharf is a gravity type structure of length 32 m and water depth of 3.7m (12'). It was originally built to berth lighters bringing mainly food from cargo vessels moored in the deeper waters of the Clappenburg Bay. The cargo is discharged into Lorries by cranes and taken to the 7 transit sheds owned by the Food Department behind the wharf with a floor area of approximately 13,000 m^2.

Presently, the Sri Lanka Army has taken over the wharf and the transit sheds for their activities.

Clappenburg Bay is the only protected water area in the harbour presently available for major port development. The water depths in the bay range from 6 to 20m. The high ground in the southern part of the bay has an average height of 10m and goes up to 30- 34m at high spots. The average width of this promontory is 70 to 90m. A water way of 50 acres with 8 to 20m water depths is available for safe vessel navigation. The shoreline stretches more than 2,000 m north to south.

The upland offers space for storage yards which is in close proximity to the Kinniya-Trincomalee main road and the rail road.

The bay itself is nearest to the Outer Harbour and provides easy access and entrance channel routes to entering and departing cargo vessels. This will reduce ship travel time and the need for extensive navigation aids.

(ii) French Pass

The British Admiralty chart 816 for Trincomalee Harbour indicates the existence of an Oyster Bed in French Pass connecting Malay Cove to Clappenburg Bay.

This matter is required to be studied further and taken into consideration in the proposed development activities of the harbour and the environs.

4.6 Social Infrastructure Facilities

4.6.1 Education

As mentioned in the previous section most of the schools in Trincomalee District are located in the Metro Urban Centre. All schools are having individual problems and in common staff, facilities and land is considered as common issues. All these matters to look into seriously in order to develop future human resources programme.

In order to attend the future increase of population so as to increase the number going to school it is necessary to upgrade the levels of some schools as well as establish two new schools in the areas where new development locates.

In addition to formal education technical and vocational education need heavy attention in order to develop skilled labour.

Trincomalee has a huge potential for Tourism development. Tourist industry generates more employment for the youths of this area. Tourism related skills to be impared to youths to seek prospective employment within the industry. A full fledge hotel school is necessary to train youths in hotel related industry such as:

- Front Desk Operation
- Food and Beverages
- Hotel Management etc.

The incoming industries need the services of skilled labour in mechanical and engineering operations, welding, fitting etc and the school drop out youths to be trained to capture opportunities. Therefore a technical and vocational education programmes and necessary training institutes to be established in several locations in the future.

The fishermen of Trincomalee are still involved with the services of skill people in the modern techniques of fishing which shall minimize the risk of dynamite fishing also.

4.6.2 Health

The existing health institutions provide necessary health services to the people but it is necessary to improve the facilities and fill the existing vacancies of the cadre in order to properly attend the services.

4.6.3 Recreational Facilities

Data on Recreational facilities in the district is not available to make an assessment of the exiting situation. Presented here is only the existing facilities in Trincomalle Urban Council area.

Table 4.6

Recreational facilities in Trincomalle Urban Council Area

Type of the facility	Number
Libraries	2
Play Grounds	3
Children parks	4
Community Centers	4
Sports stadiums	1
Community Halls	1
Gymnasium	1
Pavilion	1

Source: Annual Report; Trincomalee Urban Council

It is noted that the above mentioned recreational facilities are not adequate for the present needs and most of such facilities are not properly maintained due to lack of funds and the ongoing conflict situation. Therefore it is necessary to addressed the recreation needs of the present population as well as the future requirements when formulating the development plans.

The available stadium needs modernization as it is in dilapidated condition. Trincomalee schools need a separate cricket stadium to promote the game among school children.

In Kantale PS area has two cinema halls and 6 public play grounds. The main play ground is located in Peraru GN Division which has a total extent of 4.0 ha.

5.0 Vision, Objectives and Concept for Development of Trincomalee Metro Urban Centre

5.1 Vision

The vision envisaged in the development plan of Trincomalee Metro Urban Centre is to:

"Create peace, harmony and integrity through economic development in the Trincomalee Metro Urban Centre, whilst retaining the environmental and socio-cultural heritage of the district"

5.2 Objectives

- *Optimum utilization of land harmonizing to it strategic locations.*
- *Creation of mega scale employment opportunities through industrial, tourism, fisheries and agricultural development.*
- *Create multi ethnic, multi religious and multi dimensional socio-cultura fabric to improve living standards of the community creating integrity among all.*
- *Improve infrastructure network of the area to integrate overall development.*
- *create an aesthetically pleasing, environmentally sustainable and functionally efficient urban system*

5.3 Development Concept

All stakeholder institutions were concern for the development of Trincomalee Metro Urban Centre were highly regarded in identification of key areas in formulating the concept for future development. Some of the key issues discussed at various forums are as follows:

- preserving the individuality and uniqueness of Trincomalee
- Conservation of historical, religious and cultural heritage of the district
- All stake holder involvement in the development planning process and implementation of identified projects
- Consultation of Chamber of Commerce and Industry representatives in Colombo for development
- If involuntary displacement involved to implement the identified projects it requires to properly address the resettlement and livelihood of resettled population
- Make awareness programmes on the proposed programmes to make consensus built around the proposals resulting in ownership of the programme

- Not to allow local people to be marginalized

- Preference should be given to local people in employment and in establishing industries, hotels tourism and industry related economic activities

- Complete Environmental Impact Assessment to be done on projects on industries, hotels, tourism and industry related economic activities

- Incorporate Cinema, Theatre, Music and Dance and other cultural events in order to avoid Trincomalee a cultural dessert

- Care should be taken on ill effects of tourism including cultural degradation.

In addition to the factors such as topography, land use, environmental sensitivity and development potential of the Trincomalee Metro Urban Centre broad consideration were given to following factors also when formulating the development options for the area:

- Greater integration between existing urban centres and proposed new centers

- Fast economic growth encouraging industrial, tourism, fisheries and environmental conservation

- Release lands for appropriate uses harnessing environment and other strategic conditions of the area

- Improve accessibility and availability of modern infrastructure facilities

- Encourage people to concentrate on new urban areas

- Integrate natural environment and green areas to physical development.

5.4 Planning Targets

In developing the options for the development following planning targets were decided:

-	Planning Horizon	-2007 – 2030
-	Estimated Population	-600,000 in 2030 as against 337,711 In 2006
-	Housing Requirement	-New Construction- 58,500 -Replacement of existing stock- 37,500 -Units for relocation sites -15,000 -Total Requirement-111,000 by 2030

Accordingly two options were developed; one based on integration of environment and shifting the development outside the sensitive areas and the second on the basis of blending proposed development in relation to the availability of land harnessing environmental and security aspect.

Fig 5.1 and 5.2 indicate the two concepts in spatial terms. Fig 5.1 is a Green Concept where it proposed to have two ring roads within the area industrial activities locating along these two ring roads. Basically the Trincomalee Port area is earmarked for conservation. The residential areas are located in the central part of each block intersected by the proposed road network.

Fig 5.2 is an integrated development concept which would promote large scale physical development within the identified locations.

5.5 Integrated Development Plan

Based on various deliberations, discussions, meetings and field visits and analyzing the plans, programmes and future requirements of various stakeholders a integrated comprehensive development plan is formulated as indicated in Fig 5.3.

Accordingly following major development areas have identified for future development of Trincomalee Metro Urban Centre.

1. Port and Port related development
2. Tourism and tourist related industries/facilities development
3. Fisheries and Marine resources and infrastructure development
4. Commercial agriculture development (maize, pineapple, melon, cashew, diary farming)
5. Minerals processing
6. Major infrastructure development such road network, Coal Power Plant, water supply etc
7. Construction of new District Secretariat, Provincial Council Secretariat & related housing development programmes
8. Industrial Townships & Special Economic Zone
9. Agriculture and Livestock Development.

1. Port & Port Related services:

It is the view of the Sri Lanka Ports Authority that major commercial logistical requirements would be met by the Colombo, Hambantota and Galle Ports. Any other ports in Sri Lanka would be viewed as regional ports which would stimulate the local economy. At present Trincomalee Port is providing major transport links to north and west. SLPA is aiming for the conservation of Trincomalee Port which is a natural harbour with unique eco-system without parallel globally.

As mentioned by SLPA, that there would be higher commercial returns in the long term from well marketed and managed yacht marinas and cruise berths coupled with exclusive eco-resorts than from infrequent bulk commercial cargo catering for selected industries.

However, that it should not neglect the potential values of oil tank farm which is under utilized at the moment for bunkering, oil storage and oil refining.

2. Tourism and Tourist related services

- Resort Development with golf course facilities and sports complexes
- Eco tourism projects - whale watching, bird watching, hiking, boating, safari tours, angling
- Underwater aquarium/ marine museum /marine research station
- Historical/Archeological Museum/Tours
- Development of Hot Springs at Kinnya
- Sun and Sand Tourism
- Casinos

In addition to that more comfort centers for local tourists, information centers at strategic places, cultural centers to expose the talents of local artists are essential items to be developed in the area.

3. Fisheries and Marine Resources

The only available access for Cod Bay Fisheries Harbour is through main harbour area. Hence the main harbour at its peak functioning may not allow these small vessels to cross the harbour area to proceed to Cod Bay Fisheries Harbour for servicing an alternative fisheries harbour.

The development of fishery sector basically depend on the development of modern infrastructure facilities such as development of fishery harbour at Podawekattu, with all the facilities required such as jetty, cold rooms, ice plants, water and fuel , fish auction center, repair workshop, fish processing plant and necessary transport facilities together with multi day bots carrying modern technologies, long line fishing methods. In addition to that fishermen are in need of anchorages and landing points along the Eastern Coast of Trincomalee from Pulmoddai to Verugal. At least 16 anchorages and landing points are necessary to develop in the area.

In addition to that the following programme was formulated for the development of infrastructure facilities:

Anchorage Development

First Stage -2006/2007
Pulmudde, Kokilai, Sirimapura, Muttur, Habibnagar

Second Stage – 2007/ 2008
Kinniya, Thakwanagr

Development of Fish Landing Sites
First Stage -2006/ 2007
Weera Nagar, Erakkandiya, Nadaththivu, Kuchchaveli, Pattiyadi

Second Stage -2007/ 2008
Salapearu, Jinnapuram, Sinnakad, Walli Sambalativu, Thirukadalur, Sandibay

In addition to that the development of marketing facilities is recognized very essential to the sector and suggested the following areas for development:

-Modern Wholesale Fish Market at Trincomalee and fish sales outlets in other locations
-Carry out coast conservation activities in the coastal zone from Nilaweli to Puduweikkatu and Muttur
-Strengthening of Fishery Co-operative Societies for marketing of products, raising of banking transactions, and uplifting of living standards of fishing community

Other areas to be developed in the fishery sector are:

- Deep sea fishing
- Canning and Processing of Fish
- Pearl Culturing
- Production of Shark Fins / Shark Liver Oil
- Processing of Seaweed.
- Fishery related industries such as nets, flies, rods, lines etc.

The proposed development programmes for inland fisheries sector include:

Medium/ Large perennial reservoirs

- to organize/ strengthen fisher CBOs for fish stock enhancement through stocking of fingerlings, fishing by providing fishing crafts/ gear and micro credit establishment funds to sustain stocking.

Minor Perennial reservoirs

- to organize/ strengthen fisher CBOs, to establish culture based fisher through intensive stocking, support fishing by providing craft/ gear, micro credit and establish funds to sustain stocking.

Seasonal Village Tanks

-to utilize these tanks for production by stocking with suitable fish varieties after monsoon rains.

It is recommended to develop whale watching, hot spring medicinal bath, establishment of marine museum and marine research station.

4. Agriculture and Dairy Development

- Forestry for the Paper Industry
- Commercial Farming for Cashew nut, maize, pineapple and melon
- Cultivation and processing of medicinal herbs
- Production of milk and dairy products
- Animal husbandry – beef, chicken, mutton
- Distillery for molasses, rum and herbal wines

5. Minerals

- Mining and processing of illmenite, zircon, monozite and mineral sands
- Manufacture of bricks, tiles and pottery

6. Infrastructure Facilities

- Telecom facilities – attracting expansion projects of existing providers and BOO/BOT projects
- Power – Coal fired power plant, solar power or wind based power plants on off grid or grid-connected basis as appropriate

The following works for the improvement of electricity network is implementing over the next two years:

Under CAARP – MV Proposals

- Construction of new 25 km 33 kV SC Racoon 11 m pole line from Mutur to Seenaveli

- Construction of new 14 km SC Racoon 111 m pole line from Mudduchenai to Illankaithuraimugam

- Construction of new 13 km 33kV SC Racoon 11 m pole line from Koonitivu to Illankanthai

SBB pole gantry with 2 Nos of auto reclosures at Muttur at Navathkeni, Samagipura, Kithuluthuwa, Namalwatte, Kumburupitiya, Morawewa D5-D6, Pamburugaswewa, Mahaweligama, Nochchikulam, Thiriyaya Road, Old Trinco Road, Pulmoddai.

Under TIIP

- 16 km ELM Double Circuit express line from Trincomalee Grid Substation to Kinniya and a Gantry at Kinniya

- Rehabilitation of the existing 11 km 33 kV Racoon / Weasel Pole line from Kinniya to Muttur using 10 m wooden poles with ELM SC line

- 10 km ELM DC Express line from Trincomalee GSS to 6th Mile Post on the Trincomalee Nilaweli Road and Gantry at 6th Mile Post

- 11 km 33 kV Racoon SC lien from Thiriyaya to Pulmoddai using 10 m wooden poles.

Trincomalee has favorable windy season through out the year. Hence wind mill farm to generate power and operate on an off grid basis is a possible option to minimize the burden of burning fossil fuel.

Similarly, Trincomalee soil is so fertile to look forward for Bio Mass and Bio Gas plants to generate power and operate on a off grid basis or even to supply to grid .

- Road Network Improvements with BOO/BOT projects on toll roads
- Port facilities – building of piers, jetties, terminals, warehousing facilities inclusive of customs, immigration and duty free
- Airport facilities – BOO/BOT projects, inclusive of hangars, runways and duty free facilities
- Water supply –augmentation of existing facilities and supply to new areas and desalination projects
- Sewage and effluent collection, treatment and disposal system/s
- Solid waste collection and disposal system/s
- Upgrading, electrification of the railways
- Irrigation facilities to new areas

7. Establishment and Management of Housing Schemes

- Low income group housing
- Middle income housing
- Luxury apartments
- Dormitories
- Expatriate Housing Colony
- Executive housing
- Housing for relocation families

8. Industrial Townships & Special Economic Zone

- Industrial infrastructure
- Residential infrastructure
- Recreational & Social infrastructure
- SEC with infrastructure facilities to international standards

5.6 Strategy Formulation

The discussions and the presentations made to the Ministry of Defence, Ministry of Enterprise Development and Investment Promotion and to the regional representation at the North East Provincial Council in the preceding sections outlining the current status of the regional economy of the Trincomalee clearly demonstrated that it has serious development issues to be addressed systematically to improve the regional economy and the living

standards of the people while addressing prolonged civil disturbances. The development proposals and strategies, therefore, be identified to effectively deal with these issues. At the outset, it must be stressed that these strategies and proposals need to be divided into three categories in order to give particular attention (a) to strengthen the urban industrial base, to improve the employment and income generation (b) to promote regional economic activities to enhance development in rural areas within the context of existing constraints and potential and (c) to develop infrastructure base of the metro economy.

In the urban sector, the strategies must focus on developing urban growth with industrial, tourism and commercial activities as the base. These strategies must also take into consideration the need to improve the income of the region and employment base which will also help the revenue generating potential of the local authorities. In the urban sector, the following strategies need particular consideration.

2. Port development with considerable expansion of shipping operations and introduction of new economic activities that can make use of the potential of natural harbour such as storage facilities, distribution of goods for international markets and shipping related economic activities.

3. Tourist promotion activities along the coastal belt with increasing private sector participation at the identified tourist resorts by improving the necessary infrastructure facilities.

4. Water based recreational activities to attract both foreign and local tourists as the metro urban centre development is based on vast stretches of Trincomalee lagoon and the sea front.

5. Fisheries sector development with possibly a modern fisheries harbour which could encourage fish processing and canning industries, accommodating large number of multi day boats and free movement for seasonal migrant fishermen.

6. Reactivating of the mineral based industries with processing plants within close proximity to the harbour.

7. Light industries to improve the economic base of the urban centers.

8. Providing integrated development oriented infrastructure facilities to promote the proposed key areas of investment.

   Rural sector still accounts for a larger region but it includes within the Metro area. Unless the proposed economic activities are distributed to help the rural population, the envisaged development in the district is likely to be uneven which means that any benefit from proposed development will not trickle down to rural areas. In this context, it is important to give equal consideration in project planning to projects which will help the rural economy. The following key areas are identified to incorporate proposed development plan.

1. Agricultural diversification with greater potential to produce agricultural products for export markets such as maize, gingerly and sunflower. These products must be supported by establishing processing industries in order to produce products that are in demand in export markets.

2. Improve irrigation facilities mainly through the rehabilitation of existing irrigation net works to assist the farmers to cultivate paddy in both seasons and tap all the potential irrigation areas for new cultivation.

3. Improve marketing facilities for agricultural products in order for farmers to sell their output at prices which will give them a reasonable income.

4. Explore the potential for dairy farming and develop dairy industry to help the people to engage in alternative agricultural employment.

5. Establish rural industries using local products and talents of the rural population.

6. Explore the potential of forest based industries with a long term plan for the development of forest resources in the district.

7. Review the potential for inland fisheries and develop a comprehensive strategy to promote fresh water fishing and processing of fresh water fishing.

8. Reactivating the agricultural practices, transforming all fertile lands to commercial farming, livestock and diary farming to integrate the backward areas into main stream of development.

In the area of infrastructure development, a comprehensive strategy is needed to upgrade the physical infrastructure facilities in the district involving roads, power, telecommunication and water supply. In addition, the social infrastructure also needs substantial improvements to provide the population with adequate housing and sanitation, health and educational facilities.

Most importantly, a programme is needed to improve the marketable skills of the labour force in the region. The district remains backward in technical education when compared with most other districts in the country. Accordingly, without substantial improvement of the technical skills of the population, the proposed development activities cannot be implemented. Even the number of students following programmes leading to professional degrees is relatively small compared to other districts.

These proposed development programmes intend to heavily utilize the human resources in the area so that a comprehensive human resources development plan to be drawn and implemented soon to adequately addressed the demand that would be generated for skilled technical and vocational labour to implement mega projects proposed to the area.