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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**POLICY AND MANAGEMENT PROPOSAL FOR
SUSTAINABLE DEVELOPMENT OF COASTAL
AREAS OF CAMBODIA--SIHANOUKVILLE AS A
CASE STUDY**

By

VANN MONYNEATH
Kingdom of Cambodia

A dissertation submitted to the World Maritime University in partial fulfilment of the
requirement for the award of the decree of

MASTER OF SCIENCE

in

**GENERAL MARITIME ADMINISTRATION
AND
ENVIRONMENT PROTECTION**

1996

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

**Title of Dissertation : Policy and Management Proposal for Sustainable
Development of Coastal Areas of Cambodia–Sihanoukville
as a Case Study**

Degree : Master of Science

The dissertation is a study of coastal resources policy and management strategy for the development of the Sihanoukville Coastal Region which can be followed and implemented. It consists of five chapters.

A brief look is taken at Cambodia's existing biophysical coastal environment, the significant coastal and socio-economic features, as well as coastal economic activities of the Sihanoukville region.

Development and growth in the Sihanoukville coastal planning region in the areas of tourism and recreation, sea-port expansion, residential, airport expansion, construction and industrialisation, fishing, agriculture are investigated.

The integral environmental considerations concerning the coastal issues and the potential impacts on a wide diversity of marine life from a newly planned coastal developments are discussed. In addition, the conflicts between those activities are identified and analysed.

Further, current policies, legislation, and institutions involved in the development activities are addressed, as are the issues of particular concern to these institutions.

Finally, proposals are made for coastal resources policy and strategy to achieve sustainable development and management of coastal resources. A proposed mechanism and structure responsible for an Integrated Management of Coastal and Marine Environment is included as is the Sihanoukville master plan in order to ensure that the embedded threats to the environment from development of this coastal region can be effectively managed.

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LIST OF ABBREVIATIONS

| | |
|-----------------|---|
| ADB | Asian Development Bank |
| APHEDA | Australian People for Health and Education Abroad |
| AWB | Asian World Bank |
| Cambodia | Kingdom of Cambodia |
| CDC | Council on Development for Cambodia |
| CFC | Cambodia Fuel Company |
| DOF | Department of Fisheries |
| EIA | Environmental Impact Assessment |
| FAO | Food and Agriculture Organisation |
| GDP | Gross Domestic Product |
| GRT | Gross Registered Ton |
| IDRC | International Development Research Centre |
| ILO | International Labour Organisation |
| IMCME | Integrated Management of Coastal and Marine Environment |
| IMDG | International Maritime Dangerous Goods |
| IUCN | International Union for Conservation of Nature and Natural Resources |
| LUMO | Land Use Mapping Office |
| MAFF | Ministry of Agriculture, Forestry and Fisheries |
| MARPOL | International Convention for Prevention of Oil Pollution from Ship |
| MEYS | Ministry of Education, Youth and Sports |
| MIME | Ministry of Industry, Mines and Energy |
| MoE | Ministry of Environment |
| MoEF | Ministry of Economics and Finance |
| MoND | Ministry of National Defence |
| MoP | Ministry of Planning |
| MoRD | Ministry of Rural Development |
| MoT | Ministry of Tourism |

| | |
|----------|--|
| MPWT | Ministry of Public Works and Transport |
| NCLMU | National Committee for Land Management and Urbanisation |
| NGO | Non-Governmental Organisation |
| NPRD | National Programme for Rehabilitation and Development |
| OECD | Organisation for Economic Co-operation and Development |
| OPRC | Oil Pollution Preparedness, Response and Cooperation |
| PADCO | Planning and Development Collaboration |
| RGC | Royal Government of Cambodia |
| SOLAS | International Convention for Safety of Life at Sea |
| Sub-CLMU | Sub-Committee for Land Management and Urbanisation |
| UNDP | United Nations Development Programmes |
| UNEP | United Nations Environmental Programmes |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| USEPA | United States Environmental Protection Agency |
| UNICEF | United Nations Children's Fund |
| USD | United States Dollar |
| UNTAC | United Nations Transitional Authority of Cambodia |

INTRODUCTION

Many coastal waters of Southeast Asian countries have rich ecosystems characterised by extensive coral reefs and dense mangrove forests. Endowed with warm tropical weather and high rainfall, these waters are further enriched with nutrients from the land which enable them to support a diversity of marine life.

Cambodia's Coastal Area, is one of these, and it is of great economic and environmental significance. This significance is evident in the variety and types of demands made on the coastal area and its resources. These demands consist of the settlements at the coast, fishing, agriculture, infrastructure development, industrial development, tourism and recreation, landscape, and wildlife, and habitat protection.

In particular, the Sihanoukville Coastal Region is of great importance as the other coastal provinces are not subject to the same magnitude of demands by increasing population and economic pressure. In Sihanoukville these demands are manifested by a variety of coastal activities and newly planned activities that involve fishing, port development, tourism development, construction and industrialisation. This situation is aggravated by expanding economic planning developments attempting to uplift the standard of the living of the Kingdom of Cambodian people.

The government has formulated regulatory measures for management of the coastal resources such as the issuance of permits for sea-ports, tourism, recreation, fishing, and mangrove harvesting. However, most of such measures have not proven effective impact due to enforcement failure but largely due to lack of support of the related communities.

Several coastal resources management issues continue to further complicate the policy integration process. These issues include conflicts and contradictions

arising from administration and legislation overlaps among different resource sectors and between levels of government; the absence of sufficient data about coastal resources and their wise utilisation and the limited range of instruments used to carry out integrated coastal area management are also limiting factors.

Regarding the issues mentioned above, this dissertation concentrates on a "Policy and Management Proposal for Sustainable Development of Coastal Areas of Cambodia--Sihanoukville as a Case Study".

The purpose of this paper is to identify:

- (I) the multitude of issues and problems that are being faced, as well as the sources of these issues;
- (ii) the multiple institutions with varying responsibilities for different aspects of the management; and
- (iii) a legal and management framework to adequately address these issues.

The paper also defines an alternative institutional framework that could effectively enhance and support the process of integrated coastal planning and management. This can help to achieve the goals of sustainable development which are applicable and need to be applied to the situation along the Cambodian coast and particularly in the Sihanoukville region.

CHAPTER I

CAMBODIA'S COASTAL ENVIRONMENT AND USE OF RESOURCES

This chapter points out the country's biophysical coastal environment, related significant coastal, socio-economic features and human economic activities.

1.1 Biophysical Coastal Environment

The Kingdom of Cambodia is located in South-east Asia with covering a land area of 181,535 square kilometres (MoE and UNDP, 1994). Its maximum extent is about 580 kilometres from east to west and 450 kilometres from north to south. Cambodia shares its 2,438 kilometres border in the west and north with Thailand, in the north with Laos, in the east and south-east with Vietnam and in the south-west with the Gulf of Thailand (see map1).

Cambodia has a 445 kilometre coastline which is 1/6 of Cambodia's boundary, stretching from Koh Kong to Sihanoukville and Kampot provinces. The region is characterised by a coastal plain containing many small mountains which gradually rise to the granite Cardamon mountains, with peaks of over 1500 meters. This acts as a barrier to protect storms and strong waves from invading the adjacent plain areas.

There are about 20 rivers originating in Cambodia which drain into the Gulf of Thailand. Seven of them are the main rivers which can affect coastal waters,

namely: Prek Kampong Bay, Prek Kampong Som, Prek Pophit, Stung Chhay Areng,
Sung Sala Munthun, Stung Russei Chrum and Stung Moek (see map 2).

The catchments of these rivers cover roughly 13,406 square kilometres. Activities within the catchments of these rivers do not yet play an important role in Cambodia's economy, but when taken into account there is unrealised potential for hydroelectric power that could affect the functional integrity of the coastal areas.

A large part (73%) of the country's land area was under some form of forest in 1969. However, the latest forest inventory in 1991 by LandSat imagery measured the forest cover at 62% (Thung, 1993). Sadoff, 1993 estimated the forest cover to be only 49% (MoE and UNDP, 1994).

Within Cambodia's coast, the mostly flat slope is dominated by mangrove forests; raised beaches and sand deposits support land developments. The coastal lands have an agriculture value and their best use is for urban, residential, recreational, port development, and industrial developments. Considerable land developments in this direction have taken place particularly along the coastal region of Sihanoukville.

The average depth of Cambodia's sea is 50 meters with a maximum depth of up to 75 meters. There are four main islands namely: Koh Kong, Koh Rong Sanlem, and Koh Thmey and there are a lot of small islands near the coast such as Koh Tang, Koh Pring, Koh Pous, and Koh Pol Wai.

Cambodia has a distinctly tropical climate characterised by high temperature and rainfall. Thus, the country's coastal waters are relatively warm. Climatic variation is minimal with a maximum average of 35°C in April and a minimum average of 19°C in December (Halcrow, 1994). The dominating monsoon winds result in two distinct seasons: rainy and dry. The north-east monsoon prevails from November to April. The south-west monsoon occurs from May to October.

The annual rainfall accounts for more than one metre which occurs between May and October. The rainfall in coastal areas can be as high as in the inland areas because of the south-west monsoon with the mountains serving as a natural wall. The high rainfall promotes tropical rainforest growth, but at the same time induces heavy erosion of exposed soils.

The coastal shoreline has tides twice daily with an amplitude of about 2.5 meters. Cambodia's Gulf has a flat sea-bed and is not very deep with three types of tides diurnal, semi-diurnal, and mixed.

In accordance with oceanographic studies there is a rich fish and sea life in the Cambodian Gulf. The coastal region is favourable for agriculture, (coconut, plantations) in particular due to the fact that it is rich in nitrogen, and potassium, and phosphoric acid.

1.2 Significant Coastal and Marine Features

Cambodia's coastal features are significant due to their contribution to the coastal area's biodiversity, productivity. The functions of mangroves, coral and coral reefs, islands and estuaries are presents their value to the national economy.

1.2.1 Mangrove Forest

The mangrove forest of Cambodia has an area of 83,700 hectares; it represents 0.7% of the country's total land area (Mekong Secretariat and LUMO, 1992).

From an ecological point of view, mangrove forests are well known for their high biological productivity and are significant for their input of nutrients into nearby systems. They support valuable estuarine and near shore fisheries; act as nursery and breeding grounds for many economically important fish and crustaceans; reduce surges and strong winds associated with storms; protect erosion of riverbanks which

in turn prevent adjacent properties; and harbour unusual wildlife which provides valuable opportunities for education, scientific study and tourism.

In Cambodia's coastal forests, there are 35 families, 53 genera, and 74 species including plants that occur at the limit of salinity influence (Chhun, 1993). The combination of these is to maintain a diversity of biota which is not only significant for the conservation of biological diversity but also has direct economic significance on Cambodia and all other countries situated around the Gulf of Thailand. The coastal forests which are located in the catchments of the main rivers, as said, have long been important in the protection of the soil and the regulation of the flow of water and nutrients to the nearby coastal water.

1.2.2 Estuaries

Cambodia has two main estuaries which occur in the region around Koh Kong province and near Kampot province. The estuaries are namely: Kaoh Poa and Kep river. Scott, 1989, describes the estuary systems as a complex of tidal channels and creeks, low island mangrove swamps, tidal mudflats and coastal lagoons. Both rivers originate in the Cardamon range and discharge their flow in the Koh Kong Bay. The Bay is protected from south-west storms by the large island of Koh Kong. These estuaries are often highly productive areas due to the nutrients they receive from the land and the sheltered environment that they provide.

There are significant mudflats areas in Cambodia characterised often associated with estuaries. The main ones are situated adjacent to mangroves. Mudflats serve as a habitat for very productive systems such as high diversities of invertebrates living on and the mud, in particular molluscs, crustaceans a variety of worms, and waterbirds. During low tide different birds feed on the biotic community and during high tide, various vertebrates such as fish, shrimps, crabs and molluscs forage for food on the mudflats.

Due to tidal effects, materials that come in to an estuary take time to be drawn out to sea. This forms the basis for to build up of nutrients and for estuaries to be regarded as nutrient traps of high productivity.

1.2.3 Coral Reefs

In the Cambodia Sea, the coral and coral reefs are the most productive of the marine ecosystem. They are found almost surrounding the islands in the Cambodia sea (see map 3). However, there is limited information on the distribution of the types of the corals and coral reefs.

Recently, some of the many species of coral on the reefs in the Cambodia Sea have been identified as: Sarcophyton, Dploria, Pocillopora, Fungia, Hydrophora Rigida, Moutiphore Aequituberculata, Favita, and Platygyra (Ouk, 1995).

1.2.4 Seagrasses

Seagrasses are found in the Kampong Som Bay and around some islands in Kampot and Koh Kong provinces (see map 3). Some of the species of seagrass have been identified as: Tropical Eelgrass (*Enhalus acoroides*), Fibber, Stand grass (*halodule pinifolia*), Syringe grass (*Syringodium isoetifolium*), and Dugong grass (*Thelaria hemprichii*) (Long, 1995).

From an ecological standpoint, seagrasses are known to:

- contribute nursery areas, shelters and feeding sites for a large number of invertebrates and fish;
- give a significant proportion of the nutrients produced and transferred to adjacent ecosystems such as the coral reefs;
- prevent erosion by stabilising sediments and dampening wave movements.

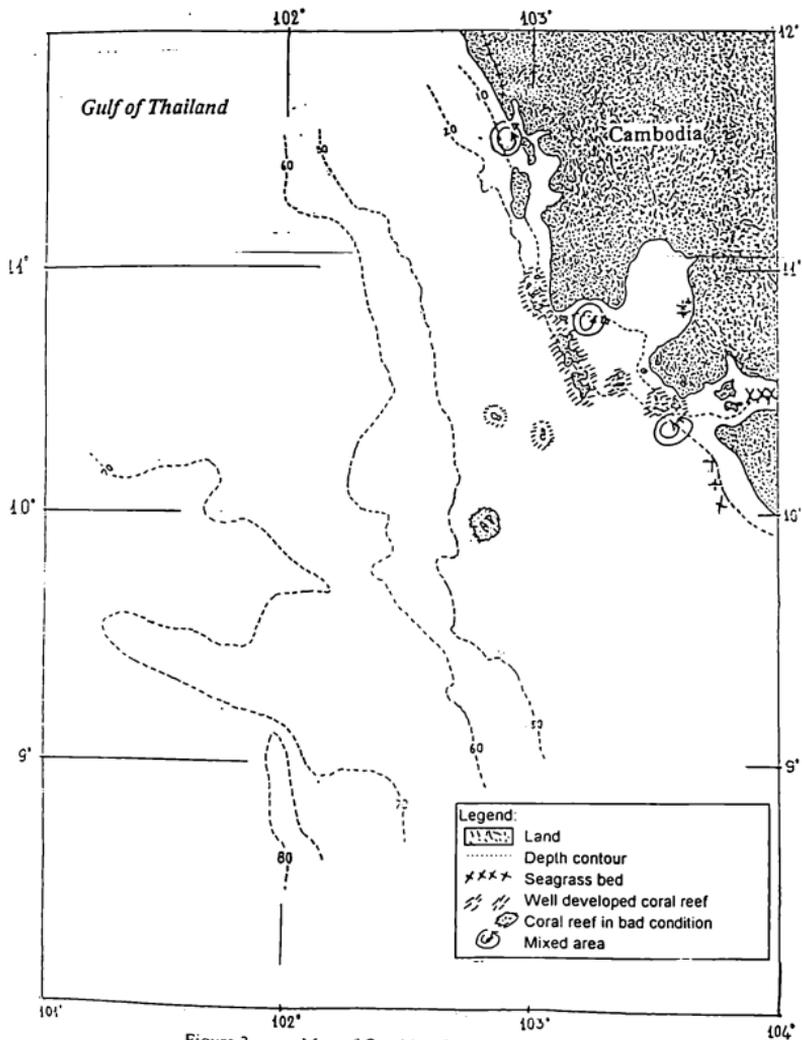


Figure 3 Map of Coral Reefs and Seagrass Beds

Source: LUMO, MoAFF, 1995

1.2.5 Oil and Gas

At present, several zones in the marine and coastal area have been explored and will continue to be explored for oil and gas. The country's economy may be dominated by the oil and gas sector if these resources are found in sufficient quantities in the offshore areas. Petroleum experts are of the opinion that Cambodia has a high potential for natural gas and a modest potential for oil. Tentative estimates suggest that Cambodia's potential is of 1.5 to 3.5 trillion cubic feet of gas, and 30 to 180 million barrels oil (MoE/UNDP, 1995).

1.3 Socio-Economic Features

This section will highlight the socio-economic concerns of the coastal region of the Kingdom of Cambodia.

1.3.1 Population and Employment

Cambodia has an estimated population of 10.4 million in 1995, (PADCO, 1995). By the year 2000, it is expected that the population will reach 14.6 million.

With 7.5% (675,000 people) of Cambodia's inhabitants now recorded as living in the coastal provinces, the population of the coastal region has grown rapidly over the last year, but more than 80% of the people still live in the rural inland areas (Sir. William, 1994). In particular, 77% of people live in Koh Kong; 58% in Sihanoukville and 95% in Kampot provinces.

The population growth rate has been increasing during the last 20 years after the civil war. From 1993-1995, the highest growth rate populations were in Koh Kong province (4.6%); in Sihanoukville (2.7%); and in Kampot province (-0.6%) (Provincial Offices of Planning, 1994, and 1995).

In the coastal area, the average density of population is 79 people per square kilometre with household sizes between 5 and 6 persons per dwelling in the urban areas and slightly more than 5 persons per dwelling in the rural areas.

Similar to the country as a whole, approximately half of the population is under 18 years of age. About 39% of the population is in the labour force. Of these 2.3% were openly unemployed (Ministry of Planning, 1995). Approximately 90% of the people in the Sihanoukville and Koh Kong are ethnic Khmer and the other are Vietnamese, Chinese, Cham, and Thai. For Kampot province no information was available.

1.3.2 Institutions and Legislation

The Royal Government of Cambodia (RGC) was established by elections supervised by the United Nations Transitional Authority of Cambodia (UNTAC) in May 1993. The new Government institutions have been created with King Norodom Sihanouk as head of state.

The Council of Ministers with responsibility over National Defence; Foreign Affairs; Post and Communication; Public Works and Transport; Environment; Agriculture, Forestry and Fisheries; Tourism; Economics and Finance; Commerce; Information and Press; Education, Youth and Sports; Justice; Labour and Social Welfare; Health; Rural Development; Industry, Mining and Energy; Religion Affairs; Culture and Fine Arts; Planning; and Interior.

The country is divided into Provinces and Municipalities. The provinces are divided into districts and communes. The Municipalities are divided into Khan and Sancat (Constitution, 1993).

The Ministry of Interior has taken direct responsibility for the supervision and functioning of the 19 provinces and two municipalities (Sihanoukville and Kap City). External services of the operational Ministry are now receiving functional direction from their respective ministries from Phnom Penh city. The governor (and his office) is the administrative and political representative of the central Government in the province.

The country's highest court is the Supreme Council chaired by the King. The Supreme Court shall be established by an organic law which shall determine its composition and function.

The Ministry of Environment (established in 1993) is at present responsible for environmental management in the country. The Government has already recognised the importance of the environment for the future development of Cambodia. Recent studies, however, note that there are many agencies that have been established at various levels, some concerned particularly with respect to coast area management: highly sectoral and insufficiently co-ordinated efforts; overlapping or duplication of statutory responsibilities.

Because the Ministry of Environment was recently established, the existing legal authority is inadequate to ensure acceptable levels of environment quality and administrative agencies have yet to implement their full legal power through their proper translation into relevant rules and regulations.

The public awareness of the importance of the environment is poor. However, step by step this can be improved by environmental education in the primary schools at all levels. This is very important in regard to coastal issues. Today, non-government organisation(s), United Nations and Environment

Programme (UNEP), United Nations and Development Programme (UNDP) can play an important role in needed educational endeavours.

1.3.3 Economic Performance

The main feature of the economy of Cambodia is the dominance of the agriculture, industry and services sectors in terms of contribution to gross Domestic Product (GDP). The contribution to GDP by industrial origin from 1990-1995 indicated that GDP had increased at an annual average of 5.9% in real terms between 1990-1995. GDP growth in 1990-1995 was led by dynamic expansion in the industry and services sectors of 10.9% and 8.3% per year. The 2.6% average annual growth in the agricultural sector as a whole meant that agricultural production per capita declined (Ministry of Planning, 1995).

With regard to the coastal region, there is very little information available concerning the provinces' economic activities. However, in 1994, Koh Kong's GDP was reported to be USD. 1.03 million of this, 52% is attributable to the industrial sector, with 18% services sector, and 30% to agriculture (Provincial Department of Finances and Economics, 1995). For Sihanoukville and Kampot provinces, it has not been possible to obtain GDP data.

1.4 Coastal Economic Activities

1.4.1 Agriculture

The agricultural sector plays an important role in the economy. The main agricultural crop is rice. This sector is the largest source of employment accounting for approximately 80-85% of the labour force which contributes 63% to agriculture is share of the GDP while livestock and fisheries 24%. Forestry contributes 10% and (World Bank, 1994).

The coastal land area covers 17,237 square kilometres and represents 9.5% of the country with a population of 675,927 equal to 6.7% of the country's total population (Ministry of Planning, 1995). Rice production from 1991 to 1995 represented in Table 1 below:

Table 1: Rice Production by year in the Coastal Provinces (T)

| Year | Coastal provinces | | | |
|---------|-------------------|---------------|----------|---------|
| | Kampot | Sihanoukville | Koh Kong | Total |
| 1990-91 | 194,000 | 17,000 | 9,000 | 220,000 |
| 1991-92 | 147,000 | 15,000 | 8,000 | 170,000 |
| 1992-93 | 123,000 | 12,000 | 5,600 | 141,500 |
| 1993-94 | 128,000 | 63,000 | 6,000 | 197,000 |
| 1994-95 | 134,000 | 12,300 | 6,000 | 460,000 |

Source: Provincial Departments of Agriculture, 1995
(Kampot, Sihanoukville, and Koh Kong)

1.4.2 Fisheries

The fisheries of Cambodia are broadly categorised into the artisanal and commercial sectors and contribute 5% of the GDP (World Bank, 1994). Fish production comes from inland, marine and aquaculture sources. The inland fisheries is Cambodia's most important fishery in terms of both production and value. Marine fishing is less developed but represents significant potential for growth.

The total commercial fisheries output between 1990 and 1992 averaged 113,500 tons per year, of which 70,000 tons (61%) were inland fish; 37,000 tons

(32%) marine fish; and 7,000 tons about (6%) aquacultural products (Fisheries Department, 1994).

Since 1990 to 1994, marine fisheries production has decreased from 39,900 tons to 30,000 tons. The decrease in marine products was reportedly due to over-fishing, destructive fishing methods, and depletion of fish habitats.

Approximately 10-13% of the total national fish catch was exported from 1992 to 1994 (DOF, 1995). However, more than half of the marine caught fish in Koh Kong (67%) and Sihanoukville (52%) were exported in 1994. Kampot province exported only 13% (DOF, 1995).

1.4.3 Aquaculture

From 1984 statistical data was collected separately for culture fish production and showed an annual average growth rate of 28% per year between 1984 and 1992 (Fisheries Department, 1992). It appeared to have good prospects in terms of fish production and economic contribution to Cambodia.

These activities consist of small-scale fish ponds and cages totalling an area of 430.70 ha and 1386 cages (Chheng, 1993). The Department of Fisheries identified 840 ha of potential coastal sites for shrimp farming. Among these are 238 ha in Koh Kong province which are currently under operation, 177 ha are under construction and a further 425 ha have been licensed but are not yet built. Most of these areas identified for development lie in the inter-tidal mangrove forest.

1.4.4 Mangrove Harvesting

Mangroves have been exported on a limited scale for several uses in Cambodia. There are no known serious conflicts among users.

In 1992, the 300 kilns were producing charcoal 24,000 tons of mangroves. Approximately 100,000 tons of mangrove timber is yearly exported to foreign countries, in particular Thailand. During 1992 the Government has made a contract to provide 10,000 tons of mangrove timber with a Taiwan Company (Chheng, 1993).

In 1993, it is estimated that approximately 30% of charcoal product was for local domestic use and 70% for illegal exported. It was reported that 244 large size kilns were producing charcoal. An average size kiln of 6 meters diameter can convert 45 tons of mangrove wood into 15 tons of charcoal in one month (Ministry of Environment, Mangrove Working Group, 1994).

From these harvesting practicing point of view, mangrove forests are now under embedded threats to the environment. The Ministry of Environment together with the Ministry of Agriculture, Forestry and Fisheries should take steps in place to regulate and control mangrove forests in order to ensure balance between the economic interests and the environment protection.

The coastal inland forests are not exploited for commercial purposes but some forests have been cleared and converted to sites for housing and industrial projects.

1.4.5 Industry

In general, the industrial sector has been less developed within the coastal region. However, in the whole country, it is noted that manufacturing GDP (at constant prices) increased by 7.0% annually over the period of 1991 to 1995, despite starting from a small base. The annual growth of industry as a whole was significantly higher at 11.4% due to the much higher rate of expansion of the construction sector, at 16.1% a year.

As a result, the industrial share of GDP was 18.7% in 1995, with manufacturing accounting for 7.4%, mining 1.2%, electricity and water 0.2% and construction 9.8% (Ministry of Planning, 1995).

There have been so far some small factories or plants constructed in the coastal region of Cambodia, namely: a brewery, oil and gas refineries and factories, a saw mill, a plywood factory, a silica mine, a cement plant, a salt recovery, industry, and phosphate fertiliser plant. However, some of these industries are non-operational at the present time due to a shortage of financial and technical assistance. Others are still in operation including the brewery, the plywood, salt recovery and the industry.

1.4.6 Tourism

Cambodia is still limited in the development of tourism compared with other countries in the region but the beaches of the coastal areas are important recreational areas. The pristine beaches, blue seas, offshore coastal provinces with many islands, shallow water, and easy accessibility make some of the beaches, in particular Sihanoukville, Kampot/Kep, and Koh Kong ideal for picnics, walking, bathing, swimming, some fishing and other water-based recreational activities. The adjoining forests give shade and resting places. The more important, and most accessible and popular beaches get crowded during weekends and public holidays with local people as well as foreign visitors. The number of tourists in the three coastal provinces in 1995 has been estimated at 110,206. Among these 90,000 were in Kampot; 16,206 in Sihanoukville; and 400 in Koh Kong (Provincial Offices of Planning, 1995).

It is noted, therefore, that pure tourism arrivals for the whole country was 176,617 in 1994. An approximately 9% growth in tourism arrivals in Cambodia are Japanese, Taiwan and Chinese. This indicated that positive growth in the potential tourism development sector in the country.

French, Chinese, American, and Japanese constitute the main source of international tourists to Cambodia with American and Europeans showing strong growth from 1993-1994. It was estimated that during the first nine months of 1995, approximately a 22% increase would occur, corresponding to the same period in 1994 (Ministry of Tourism, 1994).

1.4.7 Ports and Shipping

Sihanoukville and Phnom Penh Ports are the main ports of Cambodia. One other in the Koh Kong province is involved in international trade with Singapore and Thailand.

Sihanoukville port is the most important port of entry for sea going traffic with offers port facilities of 10,000 to 12,000 dwt. The transit warehouse and the container freight station are situated within the port area's approximately 21,600 square kilometers. The income was USD. 5.7 million in 1994 (Port Statistics, 1994).

Phnom Penh port is a river port, located at the confluence of the Mekong and Tonle Sap River. It can discharge an average of only 200-250 tons a day (Curtis, Grant, 1990). The port has 12 warehouses for 7,032 tonnes of cargo.

Koh Kong port can be accessible for vessels up to 300 tons at the dock or 500 tons at anchorage. This is port used for linking the vessels entering to Cambodia from Singapore, Malaysia and Thailand. The 300 tonne vessels can proceed across the Bay to Koh Kong town for loading to smaller ships, (Leng, 1995).

There are three vessels in the national merchant fleet with a total displacement of 3,558 Gross Registered Tons (GRT). Among these one is a cargo carrying ship that is 71 years old and its total displacement is 998 GRT. The other

two ships are miscellaneous with ages of 23 years (Lloyd's register of Shipping, 1993).

1.5 Summary

Cambodia's coastal region including its marine and coastal water resources, is important to the support of economic sectoral activities such as marine fisheries, seaports, industry, tourism, and transportation. However, these waters have not been used in a sustainable way. Therefore a new concept of sustainable development and management needs to be established in Cambodia.

Chapter 2 will present the Coastal Sihanoukville Region as an example of a coastal area in the Kingdom of Cambodia for further examination on the application of sustainable development management concepts.

CHAPTER II
THE COASTAL SIHANOUKVILLE REGION

This chapter focuses on the coastal Sihanoukville region and describes the local geographical area, the human activities and the initial land use zonings for the region.

2.1 Sihanoukville Region

2.1.1 Geographical Description of Sihanoukville

Sihanoukville is a coastal municipality situated in the far south-western part of the Kingdom of Cambodia. It is bounded in the north by Koh Kong and in the east by Kampot province. On the south and west is the Gulf of Thailand (see map 4).

Sihanoukville has an area of 868 kilometres and consists of three districts. The town of Sihanoukville sprawls along its main arteries in a linear, low density fashion. There are no identifiable central business districts but there are three zones of development which can be identified: an administrative area; an industrial area located close-by the port; and a large area of housing, commerce and tourism located along the coast.

The city of Sihanoukville lies on several small undulating hills ranging from 42 meters to 100 meters in height. Fifteen kilometres outside the city lies Kang Keng airport on a broad flat plain. To the south and west of the airport there are shallow

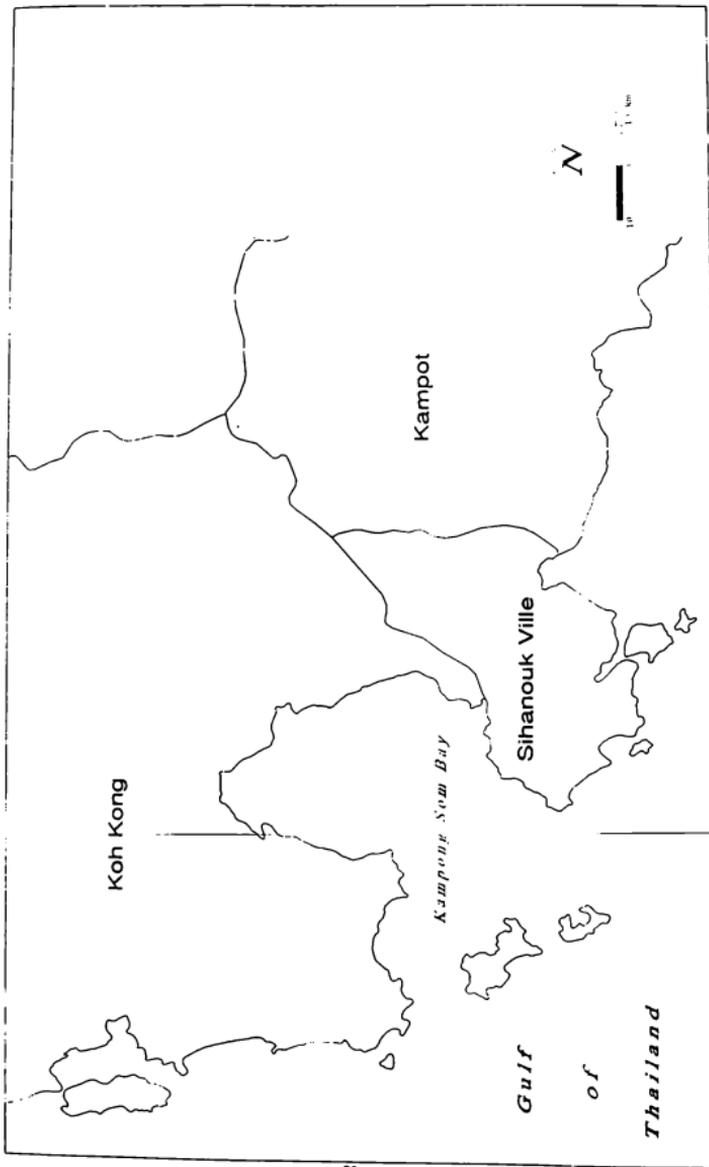


Figure 4 Map of Sihanoukville and Vicinity
Source: UNDP, 1992-94

wetlands and rice fields. The eastern side is dominated by a high mountain and Ream National Park.

The Sihanoukville coastline consists of approximately 40 kilometres of undeveloped beaches. It winds unevenly with frequent bays and long narrow white sandy beaches. There are numerous islands of varying size lying off the mainland, including Koh Pous.

The Sihanoukville region is furnished with fresh water from two large rivers the Teuk Sab and Kampong Smach.

2.1.2 Climate

The climate of the Sihanoukville is related to the monsoon periods. The average daily temperature in Sihanoukville in 1994 was 27.1 degrees centigrade peaking at 28.4 degrees centigrades in April, the hottest month, and falling to a minimum of 26.1 degrees centigrade in January, the coolest.

Sihanoukville is in one of the provinces where largest precipitation. Rainfall is on the ascent from May (424 mm), peaking in June (994 mm), oscillating during July (492 mm), and August (574 mm) before rising again in September (743.9), The low precipitation rates are in November (63.5 mm) through to April (199.2) indicating clearly the sharp fall during the north-eastern monsoon. The average rainfall is 333.3 mm (The Ministry of Agriculture, Forestry and Fisheries, 1994).

2.1.3 Population and Density

According to the latest census in 1995, the population of Sihanoukville was 121,000 inhabitants: Sihanoukville proper - 47,000; Stung Hau - 10,500 and Prey Nap district - 63,000 people, corresponding to a population density of 138 inhabitants

per sq.km well above the national figure of 52 persons per sq.km. Table 2 shows the population growth in Sihanoukville.

Table 2: Population and growth rate in Sihanoukville, 1980-95

| Municipality | Population x 1000 persons | | | | | | Av.gr.rate/year 1993-95 |
|---------------|---------------------------|------|--------|--------|--------|--------|----------------------------|
| | 1980 | 1987 | 1992 | 1993 | 1994 | 1995 | |
| Sihanoukville | 51.0 | 61.0 | 1,07.0 | 1,14.0 | 1,21.0 | 1,20.0 | 2.7 |

Sources: 1. Ministry of Planning, 1994

2. Sihanoukville, Offices of Planning, 1995

Note: av.gr.rate- average growth rate/year

Approximately half of the population in Sihanoukville is under 18 years of age (UNDP, ILO, 1993). In Sihanoukville about 90% of the people are ethnic Khmer. Vietnamese represent 1.8%, Chinese 2.2%, and Cham 6% (Sihanoukville, Department of Planning, 1995).

2.2 Human Activities in the Coastal Sihanoukville Region

2.2.1 Agriculture

There are approximately 20,000 ha of agricultural land in Sihanoukville. The land cultivated decreased by 43% between 1985 and 1993 as indicated in table 3 below:

Table 3: Estimated Area of Agriculture Land in Sihanoukville, 1985-93

| Years | Estimated Area of Agriculture land (ha) |
|---------|---|
| 1985/87 | 35,300 |
| 1990 | 33,889 |
| 1991 | 22,672 |
| 1992/93 | 20,000 |

sources : 1. Cambodia Land cover Atlas (UNDP/FAO, 1987, 92, and 1993)

2. Sihanoukville, Agriculture Office, 1991

Table 4: The land use for agriculture products in Sihanoukville

| Types of crop | Area (ha) | % of total |
|--------------------|---------------|------------|
| Annual plantations | 12,848 | 79 |
| - paddy fields | 11,240 | 69 |
| - other crops | 1,608 | 10 |
| Industrial land | 2,149 | 13 |
| - industrial land | 1,000 | 6 |
| - rubber | 549 | 3 |
| - fruit crops | 600 | 4 |
| Grass land | 1,300 | 8 |
| Total | 16,297 | 100 |

Sources: Sihanoukville, Agriculture office, 1990

Note : data does not include Prey Nup district

Rice crops in Sihanoukville are naturally grown for consumption in the people and are considered to be the predominant production crops. In 1994/95 the total rice production was approximately 12,300 tons harvested from an area of 9,500 ha. However, in 1993/94 the rice harvested was only 6,300 tons harvested from areas of only approximately 60% of this size due to a decline in harvest areas available due to droughts and floods. On other reason, people are interested in performing more work associated with the expanding tourism industry because of they make economic survival sensitive to the tourism aspect (Sihanoukville, Agriculture office, 1995).

The other crop productions like corn, black pepper, durian, and pineapple are also produced in Prey Nup, Stung Hav Districts, and Mitaheap Khan in the Sihanoukville.

2.2.2 Fisheries

Like other coastal provinces, the commercial and artisanal fishery in Sihanoukville is carried out in inshore and offshore areas within the territory of Cambodia's Sea. There are many types of fishing gear used to catch fish in the coastal Sihanoukville region. The primary fishing gear used are namely: purse seiner, otter trawler, driftgillnetter, set gillnetter, bottom gillnetter, encircling gillnetter, trapland liner, engine boat push netter, and boat seine. In 1995, there were approximately 1,243 vessels. Among these 432 were not motorised and all of these were less than 5 gross tons. Eight hundred and twenty were motorised with engines of less than 10 hp., (Fisheries Department, 1995). All vessels are comparatively small and are family owned. Boats with motors are used to fish further offshore using purse seining, trawling, gillnetting, squid trapps, push netting and long living (APHEDA, 1995).

In 1995 the volume of employment in the Sihanoukville fishing sector was 2,635 fishermen (about 755 families), representing 15% of the region's total employment (Fisheries Department, 1995)

The fish production estimates of Table 5 from 1988-1994, indicate total fish production at 60,625 tons. Of this 60,410 tons comes from fish caught and 215 tons comes from aquaculture production.

The domestic price for marine fish is approximately USD. 0.2-0.3/kg and the price for commercial marine fish for export is USD. 3-6/kg (FAO Mission, 1993). In 1994 more than 52% of the marine capture production of Sihanoukville was exported (see table 6).

Table: 5 Fish Production from 1988-1994 (T)

| Municipality | Years | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|--------------------|-------------|-------|-------|-------|-------|-------|-------|-------|
| Sihanouk -ville | fish cap. | 7,890 | 9,120 | 9,300 | 8,300 | 8,600 | 8,560 | 8,700 |
| | fish aquac. | 15 | 50 | 57 | 30 | 13 | 15 | 35 |

Source: Fisheries Department, 1995

Note : cap. capture; aquac. aquaculture

Table 6: Fish Capture Exported from 1992-94

| Municipality | Years | Exported (T) | % Exported |
|---------------|-------|--------------|------------|
| Sihanoukville | 1992 | 6,100 | 71 |
| | 1993 | 4,093 | 48 |
| | 1994 | 4,528 | 52 |

Source: Fisheries Department, 1995

2.2.3 Industry

In Sihanoukville, the various types of industry include:

- Brewery
- Oil and Gas refineries and storage facilities
- Ice factory
- Saw mill
- Plywood factory
- Other handicraft and small-scale industry

The Brewery is located on the river just outside the Municipality of Sihanoukville. This beer can be purchased throughout the country. It is noted that all the wastes discharged from this industry are released directly into the adjacent rivers (fishermen, and local people reported, 1995).

The Oil and Gas refineries and storage facilities north of Sihanoukville port were set up in 1967 to refine imported crude in a facility with an annual capacity of 600,000 tons. The refinery was expected to process 400,000 tons in 1969, and to achieve annual exports of 120,000 tons of naphtha and fuel oil. Currently, Shell Oil

is leasing the site for use only as a storage and distribution facility for oil and gas. Oil and gas is distributed nation-wide via trucks from the Sihanoukville petroleum storage facility.

The Plywood factory is located along the Prek Teok Sap river bank. It covers an area of 17 ha and employs 400 local workers. It is run by a Taiwanese company. The factory produces 3,500 cubic meters of plywood/month of which 95% is exported to China and Taiwan (Sihanoukville, Office of Planning, 1995).

Within the small-scale industry, there are 233 handicrafts. They include sewing, bakeries, brick making, fish steaming, shrimp processing, sewer line and jar making, steel door factory, wood processing, fish source production, and purification of drinking water.

2.2.4 Sihanoukville Port

The Port of Sihanoukville is located in the south-east part of Cambodia. It was constructed in 1950 and 1960. The port has a well developed deep sea access which handles approximately 40% of Cambodia's total port tonnage (500,000 tons). In 1994, the port had a total throughput of 522,000 tonnes with a vessel turnaround of 403 vessels and 21,186 containers.

Sihanoukville's oil terminal is also a part of this port, located 9 kilometres from the commercial port. This terminal, today, is operated by the Cambodian Fuel Company (CFC) and Shell to import refined oil from Singapore. This terminal has a storage of 60,000 cu.m capacity in operation and 80,00-100,000 cu.m (Diss. Leng, 1995).

A total employment of 1,009 people work for the port authority. It is estimated that in 1993 the combined total commodities passing through this port consisted of 68% import and 32% export (Diss. Leng, 1995).

Sihanoukville port revenue in 1994 was distributed 61% to stevedoring; 14% to warehousing and port dues; and to 25% pilotage (Diss. Leng, 1995).

2.2.5 Tourism

Tourism is an activity which is increasing in importance in the region. Current studies, noted that tourism demand is dominated by domestic tourism, resident Cambodian nationals, NGO-persons and expatriates working in Cambodia.

In 1995, approximately 16,206 tourists were expected to visit Sihanoukville region (Provincial Office of Planning, 1995). It is expected that 10% of the profit made by the private tourism industry will go to the provincial government, mainly through taxes (PADCO, 1995).

2.2.6 Coastal Conservation and Protection

Like other provinces, one of the national parks in coastal Sihanoukville was established by HM King Norodom Sihanouk's Decree concerning the creation and designation of protected areas on 1 November, 1993 (see Royal Decree in appendix 1).

In the Park there are four subdistricts namely Ream-Bot Rrong, Boeng Taprum, Onha Heng and Ochrou and 23 villages. Under the decree this park is directly managed by the Department of National Parks and Protected Area System Management under the responsibility of the Ministry of Environment.

The park is named Preah Sihanouk National Park (Ream) and it covers a land area of 15,000 ha. A full biological inventory of the park has not been undertaken. A vegetation and land use map is currently under preparation by IUCN and MoE (IUCN and MoE, 1995).

Human activities in this park include farming, fishing, logging, and charcoal production. The nature and extent of community use are dependent on the area's natural resources. The extent of these future uses will depend upon the analysis by the park planning team. This analysis will define more clearly the nature, dependence and impact of various user groups regarding the natural resources (IUCN and MoE, 1995).

2.3 Socio-Economic Profile

The Socio-economic profile is only available for Cambodia as a whole. Sihanoukville is dominated by the port and to a lesser extent by the Cambrew brewery. However, unemployment levels are high. Primary sources of employment include fishing, trade, and logging. The percent estimates of 1995 employment by sector in Sihanoukville are shown table 7 below:

Table 7: Employment in Sihanoukville, 1995

| | |
|--|-----|
| 1- farming | 45% |
| 2- trade and business and Enterprises | 25% |
| 3- fishing | 15% |
| 4- government official | 15% |

Source: Sihanoukville, Department of Finance and Economics, 1995

According to United Nations Children's Fund (UNICEF), the per capita income was approximately USD. 160 in 1992. In 1994, the United Nation Development Programme (UNDP) estimated that it had increased to USD. 252 ranking Cambodia as number 114 of 173 countries (173 having the lowest per capita income). The figures from Sihanoukville city show that the majority of the population are in the middle income bracket. The upper income (business people, politician) constitutes 13%; middle income (public servants, petty traders) 48%; and lower income 39% (Ministry of Interior, 1994 cited in PADCO, 1995).

2.4 Sihanoukville National Planning Development

2.4.1 General status

Sihanoukville is a typical coastal region, in the sense that there are demands for various production, services, and activities that the region and its environment can fulfil. On the other hand, Sihanoukville can be considered a multiple use resource and economical region for national and international economic development.

In the short term, development of the region will face large demands for urban expansion such as a new residential areas, industrial areas, port city centre, tourism locations, and expanded airport facilities.

The Royal Government's goals for Sihanoukville originally planned for economic development in Cambodia through the rebuilding of tourism, industry, and the expansion of the deep water port.

The Royal Government has already established initial land use zonings for Sihanoukville development through direct research by expert teams with a Sub-Committee for Land Management and Urbanisation under the responsibility of the

National Committee for Land Management and Urbanisation. However, it is noted that the Master Plans are still with the Government and Assembly for approval.

The zonings and the land use (see map 5) have led to the definition of clear and coherent zones as below:

- # Zone 1- Port
- # Zone 2- Industries
- # Zone 3- City Centre
- # Zone 4- Residential
- # Zone 5- Tourism
- # Zone 6- Airport
- # Zone 7- Land Reserves

Source: Ly Chin Tornq, 1995

2.4.2 Description of Plans

The development plans for Sihanoukville are still under preparation by the National Committee for Land Management and Urbanisation co-operating with the Municipality. Some of the plans are involved directly with ministries to research and response but for decided planning development must be approved by government.

2.4.2.1 Port Development Zone

The extension of the existing port zone is required to permit the expansion of the port and to include a customs zone and a free trade zone. The maximum area required is 140 ha of which 60 ha are proposed for reclamation from harbour.

The Petroleum Port, the discovery of layers of oil and gas demands the creation at the refinery site of a petroleum port. A total extent: 600 ha on land + 400 ha on sea eventually.

The Port Development Zone is now under the responsibility of the Ministry of Public Works and Transport. Lloyd's of London, 1995 reported that Japan's International Co-operation Agency has signed a contract with the Cambodian government to carry out a feasibility study on the development of the southern deep seaport of Sihanoukville. The government and Japan signed a contract for the study for 15 months, which they expect to start by early next year.

2.4.2.2 Industrial Development Zone

The industrial development zone was established in the Stung Hav district of Sihanoukville called "Stung Hav - Sihanoukville Industry Zone" (sub-decree No 73, 1995). It is a special industrial development zone which includes general industry activities, export processing industries, free industries, and all other services to assist in the exploitation and production of the area.

The industry development zone covers approximately 1,150 ha. This area is under study and the responsibility of the Ministry of Industry, Mines and Energy.

2.4.2.3 Tourism Development Zone

Two coastal zones are designed for tourism use in the Sihanoukville area:

Zone 1 covers a total land area of 321 ha, extending to the north beyond the security area for the petrochemical industries.

Zone 2 covers 555 ha, extending to the south of Ochhoeu Teal to the southern end of Phar Ream (Ly Chin Torng, 1995).

The proposed study zones are now under the responsibility of the Ministry of Tourism and a Malaysian company. At the end of 1995, tourism expansion in Sihanoukville was approved by the Royal Government as follows:

1. Three major developments for the south-west port-resort area of Sihanoukville. All three projects form part of a USD. 1.3 billion casino resort and infrastructure investment by Malaysia's Arison Sdn. Bhd Company.

2. A USD. 15 million renovation and expansion of the Independence Hotel, to be completed by the YTL corporation of Malaysia, to be completed by 1997 (Ministry of Tourism, 1995).

2.4.3 Rules for Protection of Port, Industry, and Tourism zones

The following directions for the development of these zones article 11 and 12 of sub-decree of zoning and administration of Sihanoukville promulgated that:

2.4.3.1 Port and Industry Zones

- To prohibit (solid) waste discharges in the sea, and of wastewater without treatment.
- For the petroleum port, to provide security arrangements to prevent the discharge of oil in the event of an accident.
- To require the installation of equipment for treatment of wastes, atmospheric emissions of toxic gases or pollutions.
- To require appropriate measures to eliminate industrial waste discharges.
- To provide clear roadways specifically for the zones, which are independent of road number 4.

2.4.3.2 Tourist Installations

- Conceived to accommodate foreign tourists, these installations will have to meet international standards, as to the level of rules of safety and sanitation for the facilities and the grounds of these premises.
- The opening of these installations to the public is subject to obtaining certificates of compliance.
- The construction of new hotels will not be permitted outside tourist zones or mixed zones (Tourism and Housing). The using of solar energy for these facilities, will be recommended for the production of hot water and for air conditioning.

2.5 Summary

Agriculture, tourism, the seaport, industry, and fisheries, play an important role in the local economic communities in the Sihanoukville region as in the national economy.

For the development of Sihanoukville to be sustainable, policy recommendations and a management structure will be needed. Effective policy and management processes will be required to preserve and protect the national resources and pristine coastline.

Chapter 3 will consider and analyse the integration of environmental considerations on Sihanoukville coastal development.

CHAPTER III
INTEGRATING ENVIRONMENTAL CONSIDERATIONS INTO THE
SIHANOUKVILLE COASTAL DEVELOPMENT

This chapter presents the current coastal and marine environmental issues, problems and their causes in the coastal Sihanoukville region. It discusses the possible impact from new national planning for development of this region. Planned development activities include port expansion, increasing tourism, and oil and gas industrial development and expansion. Finally, conflicts between those activities will be discussed and identified.

3.1 The Current Coastal and Marine Environmental Issues and Causes

There have been different types of issues and problems affecting the coastal and marine environment in the Sihanoukville region. These are problems caused by the human activities of the local community effort and national economic development.

3.1.1 Fisheries Issues

Baseline information on the marine resources of this region is poor. No reliable records on the composition of fish species in catches, or on stocks are available (MoE and UNDU, 1994). However, inshore fish stocks in Sihanoukville have been declining as a result of various factors, including:

1. overfishing,
2. use of harmful traditional methods,
3. ineffective enforcement of fisheries law, and
4. data collection problems

3.1.1.1 Overfishing

The reports by fishermen and DOF indicate that fish stocks inshore in Sihanoukville's waters may be over-exploited. Poor fisheries management exists, with no restrictions on the number of fishing vessels, or fishing licenses issued. Fish stock depletion is indirectly evidenced by fishermen selling their vessels in Sihanoukville showing that it is no longer economically viable to earn a living from fishing in inshore areas. Fish catches, as shown in Table 5, have decreased steadily since 1990.

Another reason for stock depletion is likely related to the fishermen using gear, such as push nets and drag nets, in sea grass areas which depletes the stocks of juvenile fish and destroys the sea grass ecosystem which is so vital to the existence of many fish species. The degradation of juvenile fish stocks has a direct impact both on the future inshore and offshore mature stocks.

3.1.1.2 Use of harmful traditional methods

The use of harmful traditional methods for fishing, such as dynamite, fish poisons or intoxicants, have also affected fisheries production. The use of these methods in the inshore areas, has resulted in the destruction of coral, mangrove, and wetland areas. These methods can destroy the important breeding grounds for the fish as well as the entire ecosystem needed to support the entire life cycle.

3.1.1.3 Ineffective enforcement of fisheries law

The institution and the enforcement of fisheries law to manage, monitor and control fishing activities is weak. This is due in part to the lower financial salary of governmental officials, and the lack of human resources trained in fisheries management responsibilities.

3.1.1.4 Data collection problems

Data and dissemination of information on fish stocks, sustainable yield and fishing grounds is either lacking or is not available to be used by DOF. This makes assessing and controlling stock very difficult.

3.1.2 Port Issues

According to interviews with officials of the port authority, one of the biggest problems is that there are no provisions for, or regulations related to, environmental protection. Further, there are insufficient reception facilities (Ly, 1996). Thus, marine pollution from activities such as cargo operations, run-off from material storage and spills from bulk cargo handling are degrading the coastal water quality and affecting marine resources with direct impact on fisheries, sea grass beds, mangroves, and human health.

Impacts of port operations on the coastal area of Sihanoukville are greater than they need to be. The main reason for this is that the government has not ratified any international conventions such as the London Dumping Convention, Oil Pollution Preparedness and Response Convention (OPRC), or the International Maritime Dangerous Goods (IMDG) Code. The absence of these in the primary legislation of the country is a major constraint in carrying out environmental protection provisions relative to the shipping and port activities in Sihanoukville.

3.1.3 Mangrove Forestry Issues

The Cambodian coast includes a remarkable mangrove forest as well as a mangroves in the wetland areas. In addition to being a valuable forest and fisheries resource, mangrove forests provide many ecological support functions such as shoreline stabilisation and storm protection. They constitute an important economic resource at both the subsistence and commercial level (David,1994).

The total mangrove forest covers approximately 13,500 hectares in the coastal Sihanoukville region. Current studies indicate that through habitat degradation, the mangrove forests have been reduced by roughly 35-40% (Touch, 1995). These mangrove forests are now still being depleted due to uncontrolled exploitation for firewood and charcoal and reclamation for rice fields.

The main causes of degradation are driven by local economic activities. Some of the factors contributing to destruction of mangrove forests are related to agriculture activities where people are clearing land by using the burning method. In addition to this mangroves are cut for wood and charcoal production.

The most serious ecological consequence of cutting mangroves is soil erosion which leads to the destruction of the soil characteristics and fertility in the coastal areas. For instance, indiscriminate cutting of mangrove forests and inland forests in adjacent, hills leads to destruction of the habitats to support biological diversity. This results from the erosion of beaches and shoreline areas, increasing sedimentation, erosion and accumulated particulate matter.

3.1.4 Coastal Habitat Issues

Degradation of coastal and marine resources in the coastal Sihanoukville region is a result of local economic activities such as using wetland areas for housing, discharge of waste disposal into coastal waters, construction of local tourism

facilities, overfishing, pollution from land based activities, and in particular from port and shipping activities have. These have resulted in a degraded inshore environment and fishery nursery grounds, and a coastal area more susceptible to damage from natural disasters such as hurricanes and storm surges.

Beach and shoreline erosion occur as a result of mining or removal of sand (silica sand) and this aggravates the effects of natural processes related to wind, currents and waves. The removal of sand and the resulting beach erosion is remarkable in the Tuk Sap (20 km, ESE of Sihanoukville), O Tres (15 km of SSE of Sihanoukville), and O Chru (East of Tuk Sap) regions.

Wildlife habitats have also been destroyed by the war by the filling of mangrove areas for housing accommodation, by pollution of marine environment and by some fishing and hunting activities, most notable perhaps, in the Prek Tuk Sap Estuary in Sihanoukville region.

The depletion of natural resources such as forests, fish, mangroves, and wildlife, which are the main coastal and marine resources within the coastal Sihanoukville region, has led to an overall decrease in socio-economic conditions.

3.1.5 Pollution Issues

The convention on the Law of the Sea, clearly establishes that pollution of the marine environment means:

“the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazard to human health, hindrance to marine activities including fisheries and other legitimate use of

the sea, impairment of quality for use of sea water and reduction of amenities” (Article 1, paragr. (4), p.98, Law of the Sea, 1991).

This definition is most applicable to the situation in Cambodia, particularly within the coastal Sihanoukville region. The increase in man’s activity will likely lead to harming living resources and marine life, being a hazard to human health, as well as hindrances to marine activities.

The high rate of growth of 2.7% per year of population in Sihanoukville represents a challenge to the country’s present and future requirements in terms of food and houses. In this regard, reclaiming the wetlands, burning the mangroves for firewood, and using them for building purposes have increased as well as appropriation of land for agriculture purposes.

The major marine environmental sources of pollution to Sihanoukville’s land and coastal waters can be attributed to four major causes:

1. transportation of oil
2. urbanisation
3. intensification of agriculture
4. industrialization

3.1.5.1 Transportation of oil

Pollution from oil spills in the South China sea may effect the Cambodian marine environment. These can be divided into three sources of pollution: accidental spills and leaks from the petroleum storage facility or during transfer of products in Sihanoukville port; spills and leaks from vessels transporting petroleum products on the way to Thailand and/or Japan; and spills, leaks and improper waste management practices from petroleum exploitation activities. With regard to the last issue, the

scale and magnitude of the potential impact from oil and gas exploration and exploitation in the seabed of Cambodia needs to be investigated and determined aiming at establishing appropriate and adequate measures to respond to eventual environment problems and accidents (Tropical coasts, 1995).

3.1.5.2 Urbanisation

In this urban locality of coastal Sihanoukville city, solid and liquid wastes are discharged into the river and carried into the sea directly. In addition, many agriculture and agro-industrial plants in the suburbs of this coastal city discharge organic residues into the coastal waterways that run into the sea. These substances are toxic to the marine plants and hazardous to fisheries.

Facilities to provide water, electricity, and sewage treatment have not kept pace with the increase in population in the coastal region. Therefore, the sea has been used for untreated sewage disposal. This practice has resulted in water bodies becoming a potential hazard to human health and marine life.

Moreover, combined stormwater and sewage goes directly into the sea, which results in a direct threat to environmental health and deterioration of the marine ecosystem, leading to a decline in biological diversity and productivity of the marine natural resources.

3.1.5.3 Intensification of agriculture

The coastal waters of Sihanoukville have been polluted by agricultural activities. The main causes are the release of pesticides and insecticides into the water. Increases in agriculture yields have been accompanied by the increase in the use of artificial fertilisers and a variety of pesticides and insecticides. This has resulted in surface and ground water contamination in this region and during periods of rainfall result in direct run-off into the inland and coastal waters.

Presently, the government, in particular the Ministry of Agriculture, Forestry and Fisheries along with the Ministry of Environment, need to take steps to regulate and establish programmes to resolve the problems arising from the use of pesticides, insecticides and fertilisers.

3.1.5.4 Industrialization

Pollution of coastal Sihanoukville from the industrial sector is relatively small in scale and magnitude compared to the problems of neighbouring nations. Most of the small scale industries and handiworks are usually found situated along the shoreline of Tumnob Rolok Sihanoukville and along streams. The direct disposal of industrial waste, particularly liquid waste from Sihanoukville's brewery, into the coastal environment is viewed as a serious issue that needs to be addressed. This liquid waste contain nutrients, phosphates, and nitrogen because of the raw materials such as water, hops, barley, corn, rice and sugar that are needed in the process.

The used lubricants from the power plant and waste oil from vehicle scrap operations in the coastal area are also being disposed of into the water.

Another example can be found along Prek Toek Sap stream in Sihanoukville where the plywood factory is located. Waste like saw dust and wood shavings are dumped into the stream and then carried downstream to the sea. Furthermore, the raw timbers are normally soaked before they can be processed. This process causes the water quality to deteriorate, increases sedimentation and depletes the life stocks within streams and estuaries.

Despite the establishment of agencies to intervene and address environmental problems that result from development, these problems still persist. With ineffective institutions and poorly implemented rules and regulations on discharge and safety

standards, industrial development has been carried out with little or no regard to the adverse impact that this may have on the natural environment.

The coastal Sihanoukville municipality's economy is in need of a comprehensive long-term strategy that focuses on improving both the physical and social infrastructure. Stimulating and enabling the population to actively participate in this process is needed and ultimately leads to sustainable and equitable progress.

3.2 The Major Impacts of new Plans for Coastal Development

Multiple use conflicts arise when one use of a resource in a marine area precludes or adversely impinges upon the use of other resources within that area by other users (Thomas, Lecture 1996). These adverse effects include physical damage to the resources, increase cost of operation due to the actions of others, and constraints on one use imposed by another.

Looking at human activities in the Sihanoukville region, development in agriculture, industry, fisheries, tourism, and the seaport are all competing for the same resources and each conflicts with the others. These conflicts are related to the proposed development in the Sihanoukville region and are identified in the following paragraphs.

3.2.1 Consideration and Analysis of the Impacts of Port Development

Under a new policy of the Royal Government, the National Committee for Land Use and Urbanisation was established in 1994. Its purpose has been to design and prepare the Sihanoukville Master Plan for national economic development. The expansion of the Sihanoukville Port is of major significance in this planned development.

As described in the last chapter, the expansion of Sihanoukville port facilities can make a contribution to the economy as a main hub for the growth of maritime transport, which should, in turn, attract manufacturing enterprises, but may also have an adverse impact on the surrounding environment.

From an environmental point of view, the effects of a new proposal for port expansion can be focused upon port location, port construction, and port operation. The environmental impacts from port location and port construction are addressed in the following sections.

3.2.1.1 Impact of port location

A). Impact on water quality

The breakwater in front of Sihanoukville port may change prevailing currents and cause the stagnation of water behind this construction. Since Sihanoukville port is located in Sihanoukville city, where dense industries exist, effluents from the city and its industries that flow into the port, may stagnate and cause dramatic plankton growth and a decrease of dissolved oxygen.

B). Impact on coastal hydrology

The location of a new port may cause a change in coastal current patterns and littoral drift due to the alteration of wave refraction and reflection. This may lead to erosion and accretion in the onshore area.

C). Impact on bottom contamination

The slower movement of water may accelerate deposition of sediments in stagnant water behind the breakwater structure and cause contamination of the sea bottom. Sediment deposition has an impact on bottom biota and their physical habitat.

D). Impact on marine coastal ecology

Aquatic fauna and flora may be affected through changes of water quality, hydrology and bottom contamination. Such changes may destroy bottom habitat and displace fisheries resources.

E). Impact on visual quality

This may be effected by the port facilities, lighting and other structure such as warehouses or tanks. These may give an unpleasant view for the local inhabitants.

3.1.1.2 Impact of port construction

A). Impact on water quality

The further expansion of Sihanoukville port is necessary for development, thus some activities are needed such as pile driving, deposition of rubble, dredging sand and other construction work in the water. These activities cause the resuspension of sediments and turbid water. The construction location may have a potential impact on coastal hydrology, bottom contamination, marine ecology, air quality, noise and vibration, as well as waste management.

B). Impact on coastal hydrology

Dredging activities may cause changes in current patterns and flow as well as allowing a salt wedge intrusion into the river mouth in the shore area. The latter may lead to further beach erosion. Disposal of dredged materials on land may possibly cause leakage of harmful substances into ground water or changes in the water front drainage.

D). Impact of bottom contamination

Construction and dredging activities may disturb bottom sediments and induce the resuspension of contaminated materials, dispersion and resettlement of

such sediments. Dredging may remove the habitat and lead to destruction of fisheries resources.

E). Impact on marine ecology

Port construction activities may cause displacement of fisheries resources and other mobile bottom biota. Dredging removes bottom biota and dumping of dredged materials covers bottom habitats. These actions may damage the ecosystems, fauna, and flora, including that associated with coral reefs.

F). Impact on air, noise and vibration

Air pollution, as well noise and vibration problems, could result from construction activities but would likely be only of a temporary water.

G). Waste management

The disposal of dredged materials on the land can cause destruction of plants, loss of vegetation, leakage of contaminated materials, an unsightly view and other nuisances to the local communities.

3.2.1.3 Sectors affected by these problems

The environmental impacts from Sihanoukville port expansion affect not only a single sector, they will lead to conflicts with other activities, particularly in the marine field, if they have not been dealt with in an integrated manner. The sectors that are directly affected by these problems are fisheries, tourism and transport. However, these conflicts can be relieved if appropriate representations of all sectors, such as planners, administrators, and environmentalists, work in very close collaboration and co-ordinate with each other to ensure that economic development is sustainable responses.

3.2.2 Consideration and Analysis of Impacts of Tourism Development

Coastal Sihanoukville is a matter of great importance to the future of Cambodia, both in terms of economical and environmental considerations. The way in which the resources found within this zone are to be developed requires careful coordination. The aspects of tourism development in Sihanoukville can be addressed as follows:

- There is a lack of institutional, management, and promotional capacity of the tourism sector in Cambodia and there have been no enunciated policy objectives,
- There exists poor human resources capability including a lack of training, education, skilled labour and professionals,
- There are poor communications and utility support for the tourism trade including inadequacies in the airports, roads, rail, water, power, and sewerage. Infrastructure support is further lacking in terms of healthcare capability and resort facilities,
- The length of the monsoon seasons may detract from all year around tourism.

Under the National Programme for Rehabilitation and Development (NPRD) of the new Royal Government of the Kingdom of Cambodia, new projects for the development of tourism have been approved as described previously. More than USD. 1.3 billion will be invested in a casino resort, and the supporting infrastructure, including replacing the existing airport, hotels and accommodations and residential facilities. It is speculated that the Sihanoukville region will become one of the prime resort destinations in South East Asia.

Tourism developments are also expected to lead the way for Sihanoukville to develop as a commercial centre which would substantially increase its population. Highway number 4 from Phnom Penh (PP) will develop over time as an important corridor. The configuration of the town and area will permit compatible mixed

development, with the tourism area lying to the east of the town. Cruise ships calling at the port are projected to drive a demand for many new services within this tourism area, including shops and excursion capabilities to nearby areas. The area offers great potential for development of water sports and it is expected that diving and boat excursions within the neighbouring waters along the coast will emerge.

These types of activities are likely to create environmental issues and problems for both the coastal inland resources and the coastal water resources, if the relevant planning authorities do not have clear policies for tourism development, or if they are not familiar with requirements for coastal protection and the importance of landscape and habitat protection.

3.2.2.1 Impact on the coastal inland resources

In the land adjacent to coastal Sihanoukville waters, many construction activities will take place if the projects are completed. The resulting pressure on the environment through destabilization of the balance of such developments may contribute to the destruction of beaches, wetlands, and coastal forests by destroying their unique ecosystem and may cause permanent restructuring of the environment; as an example the replacing of the existing Keng Kong airport.

On the other hand, the coastal inland resources will mostly be used for tourism activity, such as industrial development, agriculture or urban developments. Thus the effects on the inland, areas will likely follow the patterns. One example reported from the USA seen previously in other countries indicates:

- coastal hazards, the number of tourism developments and secondary homes are growing and number of people and property at risk from coastal storms, chronic erosion and the larger term impact of projected sea-level rise is increasing. 25% of the US shoreline is experiencing significant erosion, and

- the problem of plastics, flatables and debris on beaches. In some cases these are only nuisances that can be cleaned up, but in other cases this pollution includes toxic contamination from waste, which can be a serious public health hazard and deterrent to tourism (OECD, 1993). As in these examples, tourism development can be a cause of serious damage to the marine environment.

3.2.2.2 Impact on the coastal water resources

Coastal Sihanoukville is the primary area planned for use in tourism development. Projecting from the 22% increase in tourists in 1994, it is estimated that the number of tourists will increase to 1.2 million by the year 2000 (Ministry of Tourism, 1994). This is an indication that coastal Sihanoukville waters will be heavily used for activities such as swimming, windsurfing, water skiing, boating and fishing. Some of these activities may lead to a degradation of the quality of the coastal waters and this would affect other marine resources such as fisheries, coral reefs, and seagrasses. For instance, the effects of petrol spillage from boats and waste products generated by tourism can combine to cause harm to aquatic plants and wildlife be more specific. In Italy for instance, it has been stated that tourism related environmental problems have result in:

- the tourism sector itself becoming threatened by the increase in pollution and eutrophication; and,
- urbanisation of the coast, leading to the reduction and to the disappearance of natural areas (OECD, 1993 p115).

According to Davidson, "... much of the damage done to the environment as a result of tourism is caused simply by the volume of visitors... and the natural environment rarely escapes damage where large numbers of tourists are found". This means that the quality of coastal water and air and the amount and diversity of vegetation and wildlife are inevitably affected in some way (Davidson, 1993, p.133).

From this suggestion, the impact on the coastal inland and coastal water resources can be estimated as follows:

- there may be degradation/destruction and erosion on beaches due to the breakwater construction, mining of sand to build new hotels, and other related facilities, and
- there may be damage to coral reefs due to the demand by visitors for souvenirs and also as a result of the disposal of sewage from hotels and beachfront accommodations into the coastal marine environment,
- there may be impact from construction and transportation that contributes to degraded effects on the water and air quality, and
- there may be traffic related problems in the coastal resorts, be generated by many sources such as automobiles and motor boats.

The impact of tourism development on the environment may be minimised by the use of planning control and regulations. This can be achieved through a proper and effective integrated management approach to ensure sustainable development.

3.2.3 Impact of oil and gas industrial development and expansion

Sihanoukville is favoured for establishment as an industrial centre because of its deep-port. Already several proposals have been presented for consideration and, if these are adopted, the city will become the main centre for export industries for Cambodia. It is expected that industries to be established at Sihanoukville will include:

- petrochemical production, to exploit recently confirmed oil and gas reserves in the Gulf of Thailand;
- food processing, based on the local fisheries and horticulture in the area,

- timber processing, supplied through the sustainable management of re-forested land, and
- remanufacturing, using local labour to produce value-added exports.

Oil and gas industry developments are very important as contributions to the national economy if properly managed. However, this industry also poses potential damage to the environment. The environmental impacts from oil and gas arise during various stages of oil and gas exploration and exploitation. These include the exploration itself, production, transportation, refining, and utilisation. Although the oil and gas industries within the coastal waters of Cambodia are still in the exploration stage, the potential environmental impacts should be included in the long term development strategies. These would include potential negative effects from environmental disasters, as well as conflicts with other sea uses such as fisheries, shipping, and tourism.

The requirements of Environmental Impact Assessments (EIA), environmental monitoring, and environmental auditing are very important to the development of such strategies. They should take place before the oil and gas exploration and exploitation activities take place in the inarine field.

3.3 Summary

The impacts of development which have just been described illustrate multiple conflicts in the use of marine resources. Multiple use conflicts are evident given existing and potential coastal economic activities. Sources of multiple use conflicts include :

- policies developed independently of each other by the various concerned sectors of government with very little co-ordinating;

- conversion and use of mangrove forests, and coastal land forests, for residential, commercial, industrial, and other land development needs;
- tourism and recreation needs for beach area versus sand mining, mangrove uses, fishing activities and coral reef preservation,
- degradation of fisheries resources due to industries, agriculture and urban waste disposal into coastal waters and the sea,
- the demand for conservation and protection areas versus the demand for economic development.

The proposed developments of a seaport, tourism activities, and oil and gas industries and the population expansion has a large potential to affect the environmental quality of the region. Pressure on the environment is sure to increase as a result of the proposed development and many different types of issues and problems will affect the biological and physical characteristics of the coastal and marine resources.

Figures 1 and 2, in a matrix format, represent the current and potential conflicts between the economic activities in the Sihanoukville region and between these and the main features of the environment. The basic issues are related to coastal water quality and the most important impacts are associated with the agriculture sector. Also significant are the conflicts created between the agricultural activities and industrial sector.

The best hope for solving of these problems is through an integrated management system, beginning with an integrated national sustainable development policy that will be discussed in the final chapter.

The next chapter will highlight the current policies and the legal and institutional framework applicable to the coastal Sihanoukville region. It is within these frameworks that an integrated national policy must be made to work.

Figure 1: Conflicts between Human Activities

| Environment Evaluation factors | Sources of Conflicts | | | | | | | | | | |
|-------------------------------------|----------------------|-----|-----|-----|------|-----|-----|-----|-----|-----|--|
| | Ag. | En. | Fi. | Fo. | L.in | Oi. | Po. | To. | Tr. | Re. | |
| 1. Agriculture | | CC | CC | CC | CC | | | | | CC | |
| 2.Environment management effeciency | CC | | CC | CC | CC | CC | CC | CC | CC | | |
| 3. Fisheries | CC | CC | | CC | CC | CC | | | CC | | |
| 4. Forestry | CC | CC | CC | | | | | CC | | CC | |
| 5. Light-Industry | CC | CC | CC | | | | | | | CC | |
| 6. Oil and Gas. | | CC | CC | | | | | CC | | | |
| 7. Port | | CC | | | | | | | | | |
| 8. Tourism | | CC | | CC | CC | | | | CC | CC | |
| 9. Transport | | CC | CC | | | | | CC | | | |
| 10. Residential | CC | | | CC | CC | | | CC | | | |

Key: CC- Current Conflicts

Ag- Agriculture

To- Tourism

En- Environment

Tr- Transport

Fi- Fisheries

Re- Residential

Fo-Forestry

L.In- Light-Industry

Oi- Oil and Gas industrial development

Po- Port

Figure 2: Impact Matrix of Environment conflicts in the Sihanoukville Region

| Environment Evaluation Factors | Sources of impacts | | | | | | | | |
|-----------------------------------|--------------------|-----|-----|------|-----|-----|-----|-----|-----|
| | Ag. | Fi. | Fo. | L.in | Oi. | Po. | To. | Tr. | Re. |
| 1. Coastal water quality | C | | P | CP | P | CP | P | P | CP |
| 2. Soil quality | C | | C | P | P | P | | | P |
| 3. Air quality | | | | P | P | P | | P | |
| 4. Waste disposal | C | | P | CP | P | CP | P | P | CP |
| 5. Fish | P | C | P | CP | P | P | P | P | |
| 6. Mangrove | C | C | | P | | | | | P |
| 7. Coral reefs | P | C | P | P | P | | P | P | |
| 8. Wildlife | C | | | | P | | | | |
| 9. Visual quality | | | | P | C | P | P | | |
| 10. Seagrass | | | | P | P | | | P | |
| 11. Beach | | | | P | P | P | P | P | P |
| 12. Socio-culture | | | | | | | P | | |

Key: P- Potential Impacts

C- Current Impacts

CP- Current and Potential Impacts

CHAPTER IV
POLICY, LEGAL AND INSTITUTIONS FRAMEWORK FOR
SIHANOUKVILLE COASTAL MANAGEMENT

This chapter highlights the current policies and the legal and institutional framework applicable to the Sihanoukville coastal region. The main purposes of the organisations and legislation involved with the management of the coastal Sihanoukville region are also identified.

4.1 Current National Policies

The management framework for developing coastal and marine resources in Cambodia are complex. At present, the Royal Government (RGC, 1993 p2) addresses sustainable development policy by requiring:

- Sustainable economic growth,
- Sustainable human development, and
- Sustainable management and use of natural resources.

Regarding these policies, the National Programme for Rehabilitation and Development is currently establishing priorities directed at the promotion of the key sectoral programmes in the economy. These include:

- Agriculture and Rural Development
- Manufacturing, Processing and Tourism
- Physical Infrastructure, and
- Human Resources Development

The above priorities are reasonable objectives deserving support. However, these priorities emphasise development where there is no coastal management policy and no formal comprehensive national environmental legislation or policy in Cambodia to address the principles of sustainability.

The existing situation is that coastal planning and resource use are currently divided into a number of sectors under the jurisdiction of several different ministries or agencies. These can be seen from the perspective of the various laws and regulations of the institutions which have been established to deal with such matters.

4.2 Laws and Decree/Sub-Decree relating to Coastal Planning and Management

Cambodia has passed and enacted several national laws and decrees concerned with coastal area management. Of these are the law on Fisheries, Forestry, and Investments, a decree on the Creation and Designation of Protected Areas, and a Sub-Decree on zoning and administration. Some other laws are still pending. These consist of a National Mining Law and Mineral Agreement, an Environmental Law, a Tourism Law, Sub-decree on the National Protected Areas System and Environmental Impact Assessment.

4.2.1 Law on Fisheries (1987)

This law defines fisheries and categorises fishing areas. The law provides that the government entity responsible for fisheries is to maintain a duty book and record fishing production daily. The law states violators will be warned, fined,

confined or imprisoned with the confiscation of evidence according to the seriousness of the violation.

4.2.2 Law on Forestry (1988)

This law identifies the limitations of forest boundaries and forest use subject to sub-decrees and regulations. The law prohibits hunting of all species of animals. This aspect can be enforced by the Department of Wildlife. The law provides penalties for any person violating the law through fines or imprisonment as appropriate to the seriousness of the violation.

4.2.3 Royal Decree on the Creation and Designation of Protected Areas (1993)

This Decree provides to the Ministry of Environment the responsibility for the planning and development of a national protected area system incorporating the protection of terrestrial, wetland and coastal environments.

The Royal Decree also establishes statutory sites for national parks, wildlife sanctuaries, landscapes, and multi-use areas. These sites total 3,327,200 ha of which about 1,000,000 ha of land lies in the coastal watershed and were designated as protected areas.

4.2.4 Law on Land Management, Urbanisation and Construction (1994)

This law states, in matters with a direct impact on the natural environment, that: the National Committee for Land Management and Urbanisation is to be formed along with a sub-Committee in each province. Each sub-committee is to establish a land use plan for its provinces; construction work and installations have to respect the protection of environment.

This law states that all construction is subject to obtaining a building license. Plans for construction have to be prepared by a graduate architect or other approved person. The violation of building permits can result in prosecution, work stoppage and seizure of materials. Among such violations could be activities or actions affecting the environmental management of coastal lands.

4.2.5 Law on Investment (1994)

This law is concerned with development projects and provides a Council for Development of Cambodia (CDC) which is the sole service organisation responsible for the rehabilitation, development, and oversight of investment activities including both private and public projects.

The law provides penalties for investors violating the conditions stipulated by CDC. The CDC has the power to withdraw the rights and benefits granted to the investor.

4.2.6 Sub-decree for the zoning and administration of Sihanoukville (1994)

This Sub-decree provides the National Committee for Land Management and Urbanisation, responsible for designating land use zonings for Sihanoukville, with a master plan. Aspects of the Sub-decree affecting environmental management directly include the following:

- the expansion of Sihanoukville port;
- the establishment of industrial zones;
- the establishment of a city centre;
- the establishment of residential areas;
- the establishment of tourism zones; and
- the expansion of Keng Kong airport.

4.3 International Conventions

All International Maritime Conventions address international issues and international standards. Among these some deal directly or indirectly with coastal and marine issues; for instance, the International Convention on Law of the Sea, the International Convention for Safety of Life at Sea, and the International Convention for Prevention of Oil Pollution from Ships.

Cambodia became a member of the International Maritime Organisation (IMO) Convention in 1961. For political and economic reasons Cambodia has not ratified some of the international conventions dealing with marine pollution. The absence of these in the primary legislation of the country is a major constraint in carrying out environmental protection provisions relative to the marine and coastal environment.

After a new government was established in 1993, the Minister for Foreign Affairs and International Co-operation of Cambodia is responsible for matters concerning international conventions. Some of these conventions have been accessed and ratified as follows:

1. International Convention for Safety of Life at Sea (SOLAS) 1974 was accessed on 28/11/1994.
2. International Convention for SOLAS Protocol 1978 was accessed on 28/11/1994.
3. International Convention on Load Lines 1966 was accessed on 28/11/1994.
4. International TONAGE 1969 was accessed on 28/11/1994.
5. International Convention for Preventing Collisions at Sea (COLREG) 1972 was ratified on 1972.
6. International Convention for Prevention of Oil Pollution from Ships (MARPOL) 1973/78 was accessed on 28/11/1994

7. MARPOL Annex III was accessed on 28/11/1994.
8. MARPOL Annex IV was accessed on 28/11/1994.
9. MARPOL Annex V was accessed on 28/11/1994.
10. International Convention on Civil Liability for Oil Damage 1969 was accessed on 28/11/94 (Lynda A. Young, 1996).
11. International Convention on Biodiversity was ratified in 1995.
12. United Nations Convention on Law of the Sea (UNCLOS) was adopted in 1994.

4.4 The Main Organisations involved in Coastal Planning Development and Management in Sihanoukville

4.4.1 Ministries/Agencies and Their Responsibilities

The Kingdom of Cambodia is administrative structure is still being reformed as a new state, (its organisations, and its public service), so as to attain political socio-economic priorities.

Looking at coastal planning development Sihanoukville and management, the responsibilities are spread over several government agency organisations. They are indicated below:

| 1. Land Use and Development Planning Role and Responsibility | |
|---|--|
| <ul style="list-style-type: none"> • National Committee for Land Management and Urbanisation | Overall responsibility for promotion and improvement of urban and rural areas. |
| <ul style="list-style-type: none"> • Sub-Committee for Land Management and Urbanisation of Sihanoukville | Particular responsibility for Sihanoukville planning and development control, harmonisation and co-ordination in terms of land management, activities, use and conflicts resolution among ministries or agencies through land use, zonings and construction permits. |
| <ul style="list-style-type: none"> • Sihanoukville Municipality | Land Title Office, responsible for distributing land use of local people in districts, communes, and villages. |
| 2. Nature Conservation and Protection | |
| <ul style="list-style-type: none"> • Ministry of Environment | Overall responsibility for nature conservation, the determination of environmental policy, environmental planning for water and land use management, environmental impact assessment, environmental education and information. |
| <ul style="list-style-type: none"> • Department of National Parks and Protected Areas System Management | Particular interest in the protection of national parks, wildlife sanctuaries, protected landscapes, and multi-use areas. |

These include wetlands, watersheds, and coastal area management.

3. Tourism

- **Ministry of Tourism** Sihanoukville Development Authority, responsible for development of tourism projects.

4. Fisheries

- **Ministry of Agriculture, Forestry and Fisheries** Department of Fisheries, responsible for policy and management of fisheries includes marine and inland fisheries in Cambodia.

5. Oil and Gas

- **Ministry of Industry, Mines and Energy (MIME)** Overall responsibility for controlling various types of mining surveys, exploratory mining and operational mining of gemstones, minerals and quarries.
- **Cambodian National Oil and Gas Authority** Responsibility for managing, regulating oil and gas activities in the country.
- **Cambodian National Mining Authority** Responsibility for managing, regulating mining activities in the country.

| 6. Pollution | |
|--|---|
| <ul style="list-style-type: none"> Ministry of Public Works and Transport | Sihanoukville Port Authority responsibility for pollution run-off from cargo-operations, and material storage, and spills from bulk cargo handling. |
| <ul style="list-style-type: none"> Department of Pollution Control | Responsibility for air quality and noise standards, soil and water quality management. |
| 7. Investment Projects | |
| <p>Council for Development of Cambodia</p> <ul style="list-style-type: none"> Cambodian Rehabilitation of Development Board | <p>Covers the Cambodian Rehabilitation of Development Board, and Cambodian Investment Board.</p> <p>Responsible for managing the operation of Cambodia Development Board, preparing the agenda and necessary documentation for one-stop on all matters pertaining to private sector investment.</p> <p>Monitoring the implementation to private sector investment projects in co-operation with the relevant line ministries, and submits summary reports and recommendations for Executive Committee of CDC review and action.</p> |

- Cambodian Investment Board

Responsibility for public relations, promotion of private sector investments, investment project evaluation a, environmental impact assessment, international co-operation, legal procedures, and strategic planning of private sector investment.

8. Rural Development

- Ministry of Rural Development

Sihanoukville Provincial Rural Development Committee, responsible for the preparation of a plan for Sihanoukville rural development, monitoring and evaluating implementation of development activities in the rural province plan promotion of private sector initiative and development and encouragement of participation by private institutions, NGOs and community organisations in the rural development effort.

4.5 Legislative, Organisational and Management Issues

4.5.1 Legislation Issues

It should be noted that all ministries are now under going a complete revision of structure and practices to fulfil the requirements of the new constitution and the current objectives of the Royal Government of Cambodia.

The country's legal framework for coastal planning and marine resource use and management is conspicuously deficient, and major gaps still exist. It is interesting to explore the possible reasons for the ineffectiveness of the legislation. The main issues are indicated below:

- The existing legislation relating to coastal planning and marine resources in the Sihanoukville region consists mostly laws of the fisheries law, law on land management, urbanisation and construction and a sub-decree for the zoning and administration of Sihanoukville. Of these, the Fisheries law does not avoid adverse impact on the marine resources. This can be seen in the previous chapter sector 2 on fisheries issues.
- Although Cambodia's constitution directs the Ministry of Environment to protect, preserve, and conserve the national environment, it is in practice still inadequate legislation, as is the administrative framework to ensure the conservation of the coastal and marine environment. It can be said that the existing legislation emphasises the lack of integration between land and sea, and planning and management.
- There is no coastal resources management act for protection of coastal and marine resources in Cambodia. This endangers the coastal and marine resources if the Master plan of Sihanoukville goes forward to development.

- The draft of the Environmental Law is now still being reviewed and is considered by the Council Minister. The delay in this law is a major constraint on the Ministry of Environment with respect to their role and function for protection of the natural resources.
- Cambodia will rely on oil and gas in its economic rehabilitation and development but the National Mining Law and Mineral Agreement is also still in draft form. This is a main issue for the Ministry of Industry, Mines and Energy to operate their role and function as responsible for controlling various types of exploration and operation of mining.
- Some Provision of Laws, Decrees, and sub-decrees like the draft of Environmental law and Sub-decree of CDC, have duplicated responsibilities on the Environmental Impact Assessment. These can be seen in the provision of chapter 4, Articles 7, 10, 11, 12 and 13 in the draft of environmental law, and in chapter 1, Article 5 in the Sub-decree of CDC.
- There is no legislation which promulgates that the EIA must be undertaken for any particular type of project. The draft of Sub-decree on Environmental Impact Assessment is still being prepared by the Ministry of Environment. However, the main reason for this is the reliance on the parent environmental law which it is not yet ratified by the National Assembly.
- Tourism legislation and regulations are still in draft form but the tourism projects for coastal Sihanoukville development have been approved. This is the main reason why environmental management practices can not protect the coastal and marine resources from planning tourism development.

- Recently the government has acceded to some of the international conventions concerned with marine pollution. But, with regard to the port authority activities today, there are no laws or regulations in place locally to prevent marine pollution. This is a main issue concerning protection of the coastal environmental.
- All issues mentioned above are very important. But, attention should be paid the absence of public awareness and public education. It is can be seen there is no formal public participation in the decision process of development plans. Most of the rules and implementation of policy for the coastal areas rely on the participation and willingness of the local communities if they are to be successful.

4.5.2 Organisational and Management Issues

4.5.2.1 The Existing Restructuring of the State

The basic emphasis the Cambodian government at present is to attempt to clarify the lines of responsibility for activities that currently transcend local, regional and national interests the intent is to manage and co-ordinate government actions, to clarify ministry attributions, and to ensure administrative effectiveness and propriety. The existing restructuring of administrative tasks is directed reshaping the civil service, reforming the organisational framework for effective management, and reforming the regulatory mechanisms.

The effectiveness and efficiency of organising and managing planned coastal development and resource use is dependant upon this successful re-structuring of the state (reformed administration).

4.5.2.2 The Existing Co-ordination

The numerous institutions with statutory power or interests in coastal and marine areas gives rise to the problems of overlap, gaps in responsibilities and lack of

co-ordination. The government has set up some organisational institutions in order to ensure overall co-ordination and co-operation of the different policies and measures taken by ministry levels of administration. Apart from the existing coastal and marine co-ordination, the Ministry of Environment, the National Committee for Land Management and Urbanisation, and the Council on Development for Cambodia have a very important role in co-ordinating coastal and marine development.

A)- The Ministry of Environment (MoE)

The Ministry of Environment was established in 1993 and its strategy is based on the execution of sole and joint responsibilities in conjunction with other ministries concerned with specific aspects of natural resources and infrastructure management.

However, the re-organisation of the structure of the MoE late in 1995 is not yet approved (see appendix 2). Hence, a broad mandate to protect the natural resources of the country and prevent environmental degradation has met with difficulties. In particular, this function is most difficult for the ministry itself since it is responsible for the new coastal planned development in Sihanoukville. This is because of the lack of enabling legislation, lack of clear institutional strategy, lack of EIA capability and standards, lack of environmental awareness, and inability of staff to appropriately guide the development activities with respect to the environmental problems.

The other constraints are also the inability of the legislative and executive branches to define a clear mandate for the MoE and to formulate the working arrangements for inter-agency processes focusing on EIA, industrial waste management and the broad scope of natural resource management tasks.

**B). Committee/Sub-Committee for Land Management and
Urbanisation of Sihanoukville**

This Sub-Committee was established in 1994, chaired by the Governor of the Sihanoukville Municipality and consists of all local levels of administration. The function and responsibility is for Sihanoukville plans and development control, and co-ordination in terms of land management.

However, in an interview with Mr. Hun Phy (1996) it was stated that the main current issues for the Sub-Committee are:

- lack of financial resources and expertise to support in the management of land use and planning;
- limited ability to perform research needed for the Sihanoukville Master Plan; it can be noted that the Ministry of Tourism is doing its own research into tourism development projects as described in chapter II sector 2;
- lack of definition of role and responsibilities of the relationship between agencies and ministries concerned;
- lack of communication and public awareness in the process of decision makers. The decision is always made at the national levels. Many of these levels lack experience in coastal land use and conservation; and
- lack of capacity for extensive technological transfer to the public.

C). Council on Development for Cambodia

This Council was chaired by Co-Prime Ministers and the vice chairman was a senior person in charge of the National Programme for Rehabilitation and Development (NPRD). The membership of the Council on Development of Cambodia (CDC) includes senior Ministers in charge of the National Committee for Land Management and Urbanisation (NCLMU), Ministry of Public Works and

Transport (MPWT), Ministry of Economic and Finance (MoEF), Ministry of Foreign Affairs and International Co-operation (MFAIC), secretaries-general of the Cambodian Investment Board (CIB), Cambodian Rehabilitation and Development Board (CRDB), and Council on Development of Cambodia (CDC).

Although the Council has the roles and responsibilities as described in sector 4.4.1, it is in practice the actions of line councils and ministries that have slowed down project implementation. However, much still remains to be done to delineate the boundaries among the various co-ordinating bodies and the responsibility of the various operational ministries.

4.6 Summary

The problems related to legislation and organisations concerning development and management of coastal and marine resource use in Cambodia still remain. It is, however, very important to establish an effective coastal area management framework to ensure the sustainable development of its resources for present and further generations. This must be the main objective to be taken into account in national planning development strategy and political planning.

The final chapter, integrated policy and management strategy, will recommend mechanisms and policies to achieve sustainable development growth of coastal and marine areas in the Kingdom of Cambodia. From these recommendations, a mechanism structure is proposed for an integrated management approach that can identify and manage the embedded threats to the environment as presented by the Sihanoukville Master Plan for development.

CHAPTER V
RECOMMENDATIONS FOR POLICY AND MANAGEMENT STRATEGY

Having considered and analysed the coastal issues and the potential impact of a newly planned coastal development activities, along with limited strategies for sustainable implementation it is clear that Cambodia needs urgently to define a clear policy framework and effective management strategies to ensure sustainable economic growth of the coastal and marine areas.

This chapter will recommend:

- an integrated national policy and associated objectives to cover management of the coastal and marine areas,
- the management strategies needed to support sustainable economic development in the coastal and marine areas.

5.1 An Integrated National Policy

It should be the aim of the Royal Government to support the first three current national policies which address (i) sustainable economic growth, (ii) sustainable human development (iii) sustainable management and use of natural resources.

To achieve the objective of this policy, an integrated coastal resources management policy must be developed and management structure to develop and oversee this policy should be established.

5.1.1 The Need for An Integrated Coastal Resources Management Policy

This policy must be developed basically consistent with

- (i) the current national policies;
- (ii) planning interests and objectives of the developmental policy within the coastal and marine sectors;
- (iii) principles for integrated management of marine resources;
- (iv) reducing/minimising conflicts among competing users of coastal land and sea resources;
- (v) ensuring long-term perspectives, values and benefits are realised by the extending coastal and marine areas under national jurisdiction; and
- (vi) providing co-ordinated and co-operative actions among agencies sharing responsibilities for coastal and marine resources use.

5.1.2 Statement of Objectives

The objectives of these integrated policies should be as follows:

- to increase employment opportunities, foster regional development, generate income, foreign exchange earning and government revenues.
- to accelerate economic and social development.
- to support the unified utilisation and management of coastal and marine resources of the Sihanoukville region.
- to ensure the application of sustainability concepts of despite coastal population pressures for rapid economic development.
- to form well co-ordinated and co-operative friendly relations among all sectors which contribute to the realisation of a equitable inter-sectoral economic order.
- to protect the coastal and marine environment in order to ensure the benefits for present and future generations.
- to increase renewable resources for national planning development.

- to harmonise environmental management through the establishment of an institutional framework.
- to create a legal framework to advance the implementation of integrated coastal resources management policy.

5.2 Management Strategies

The strategies development should take into account both national and international perspectives and should be oriented toward achieving integrated management of the coastal and marine environments.

5.2.1 The Need for a Cambodian Coastal Management Act

To achieve all of the above objectives, there is a need for a Cambodian Coastal Management Act. This Act should provide a legal framework for the implementation of the Cambodian coastal management strategy.

This Act should focus on:

- (i) defining the coastal area boundaries subject to national jurisdiction;
- (ii) delineating agencies or organisations' responsibilities to conserve and protect coastal ecosystems;
- (iii) defining the roles and responsibilities of the various levels of such agencies;
- (iv) eliminating the contradictory aspects of policies, especially those affecting coastal ecosystems and their resources;
- (v) monitoring and research in order to determine the baseline and evolving conditions of the managed coastal ecological processes,
- (vi) infrastructure support and resources to ensure the necessary tasks may be implemented;
- (vii) the enforcement of such an Act to ensure effective management;

(viii) sustainable resource use and provide co-ordination of management and planning by agencies government related; and

(ix) public participation.

This Act should specify the institutions that are responsible for enforcement and implementation of the various aspects of the law and for developing and preparing coastal area management plans governing the conservation and protection of the quality and balance of the coastal environment.

5.2.2 The Need for an Environmental Impact Assessment (EIA)

According to what has been identified in chapter 3 on the potential impact of a newly planned coastal development, the author would like recommend that:

- A national framework for EIA must be developed.
- The Ministry of Environment that is responsible for EIA should develop guidelines for the preparation and review of the EIA statements.
- The guide to impact assessment in the coastal environment is a necessary measure. Such a measure should provide the public with the best available information for minimising the environmental and social costs and maximising the benefits associated with proposed development projects.
- The Ministry of Environment should collaborate with the Council on Development for Cambodia and the other Ministries in order to prepare its proposal in the context of co-operation.
- An EIA process is established where proposed projects and activities must be reviewed and evaluated prior to a government decision being taken.
- The guideline on EIA procedures should address the items as outlined in the lecture of Professor J. Karker, 1995 below:

- # Impact Identification
- # Baseline Studies
- # Impact Evaluation
- # Identification of Measures of Mitigation
- # Assessment of different alternatives
- # Preparation of Documentation
- # Decision Making
- # Post Auditing

From these suggestions, the Ministry of Environment should attempt to weigh environmental effects on a common basis with economic costs and benefits. This is because an EIA is based on a prediction of the changes in environmental quality which would result from the proposed action.

5.2.3 The Need for Promoting Marine Protected Areas

The establishment and management of marine protected areas should be undertaken through National Policy. The Ministries responsible for conservation and protection should take into account of the promoting and creating of marine protected areas. The Royal Government through the Ministry of Environment, and Ministry of Agriculture, Forestry and Fisheries should take steps to establish marine protected areas for the purpose of promoting:

- (i) the protection of marine habitats and ecosystems;
- (ii) the protection of zones of special ecological significance;
- (iii) the facilitation of public activities including nature studies, boating and water sports,
- (iv) the protection of features of archaeological historic importance;
- (v) the creation of scientific reference areas; and
- (vi) public education on coastal resources, protection, and sustainable use of marine life.

5.2.4 The Need for Improving Marine Fisheries Management

According to what has been identified on the marine fisheries issues, the Ministry of Agriculture, Forestry and Fisheries that is responsible for the Fisheries Department should review and approve the policies and its objectives to ensure maximum sustainable yield, maximum economic yield, and optimum sustainability of the fishing effort.

The policy of marine fisheries should be directed to protect necessary for environmental fisheries and ensure expansion of production is not at the expense of sustainability. This policy should also include conservation of the fish stock for future fishing and co-ordinating other agency interests in order to ensure an integrated approach of the marine fisheries development.

With this in mind, the Department of Fisheries should:

- improve the institutional capacity for research, practical implementation and planning;
- rebuild the fisheries law and regulations in consonance with the Law of the Sea;
- identify the migratory stocks and their importance through regional co-operation projects;
- ensure effective implementation of policy by inspecting for illegal fishing practices;
- encourage research into environmentally friendly mariculture and fish-processing techniques;
- assess economic contributions possible through aquaculture and mariculture;
- avoid overfishing by use of modern gear such as trawling, which needs to be limited to conform with the resources of specific sea-areas;

- improve licensing and reporting for fisheries and better surveillance of illegal operations, closer control on use of illegal equipment, and control on the capture and export of fish;
- develop better understanding of the environment and socio-economic causes for depletion of marine fisheries; and
- ensure that the promotion of artisanal marine fisheries figures prominently in policies for the development of the marine fishery sector.

5.2.5 The Need for Coastal Resources Awareness, Education and Training

The main objective of coastal resources awareness, education and training is to enable people to soundly understand and appreciate the complex coastal processes as well as the contributions made by properly managed coastal ecosystems to in overall national economic development.

Coastal resources awareness, education and training which follows an integrated approach will foster sustainable development objectives.

The government through the Ministry of Environment and the Ministry of Education, Youth and Sports should:

- develop a programme to increase awareness among top policy makers on the functions and benefits of coastal resources;
- develop a comprehensive programme to increase the public's awareness of coastal ecosystems, coastal conservation and protection and benefits provided; the programme should be professionally defined, specifically targeted and aimed at identifying the role of the coastal community in management of the coastal ecological processes;

- develop coastal education and training through national programmes; this can integrate into basic coastal ecology in schools and act to encourage awareness programmes on coastal benefits and values.
- train the teachers from the various coastal province agencies and provide them with educational materials so they can integrate the concept of sustainable use of coastal resources, conservation and management into the existing curriculum;
- inform and motivate coastal people to promote coastal and environmental protection;
- cooperate with the United Nations Development programme (UNDP), United Nations Environment Programme (UNEP), United Nations Educational Scientific and Cultural Organisation (UNESCO), International Union for Conservation of Nature and Natural Resources (IUCN), and International Development Research Centre (IDRC) to seek assistance financial foreign in order to establish local community organisations to decide sustainable use of coastal resources, with participations of the local population, monks, students, ethnic groups and women;
- provide publication of all information relevant to coastal environment protection and management through cultural activities, including television programmes, radio, brochures and journals; and
- promote the educational level of Cambodian students by sending them overseas for post graduate degree studies.

5.2.6 The Need for Regional and International Co-operation

According to Agenda 21 (chapter 17) of an Agreement on Environment and Development and the Law of the Sea Convention (part XII), dealing with the protection and preservation of marine environment, the Royal Government should:

- promote international standards for sustainable development, management, and environmental protection by promoting the ratification of international conventions;
- develop (regional) common strategy of guidelines for co-ordinating activities in the field of conservation of the marine environment;
- solve problems of the marine environment by sharing experiences on common problems, exchange of information and data on a regular basis;
- cooperate with the Asian Coastal Region where it can be enhanced by technology transfer and comparing of solutions and results; and
- promote international co-operation UNDP, UNEP, UNESCO, IDRC, European Union (EU), Asian World Bank (AWB), Asian Development Bank (ADB) in order to achieve an integrated coastal resources management policy.

5.2.7 The Need for an Integrated Management of the Coastal and Marine Environment (IMCME) incorporating Strategic Planning

5.2.7.1 Objective of IMCME

The objectives of proposals for an Integrated Management of the Coastal and Marine Environment are to:

- (i) ensure the maintenance of basic ecological processes upon which all productivity of the regional, both from the sea and the land depend;
- (ii) promote sustainable use of the renewable resources and rational use of non-renewable resources and to minimise contamination or degradation of the marine ecosystem;
- (iii) conserve the biological diversity, cultural heritage and natural physical beauty of the Cambodian country side;

(vi) ensure that the quality of life of people at present and in the future is not compromised by destruction, degradation or pollution of the environment.

5.2.7.2 Proposed National Body Responsible for an IMCME

The establishment of a national structure responsible for IMCME incorporating strategic planning in Cambodia (see figure 9) would encourage the integrated management approach of the Ministries' strategic responsibilities.

The IMCME should be under the direct control of the Prime Minister and should have the following ministries as members:

- - Ministry of Agriculture, Forestry and Fisheries (MAFF).
- - Ministry of Tourism (MoT).
- - Ministry of Public Works and Transport (MPWT).
- - Ministry of Industry, Mines and Energy (MIME).
- - Ministry of Economics and Finance (MoEF).
- - Ministry of Rural Development (MoRD).
- - Ministry of Planning (MoP).
- - Ministry of National Defence (MoND).
- - Ministry of Education, Youth and Sports (MEYS).
- - Ministry of Environment (MoE).
- - Secretary-General of the Council for Development of Cambodia (CDC).
- - Secretary-General of the National Committee for Land Management and Urbanisation (NCLMU).

The IMCME Executive Council should be established by the relevant Ministries with active participation at the ministerial levels. The chairmanship of the Council should be the senior person in charge of the National Programme for

Rehabilitation and Development. A permanent Secretariat of the IMCME should be located in the Office of the Council Prime Minister.

Once the proposed organisational structure of an IMCME is established all proposals development projects in the coastal and marine sector would have to be discussed at the IMCME Executive Council and submitted to the IMCME for review and approval.

With this organisation, Sihanoukville development projects would be co-ordinated in effective way, avoiding unisectoral management and fragmented decision making.

5.2.7.3 IMCME Responsibilities

The IMCME Responsibilities should be as follows:

1. Development of a comprehensive sea, coastal and marine policy that embraces development and environment protection concerns relative to the:

- National fisheries
- Ports and shipping development
- Tourism development
- Non-point sources pollution from agriculture and urban activities
- Point sources pollution from industry and urban activities
- Exclusive Economic Zone

2. Co-ordination of interministerial activities to provide integrated management of the coastal and marine environment.

3. Review of all ministry activities that have potential to effect the coastal and marine environment.

4. Drafting of legislation necessary to achieve sustainable development of the coastal and marine environment.

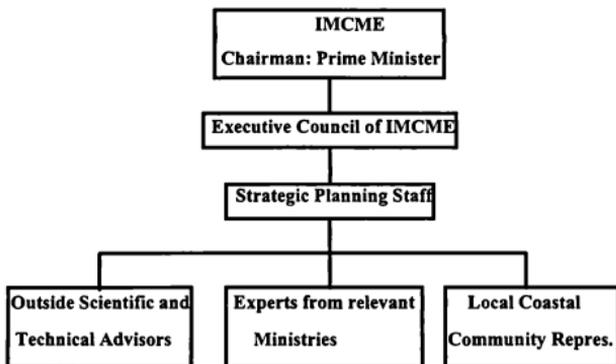
5. Strategic Planning

Strategic planning is a powerful tool that can lead government administration into a process that keeps daily activities in tune with long-term national and global objectives (T. Sampson, 1996). The case in point, IMCME allows the placement of strategic planning processes within its organisational structure and the processes should:

- identify strengths and weaknesses of the organisation which having overlapping for marine environmental protection;
- identify threats and opportunities in view of both internal and external factors that have the potential to affect both coastal development activities and marine environmental protection concerns; and
- evaluate and analyse the timing of the opportunities and threats, the probability of their occurrence, their impact on the organisations, and the ability of the organisation to influence the related ministries to address such issues development activities.

Strategic Planning provides the Prime Minister with the vision for the future which is an essential element in identifying the strategic goals of the organisation to draw up the strategic policies necessary to achieve integrated management of the coastal and marine environment.

Figure 9: Proposed Structure for Integrated Management of Coastal and Marine Environment (IMCME) incorporating Strategic Planning in the Kingdom of Cambodia



Note: Repres.- Representative

This proposed structure represents a critical element to achieve in the social and economic development planned of the coastal and marine sector in the Kingdom of Cambodia, in a sustainable manner.

The proposed structure allows the ability to anticipate coastal and marine environment problems at present and in the future from planned economic activities in Cambodia. It would also provide a mechanism to ensure the maximisation of economic benefit to be devised from each of the various coastal development activities that must share the coastal resources and the responsibility to protect them from degradation.

CONCLUSION

Cambodia's Coastal Area has a great potential for economic development in South-East Asia. Coastal waters and marine natural resources along the Cambodian Coast are very important for the support of marine and coastal economic sectoral activities. These include marine fisheries, sea-ports development, industrial development, recreation and tourism development, transportation, and coastal communities.

The Royal Government's goals directly place the major priority on the coastal areas for economic development. In particular, the Sihanoukville region has been focused on by new plans for economic development through the rebuilding of infrastructure, recreation and tourism development, industrial development, the expansion of the sea-port, expansion of oil and gas exploration and exploitation, and expansion of air-port capacity.

However, industrial development in the coastal and marine areas has in fact contributed to the deterioration and degradation of coastal and marine resources. Newly planned developments also exert a potential for further degradation of coastal environmental quality and hold within them new emerging conflicts with even greater potential impacts. The impact of these conflicts will become evident, given the existing and potential planned coastal economic activities due to: (i) the lack of development policy guidelines for coastal resource exploitation and use on an environmentally sustainable basis; (ii) the lack of development action plans to minimise resource use conflicts (iii) the lack of formulation of environmental management strategies to conserve and protect special areas of concern such as mangrove forests, coral reefs, and coastal fisheries resources; (iv) the lack of

identification of high priority coastal wetlands for preservation; (v) the lack of understanding of the impacts of coastal natural processes and land use practices; (vi) the lack of awareness, education, and training on coastal environment and coastal ecosystems; (vii) the lack of strengthening the capacity of the coastal people to manage in coastal resources in a sustainable manner; and the finally, due to the lack of integrated management approaches and capacity at high levels of the government agencies.

In order to start the coastal resources management process moving in sustainable direction in Cambodia, firm political and institutional commitment at the national levels and local levels will be important to the development of integrated coastal resources management policy and strategic planning to focus on sustainable resource use. Such strategy is also required to minimise the existing and potential impacts and conflicts among users of the coastal and marine resources.

It is also important that cost-benefit analyses be performed to identify management options with due consideration to the traditions and the culture of the coastal communities. Traditional management practices, should not be ignored, if found effective, but they should be integrated into the overall management strategies. National goals should be enhanced through Integrated Management of Coastal and Marine Environment.

The concept of sustainable development is beneficial, but it is extremely difficult to implement. To achieve this concept Cambodia should create a mechanism and structure to incorporate strategic planning for responsible Integrated Management of the Coastal and Marine Environment. This is the way to ensure the purpose of promoting sustainable use and management.

First, Cambodia must maintain basic human needs, and provide the possibility to satisfy the aspirations of its people for a better life. Second, Cambodia should ensure economic growth and development are possible, without long term adverse changes to coastal and marine ecosystems. Third, Cambodia should try to challenge its people to find the ways to achieve the first objective without causing irreparable harm to the environment. Fourth, Cambodia should put the necessary mechanisms in place to ensure that replenishment and self-adjustment occur and proper monitoring verifies that immediate actions are consistent with long-term goals for sustainable use of its coastal and marine resources.

A Cambodian designed integrated coastal and marine management approach is the key to promote sustainable use of its natural resources; it is the key to sustain critically important coastal and marine ecological processes, and the overall quality of the marine environment; it is the key to preserve Cambodia's biological diversity and to ensure the quality of life for its people of the present and future generations.

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Appendix 1: Royal decree on Creation and Designation of Protected areas

KINGDOM OF CAMBODIA
NATION, RELIGION AND KING
Made on 1st. November 1993
CREATION AND DESIGNATION OF PROTECTED AREAS

We
His Majesty Samdech Norodom Sihanouk Varaman
King of Cambodia

Declare the following:

Regulations

Article 1 : Responsibility for a National Protected Areas System

The Secretariat of State for Environment is responsible for supervising the planning and development of a National Protected Areas System incorporating the protection of terrestrial, wetland and coastal environments. The Secretariat has the authority to establish and chair appropriate inter-ministerial co-ordination committees concerning policy and technical needs of protected areas. The management and administration of the National Protected Areas System is the joint responsibility of the Secretariat in collaboration with other competent institutions. The system will include the following Categories of reserves with the following management objectives.

National Parks: Natural and scenic areas of significance for their scientific, educational and recreational values.

Wildlife Sanctuaries: Natural areas where nationally significant species of flora and fauna, natural communities, or physical features require specific intervention for their perpetuation.

Protected Landscapes: Nationally significant natural and semi-natural landscapes which must be maintained to provide opportunities for recreation and tourism.

Multiple-use Management Areas: The areas which provide for the sustainability of water resources, timber, wildlife, fish, pasture and recreation with the conservation of nature primarily oriented to support these economic activities.

Article 2 : Designation of Protected Areas

That the terrestrial, wetland and coastal ecosystems indicated on the accompanying maps be managed and developed according to the following designations.

| | Area (Ha.) | Locality |
|-------------------|---------------|--------------------------|
| 1. National Parks | | |
| Kirirom | 35,000 | Koh Kong |
| Phnom Bokor | 140,000 | Kampot |
| Kep | 5,000 | Kampot |
| Ream | 150,000 | Kompong Som |
| Botum - Sakor | 171,250 | Kampot & Kompong Som |
| Phnom Kulen | 37,500 | Siem Reap |
| Virachey | 332,500 | Ratanakiri & Stung Treng |

| | Area (ha.) | Locality |
|---|------------------|--|
| 2. Wildlife Sanctuaries | | |
| Aural | 253,750 | Kok Kong, Pursat, Kompong Chhnang and Kompong Speu |
| Beng Per | 242,500 | Kompong Thom |
| Peam Krasop | 23,750 | Koh Kong |
| Phnom Samkos | 333,750 | Koh Kong |
| Roniem Daun Sam | 178,750 | Battambang |
| Kulen - Promtep | 402,500 | Siem Reap and Preah Vihear |
| Lomphat | 250,000 | Rs tanakiri and Mondolkiri |
| Phnom Prich | 222,500 | Mondolkiri |
| Phnom Nam Lyr | 47,500 | Mondolkiri |
| 3. Protected Landscapes | | |
| Angkor | 10,800 | Siem Reap |
| Banteay Chhmar | 81,200 | Banteay Meanchey |
| preah Vihear | 5,000 | Preah Vihear |
| 4. Multiple Use Management Areas | | |
| Dong Peng | 27,700 | Koh Kong |
| Samlaut | 60,000 | Battambang |
| Tonle Sap | 316,250 | Kompong Chhnang, Kompong Thom, Siem Reap, Battambang and Pursat. |
| Total Area | 3,327,200 | |

Article 3 : Amendments

This protected area system may be amended or extended in the future on the basis of scientific information relating to biological conservation and the maintenance of the productivity of the Cambodian landscape.

Article 4 : Precedence

This kret takes precedence over other legal instruments and shall not be deemed to be void on the grounds that existing instruments may be inconsistent with it.

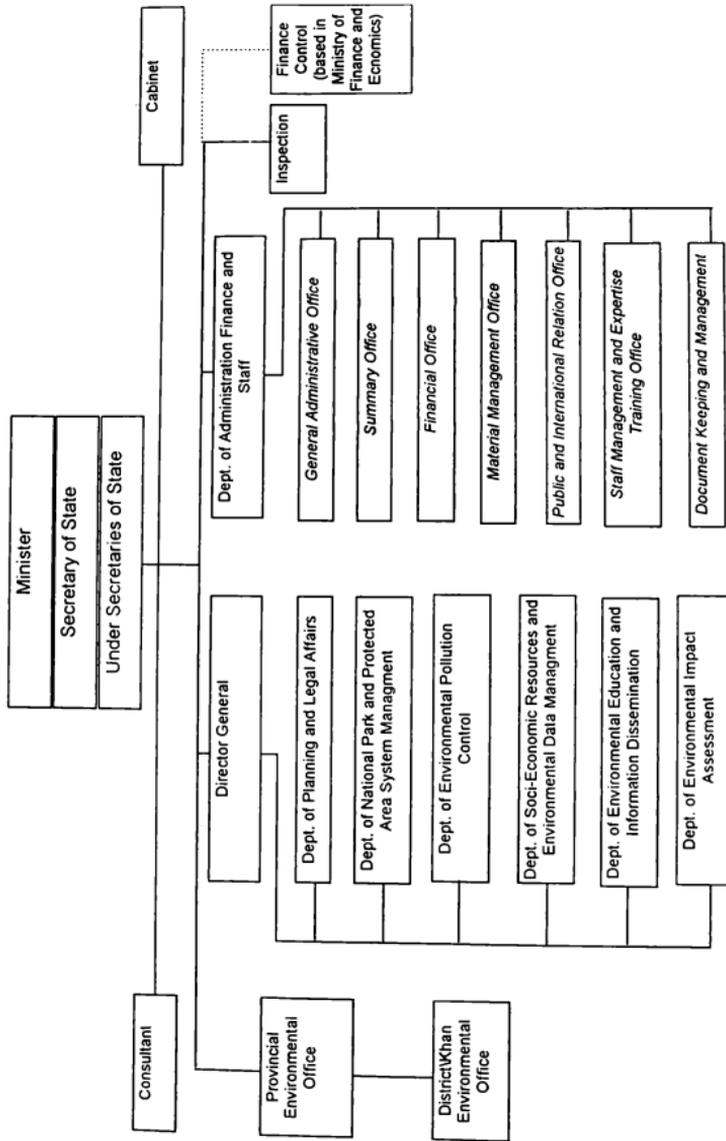
Article 5 : Application

This kret applies valid throughout the Kingdom of Cambodia from the date of signature below.

Made on 1st November 1993

Signed

Samdech Norodom Sihanouk Varaman



Appendix 2: Proposed Organogram Structure of the Ministry of Environment

Source: Ministry of Environment, 1996