# COASTAL ZONE MANAGEMENT IN MALAYSIA – THE NEED FOR AN INTEGRATED APPROACH

IR. DR HIEW KIM LOI

1994

# COASTAL ZONE MANAGEMENT IN MALAYSIA -THE NEED FOR AN INTEGRATED APPROACH

by

IR. DR HIEW KIM LOI

Director of Coastal Engineering Division
Department of Irrigation and Drainage
Malaysia

## 1. INTRODUCTION

1.1 The global concern and commitment to environmental management was clearly captured under Agenda 21 of the United Nations Conference on Environment and Development (UNCED) held in 3-14 June 1992 in Rio de Janeiro. The Rio Declaration on Environment has outlined 27 principles related to and explaining the concept of sustainable development. In particular, Principle No. 3 says that " The right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generations".

1.2 The Rio Declaration reaffirmed an earlier declaration of the United Nations Conference on Human Environment in Stockholm on 16 June 1972. There is an increasing realisation that many of the present day pursuit of economic progress are at the expense of the environment and hence are inherently non-sustainable. Sustainable development, in simple language is defined as that which meets the needs of the present without compromising the ability of future generations to meet their own needs. Simple as it sounds, the concept is in fact a demanding one in the light of expanding world population and diminishing non-renewable resources such as minerals, oil and gas.

1.4 The present day world is abound with examples of non-sustainable development, both in the developed and developing countries. In many developing countries, there is a tendency to accord greater emphasis to employment generation and income improvement, to the extent that environmental concerns are often ignored or

suppressed as a result of socio-political pressures. This has resulted in many cases where the environment has deteriorated to such an adverse level that the remedial repair costs are exorbitantly high, if at all still possible. Hence, responsible planners and decision makers are those who will balance economic gain against environmental degradation, often with greater weightage to the latter as the country becomes more developed. For this to happen, there must be a considerable element of transparency in the decision making process through public participation and opinion survey involving all levels of the society. Such a trend of development is becoming more and more evident in the more developed societies of the world.

1.4 Malaysia, being a developing country has the advantage that it is still in time to incorporate sound environmental management concepts in most of its future socio-economic development activities. The country has an abundance of resources to support the present population of about 18 million people with a growth rate of about 2.6 % per annum. At present, more than 50 % of the country are still covered with forest. Malaysia has continued to maintain a high economic growth of more than 8 % for the past few years and is determined to achieve the status of a Developed Nation by the year 2020 (VISION 2020). A high income level and quality living environment are amongst some of the desired targets under VISION 2020 objectives.

## 2. THE COASTAL ZONE OF MALAYSIA

2.1 Malaysia covers a land area of about 332,556 $km^2$ comprising two regions, Peninsular Malaysia and the States of Sarawak and Sabah. The territorial waters of Malaysia total about 150,000 $km^2$ while the EEZ extends over another 450,000 $km^2$. In addition, there are about 1000 islands belonging to Malaysia.

2.2 Malaysia has about 4,800 km of coastline comprising two distinctly different physical formations, namely the mangrove- fringed mud flats and sandy beaches. The east coast of Peninsular Malaysia consists of straight sandy formations in the north and a series of hook- or spiral-shaped bays to the south. The west coast of Peninsular Malaysia, however, comprises muddy formations, with limited areas of pocket sandy beaches. In Sarawak and Sabah, the coastlines are about equally divided between

sandy beaches and mud coast.

2.3 The coastal zone of Malaysia has a special socio-economic significance. A large majority (about 70%) of the total population live in the coastal zone. The coastal zone is also the center of economic activities encompassing urbanisation, agriculture, fisheries, aquaculture, oil and gas exploration, transportation and communication, recreation, etc. The west coast of Peninsular Malaysia is the most developed with about 57 % of its length under agriculture and 21 % under housing, transportation and recreation facilities.

2.4 While presently there is no official geographical demarcation of the coastal zone, it can be broadly interpreted as areas where terrestrial and marine environments and processes interact. These include the coastal plains, deltaic areas, coastal wetlands, estuaries and lagoons. The landward limit of coastal zone could not be accurately defined because of inadequate coverage or precision of topographical and hydrographic data in this country, particularly in the States of Sarawak and Sabah. There are differing views on the geographical definition of coastal zone and a consensus has not yet been reached. The width of the coastal zone is likely to be set between 1 to 5 km from the shoreline.

2.5 Using the upper limit of 5 km, the coastal zone is expected to capture a land area of about 4.4 million hectares representing about 13% of the total land area of Malaysia. Approximately 1.2 million hectares of the coastal zone are found in Peninsular Malaysia, 1 million hectares in Sabah and 2.2 million hectares in Sarawak, accounting for 9%, 13% and 18% respectively of the land areas of these three regions.

2.6 In addition to the above coastal lands, islands, coral reefs, estuaries and lagoons are also important sites for ecological, economic, touristic and recreational activities. Islands and their associated coral reefs are important to the fishing industry as feeding, breeding and nursery grounds for a large diversity of fishes including the commercially important species. A total of 44 islands has been or in the process of being gazetted as marine parks for the protection of aquatic flora and fauna in these localities.

2.7 Oil and gas accumulations are found in the offshore regions of east coast of Peninsular Malaysia, Sarawak and Sabah. The production of crude oil in Peninsular Malaysia for 1991 reached a level of about 360,000 barrels per day while the natural gas reserves have been estimated to be 27.4 trillion standard cubic feet.

## 3 INTEGRATED COASTAL ZONE MANAGEMENT - A NECESSITY

3.1 In the past two decades, Malaysia has successfully transformed its agriculture-based economy into a more diversified one. The GNP has increased nearly two fold from 1980 to 1990 reaching a gross value of about RM 80 billion. The industrial sector which is now the largest economic sector, accounts for about 26 % of the GNP in 1990. The industrial sector is expected to grow even more rapidly into the future as the country aspires and progresses towards the status of a developed nation. The coastal zone has historically been the center of economic activity and is expected to remain so in the years to come.

3.2 The Government of Malaysia is aware of the need and importance of sound coastal zone management in the light of increasing incidence of coastal erosion, resources depletion and environmental degradation problems in many of the more- developed coastal areas of the country. The problem of erosion, in particular, was the subject of a comprehensive study known as the National Coastal Erosion Study in 1984/1985 (EPU, 1985). The study revealed that about 1390 km (or 29 %) of the coastline are subjected to erosion. The distribution of these erosion sites is as shown in Table 1. There are 62 sites totalling some 197 km which can be classified as critical erosion areas for which urgent engineering measures are required to prevent further loss of valuable land and properties. The study has clearly pointed out that a primary cause of coastal erosion is poor siting, planning and design of coastal development projects and activities. Hence in addition to the above short term measures, it also stressed on the need to implement long term strategies emphasizing on proper planning and control of future developments in the coastal zone.

3.3 The need for sound coastal zone management is well received by the Government. Following the completion of the National Coastal Erosion Study, the Government

moved on with another initiative on the preparation of the South Johor Coastal Resources Management Plan under a USAID -ASEAN programme in 1987 to 1990, (MOSTE, 1992). The objective of this study was to develop a coastal zone management plan for the South Johor region, covering a coastal belt of some 300 km which is undergoing a rapid pace of economic development. The study has provided valuable insight into many of the current issues and problems related to mangrove and coastal forest management, water quality, coastal erosion, sand mining, fisheries, aquaculture, tourism, etc. Since these issues are also generally true of many other areas in the country, they are listed below for ease of reference :-

(a) Declining areas of mangrove and coastal forests as a result of agriculture and aquaculture development.

(b) Exploitation of inshore and coastal fisheries resources beyond sustainable levels.

(c) Lack of development control in tourism development projects

(d) Pollution and declining water quality of both the coastal waters and rivers.

(e) Lack of investment participation by local coastal communities in the various economic activities in the coastal zone.

(f) The inherent socio-economic problems of the traditional users of coastal resources.

(g) Low level of awareness of innovative development strategies.

(h) Inadequacy of the existing legislation and institutional capability for integrated coastal resources management.

3.4 Before a management plan can be developed to address the above issues and problems, it is first necessary to gain an in-depth understanding of the causes of these

problems. In brief, the main causes are :-

(a) High rate of population increase resulting in increased demand for land and exploitation of coastal resources.

(b) Inadequate or non-integrated planning

(c) Low economic valuation of natural resources such as mangroves, coastal forests, clean environment as against overvaluation of development activities such as aquaculture, industry and tourism.

(d) Improper and inadequate understanding of the ecological role of coastal resources.

(e) Absence of guidelines, criteria and standards for management of coastal resources.

(f) Lack of clarity in division of responsibility in areas of overlapping jurisdiction.

(g) Inadequate legal and regulatory measures.

(h) Inadequate enforcement due to lack of manpower and technical capability.

3.5 Based on the above, there is a clear need to step up current efforts in the management of coastal zone and its resources to ensure that all future development efforts in the coastal areas are sustainable and environmentally compatible. An integrated approach is required to ensure that the needs of all sectors are fulfilled covering both short term and long term objectives. Integrated coastal zone management involves the comprehensive assessment of resources, setting of objectives, planning and management of coastal systems and resources, taking into account traditional, cultural and historical perspectives and conflicting interests and uses. It is a continuous and evolutionary process for achieving sustainable development (World Coast, 1993).

3.6 The benefits of integrated coastal zone management have been discussed in qualitative terms in many technical and scientific forums. The United Nation Development Programme (Gus Edgren, 1993) has carried out a preliminary analysis in Indonesia on the economic returns from strategic management interventions to enhance sectoral development benefits and control sectoral development costs in the coastal areas. It was reported that improved resources management strategies and actions would result in at least a 10% improvement in growth rates for marine and coastal activities resulting in a productivity gain of some US $ 6.1 billion in 1988 terms and would generate 500,000 additional job opportunities by the end of 1994. In the Maldives, it was reported that destruction of coral reefs has had to be compensated for by the construction of a breakwater at a cost of US $ 12,000 per linear meter. In Malaysia, it is well established that the loss of the mangrove belt (for aquaculture, timber extraction, etc) is the primary cause of shoreline retreat in some muddy coast where the cost of coastal erosion control ranges from RM 2,000 to RM 5,000 per meter run.

## 4. THE ENVIRONMENTAL QUALITY ACT AND ADMINISTRATIVE GUIDELINES FOR REGULATION OF COASTAL DEVELOPMENT

4.1 The Environment Quality Act (1974) and the subsequent Environment Quality (Amendment) Act (1985) are federal laws which impose some form of regulatory control on all development activities from the consideration of potential impact on the environment. These laws are therefore in support of the concept of sustainable development and sound coastal zone management. The Environmental Impact Assessment Order of 1987 (Prescribed Activities) spells out a list of development activities which require mandatory submission of EIA reports for prior approval of the Department of Environment. Examples of projects in coastal zone which fall under the prescribed activities are -

- Land development schemes for converting forest to agricultural land which involve an area of more than 500 ha

- Drainage of mangrove swamps which involves an area of more than 100 ha

- Conversion of mangrove swamps for industrial, housing or agriculture for areas exceeding 50 ha.

- Reclamation of coastal area which involves an area of more than 50 ha.

- Aquaculture projects which involve clearing of mangrove swamp of more than 50 ha.

- Clearing of mangrove swamps in islands surrounded by national marine parks.

- Sand mining covering an area of more than 50 ha

- Construction of coastal resorts or hotels exceeding 80 rooms

- Construction of recreational facilities in islands surrounded by gazetted marine parks.

- Construction of port or expansion of existing port involving an increase of more than 50% in handling capacity

- Construction of pipelines exceeding 50 km in length on shore or offshore.

4.2 Amongst the problems encountered in the implementation of the EIA law is the poor quality of EIA reports and the delay in processing and issuance of EIA approval. These problems arise because many consultants are either inexperienced or fail to address the key issues involved. The Department of Irrigation and Drainage provides assistance to the Department of Environment in the form of providing review and comment on EIA submissions for projects affecting rivers, coast and water resources. In 1993, the Coastal Engineering Division of DID has reviewed and provided comments on some 35 EIA reports on development projects in the coastal areas. The Department is therefore aware of many of the current difficulties and weaknesses. In January 1993, DID held a workshop in Fraser's Hill which was attended by about 40

senior officials from its Federal and State offices to develop a set of guidelines for EIA submission for river, coastal and water resources related projects. The resulting guidelines for impact evaluation of coastal projects are reproduced in Appendix 1 of this paper.

4.3 Beside laws, administrative guidelines have also been introduced by the government to streamline or rationalise planning practices although these guidelines do not have the status of law. An example of this is the General Administrative Circular No.5 of 1987 issued by the Prime Minister's Department requiring all developments in the coastal zone to be referred to the Coastal Engineering Technical Center of the Department of Irrigation and Drainage for comment. Through this Circular, JPS has provided advice to approving authorities for development applications in the coastal areas by pointing out the potential impact, in particular, from the consideration of risk of coastal erosion and overall stability of the directly affected or adjacent shorelines. In 1993 alone, the Coastal Engineering Center has processed and provided comments on some 150 development applications in the coastal areas.

4.4 It need to be emphasized that the EIA law and Administrative Circular 5/1987 by themselves cannot attain the full objectives and benefits of integrated coastal zone management. Currently, environmental impact assessments are carried out on a project by project basis giving rise to the following weaknesses :-

- Potentially damaging projects could be missed because they fall outside cutoff limits.

- The cumulative effect of a series of small scale projects could be significant, for example, a string of reclamation projects located near one another.

- Lack of historical and field data to carry out meaningful simulation studies for accurate impact assessment.

- High cost of modelling studies in relation to the magnitude of investment for a project

- Inadequate recognition or under-valuation of the benefits of nature/ environmental preservation and bio-diversity.

Hence, EIA laws and administrative circulars should be regarded as instruments to promote effective coastal zone management but are inadequate by themselves to bring about integrated coastal zone management.

## 5. INSTITUTIONAL ASPECTS

5.1 The effective implementation of coastal zone management at the state and national levels requires the establishment of workable and effective institution or institutional linkage for the sound planning, control, regulation and enforcement of existing and new developments. Malaysia is a confederated state comprising two levels of government, the Federal and State Governments. The administration of land and waters, including coastal waters up to 5.5 km falls under the jurisdiction of the State Government and hence the cooperation and commitment of the latter is necessary for the success of any coastal zone management programme. The primary roles of Federal departments and agencies lie in the introduction of uniform and rational approaches and practices.

5.2 The current mechanism and institutional linkage for planning and regulation of development activities will be covered in a separate paper to be presented by the Town and Country Planning Department and hence will not be elaborated here. It is, however, recognised that there is a need to introduce a more effective and integrated approach for landuse planning and approval of development projects and activities in the coastal zone. There are a number of agencies/ departments at the Federal, State and Local levels responsible for planning and management of coastal resources, including landuse. The current practice requires the approving agency (Land Office, Municipalities, Local Authorities, State Governments) to seek the views of technical agencies regarding the various technical aspects of the development applications. Greater coordination and integration between these agencies are necessary to ensure that the inter-dependencies and conflicts between resource users can be reconciled in the most effective or rational manner.

5.3 Following the completion and favourable reception of the South Johor Coastal Resources Management Plan in 1990 (see Para 3.3 above), it s clear that there are definite merits to be gained through this more systematic pla ning approach. It is therefore advocated that

- Similar coastal resources manage ment plan be develo ed for other coastal regions, with priority given to areas of high growth or growth potential

- Coastal resources management consideration be made an integral component of future planning efforts to develop or update structu ral plans for coastal towns, local authorities or states

The development of integrated coastal zone management plan with full public participation involving all sectors and levels of the affected com munities is generally recognised as the most effective and "democratic" approach for resolving the often conflicting demands of economic progress and environmental preservation. For example, the issues of mangrove and wetland preservation are now gaining wider and greater support from planners, general public and the decision makers as people become more aware of values of these habitats in maintaining the yield of near-shore fisheries, shoreline stability, support of endangered species of w ld life and promotion of biological diversity.

5.4 From the above discussions, it is evident that there is considerable room for improvement in the current efforts for coastal zone manage ement in Malaysia. However, it is clear that the country is following the footstep of other more advanced countries as the focus of attention shifts from one of engineering measures for coastal erosion control in the late eighties into that of comprehensive coastal zone management in the early nineties and beyond.

## 6. FORMULATION OF A NATIONAL COASTAL RESOURCES MANAGEMENT POLICY

6.1 As a result of increasing awareness and concern on environmental issues and in support of the concept of integrated management and sustainable development, the

Economic Planning Unit (EPU) of Malaysia has embarked on the preparation of a National Coastal Resources Management Policy in early 1992. The proposed policy is expected to provide directions in respect of the following :-

(a) Multi-sectoral and holistic planning for the coastal zone;

(b) Site specific management plans prescribing zoning for different types and levels of resource use;

(c) Uniform guidelines for construction setbacks from mangrove areas based on the type of development proposed;

(d) Construction setbacks from mean high tide line on sandy beaches, crenulate bays or estuary mouths;

(e) Buffer zones around protected areas such as marine national parks;

(f) Operational guidelines for potentially harmful development activities such as sand mining ;

(g) Maintenance of coastal water quality and pollution control ;

(h) Environmental impact assessment for potentially damaging development proposals, irrespective of size.

6.2 For the above purpose, the Economic Planning Unit has set up an Inter-Agency Planning Group (IAPG) in early 1992 to develop the above policy. Memberships of IAPG comprise all the relevant departments and agencies such as Ministry of Agriculture, Ministry of Science, Technology and the Environment, Ministry of Land and Cooperatives Development, Ministry of Housing and Local Government, Ministry of Transport, Ministry of Primary Industries, Department of Environment, Department of Agriculture, Department of Irrigation and Drainage, Department of Public Works, Department of Forestry, Department of Town and Country Planning,

Department of Survey and Mapping, Department of Geological Survey, Attorney General's Office, Implementation and Coordination Unit and the Forestry Research Institute.

6.3 To assist the IAPG, three Technical Working Groups (TWG) have been established to study in detail the various related aspects and to prepare inputs for drawing up the required final policy. These technical working groups are

TWG 1 - Coastal Resources
TWG 2 - Coastal Planning Processes
TWG 3 - Legislative and Institutional Aspects

TWG 1- Technical Working Group on Coastal Resources

6.4 The objectives of this working group are to define the coastal zone, describe its resources and document the resource utilization problems. The scope of activities encompasses defining a sensible technical delineation of the coastal zone, compiling information on the coastal resources, covering its extent and degree of utilization and the problems these uses/ conversions have caused. The composition of TWG 1 include the Department of Agriculture (lead agency), Economic Planning Unit (Regional Economic Section), Department of Forestry, Department of Fisheries, Department of Geological Survey, Department of Irrigation and Drainage, Ministry of Defence - Hydrographic Section and the Malaysian Nature Society (a non - governmental organisation)

TWG2 - Technical Working Group on Coastal Planning Processes

6.5 The objectives of TWG 2 are to analyse the strengths and weaknesses of the current planning system and to propose a multi-sectoral holistic approach to coastal zone planning which can be implemented nationwide. This working group is expected to evaluate existing planning systems, identify major overlaps, gaps or weaknesses, review overseas practices, propose amendments to planning systems and formulate implementation schedule for the new planning system. The membership of the TWG 2 comprises Department of Town and Country Planning (lead agency), Department of Environment, Department of Irrigation and Drainage, Ministry of Local

Government, Ministry of Science, Technology and the Environment, State Economic Planning Units, Public Works Department and the Forestry Research Institute of Malaysia.

TWG 3 - Technical Working Group on Legislative and Institutional Aspects

6.6 The objectives of TWG 3 are to review the legislative and institutional arrangements for coastal zone planning and management. The scope of work encompasses examination of existing legislative and administrative arrangements, identification of failures of existing legislation and recommendations of revised legislation and institutional arrangements. The membership of TWG 3 comprises Attorney General Chambers (lead agency), Economic Planning Unit, State Economic Planning Units, Ministry of Land and Cooperative Development, Ministry of Local Government, Department of Environment and Department of Irrigation and Drainage.

6.7 The preliminary findings of the technical working groups indicate that there are a number of policy issues which need to be resolved and in particular, the legal and institutional aspects. Some of the more important ones are :-

(a) It may not be practical to delineate a fixed width for the coastal zone and in particular, on the landward side. The limits of the coastal zone must reflect the specific local conditions in order to capture all the activities that have significant impact on the coastal resources and their uses. While a general set of guidelines is useful, the final boundary should be subject to adjustment by the State or Local Authorities that are involved.

(b) Appropriate amendments may be necessary to the National Forestry Act of 1984, the Fisheries Act of 1985, National Land Code of 1965, the Land Conservation Act of 1960, the Town and Country Planning Act of 1976, the Street, Drainage and Building Act of 1976, the Sewage and Industrial Effluent Regulations of 1979, etc.

(c) Local authorities should be extended to cover all coastal zone areas, including state territorial waters and offshore islands and by-laws be made to enforce coastal management plans. The application of the Town and Country Planning

Act 1976 should be extended to Sabah and Sarawak.

(d) Activities such as aquaculture, sand mining and groundwater management are not covered or under-regulated by existing laws and hence suitable amendments to existing laws or creation of new legislation may be warranted.

(e) The Environmental Quality (Prescribed Activities ) (EIA) Order 1987 should be reviewed and activities identified to have significant impact on the environment irrespective of size should be included in the list of prescribed activities.

6.8 All the Technical Working Groups have completed their reports in mid 1993 but the policy document has yet to be finalised. Hence it is not possible to present its findings in this report. However, the focus of the proposed policy is expected to include :-

(a) The development of a National Coastal Resources Programme to address the issues of coastal resources development in an integrated, systematic and scientifically sound manner;

(b) The establishment of effective coastal resources planning and coordinating institutional mechanisms at both the Federal and State levels;

(c) The provision of budget and adequate financial resources to implement the coastal resources management programme throughout the country ;

(d) The revision of existing legislation and the possible formulation of new laws, regulations and guidelines for effective coastal resources planning and management;

(e) The enhancement of the capabilities of relevant Federal and State Departments and Agencies in terms of manpower, expertise and planning/enforcement capabilities in areas related to coastal resources;

(f) The development of a programme of research and data collection to support proper planning and to improve the capability for managing coastal resources;

(g) The preparation and implementation of integrated regional resources management plans for all parts of the country;

(h) The development of a programme of public education and awareness of the nature and importance of coastal resources for the general public and especially for those in government and public sectors who are directly involved in the development and management of coastal resources.

## 7. CONCLUSIONS

7.1 The coastal zone supports more than 70 % of the population in Malaysia and is also the center of socio- economic activities. The Government is committed to the concept and practice of sustainable development in its pursuit of economic progress and better quality of life for her people. Integrated coastal resources management is a pressing concern as well as a necessity in the light of increasing incidence of coastal erosion, resources depletion and environmental degradation problems in many of the more-developed coastal areas of the country. While the Government is currently implementing various short term measures to address specific issues and problems in coastal areas, it recognises the necessity to implement long term strategies emphasizing on proper planning and control of future developments in the coastal zone.

7.2 The formulation of a national coastal resources management policy is the first step towards a rational and integrated approach in coastal zone management in Malaysia. In this respect, Malaysia is following the footstep of other more advanced countries as the focus of attention shifts from engineering measures for coastal erosion to comprehensive integrated coastal zone management .

## REFERENCES


Economic Planning Unit, Malaysia (EPU), " National Coastal Erosion Study : Phase I Report " , the Government of Malaysia, September 1985.

Dato' Ir. Shahrizaila bin Abdullah, " Coastal Erosion Management in Malaysia", Keynote address in IEM/ICE Joint Conference in Coastal Engineering in National Development, 4-6 March 1991, Kuala Lumpur

Ministry of Science, Technology and the Environment (MOSTE), " The Coastal Resources Management Plan for South Johor, Malaysia", ICLARM Contribution No. 782, 1992.

Gus Edgren, " Expected Economic and Demographic Development in Coastal Zone Worldwide", paper presented at the World Coast Conference, 1993, Netherlands.

World Coast 2000, Draft Conference Report, World Coast 2000, Noordwijk, the Netherlands, 5th November 1993.

Table 1

## DISTRIBUTION OF COASTAL EROSION AREAS IN MALAYSIA

| State | Length of Coastline (Km) | Category 1 (Km) | Category 2 (Km) | Category 3 (Km) | Total Length of Eroding Coastline (Km) | (%) |
|---|---|---|---|---|---|---|
| Perlis | 20 | 4.4 (3) | 3.5 (1) | 6.4 (4) | 14.3 (8) | 71.5% |
| Kedah | 148 | 16.1 (10) | 2.8 (3) | 14.2 (5) | 33.1 (18) | 22.4% |
| Pulau Pinang | 152 | 34.7 (7) | 22.9 (6) | 1.1 (1) | 58.7 (14) | 38.6% |
| Perak | 230 | 16.6 (3) | 26.5 (2) | 92.5 (3) | 135.6 (8) | 59.0% |
| Selangor | 213 | 54.1 (9) | 32.9 (8) | 69.1 (4) | 156.1 (21) | 73.3% |
| N. Sembilan | 58 | 1.1 (1) | 9.6 (5) | 12.9 (1) | 23.6 (7) | 40.7% |
| Malacca | 73 | 4.0 (1) | 24.6 (3) | 3.0 (1) | 31.6 (5) | 43.3% |
| Johor | 492 | 18.8 (7) | 53.2 (9) | 165.7 (13) | 237.7 (29) | 48.3% |
| Pahang | 271 | 6.2 (5) | 4.3 (3) | 109.2 (8) | 119.7 (16) | 44.2% |
| Terengganu | 244 | 17.6 (5) | 11.0 (6) | 124.0 (10) | 152.6 (21) | 62.5% |
| Kelantan | 71 | 3.0 (3) | 10.9 (6) | 37.6 (5) | 51.5 (14) | 72.5% |
| W.P. Labuan | 59 | 0.0 | 5.0 (4) | 25.1 (2) | 30.1 (6) | 51.0% |
| Sarawak | 1,035 | 8.0 (3) | 22.8 (11) | 13.7 (7) | 44.5 (21) | 4.3% |
| Sabah | 1,743 | 12.8 (5) | 3.5 (2) | 279.2 (12) | 295.5 (19) | 17.0% |
| TOTAL : | 4,809 | 197.4 (62) | 233.5 (69) | 953.7 (76) | 1,384.6 (207) | 28.8% |

Notes : Figures in ( ) represent the number of sites
Category 1 – Critical Erosion Areas
Category 2 – Significant Erosion Areas
Category 3 – Acceptable Erosion Areas

# GENERAL GUIDELINES FOR IMPACT EVALUATION OF DEVELOPMENT PROJECTS IN THE COASTAL ZONE

***(Note : These guidelines were developed during a workshop on Environmental Impact Assessment organised by the Department of Irrigation and Drainage, Malaysia on 11-12th January 1993 in Fraser's Hill. They are intended to serve as reference or guidance materials to those undertaking the overall planning and EIA studies of coastal development projects)***

## 1. INTRODUCTION

For the purpose of environmental impact evaluation studies, it is convenient to classify coastal development projects into three broad types :-

(a) Shore front development

(b) Backshore development

(c) Dredging and land reclamation

Shore front developments are those located on the shoreline or foreshore such as ports, marinas, breakwaters, groynes, jetties, sewerage outfalls, etc. These developments can interfere with the equilibrium of coastal processes resulting in coastal erosion/ siltation problems, damage to marine eco-system, water pollution, etc. Backshore developments refer to works located inland from the shoreline such as hotel/ resort development, housing, industrial and agricultural development. The impacts of these projects on coastal processes/ equilibrium are dependent on factors such as the local wave climate, siting, nature and scale of the proposed developments. Reclamation and dredging projects affect the natural planform and nearshore hydrography and hence can result in highly significant impacts, especially in the case of large scale development.

## 2. SHORE FRONT DEVELOPMENT PROJECTS

2.1 All shore front development activities are bound to affect the environment although the severity of impacts may differ from one case to another. Hence they should be subject to proper impact evaluation study using appropriate technology commensurate with the nature and scale of the development project, the availability and the quality of data at the site of interest. For coastal engineering works, a comprehensive impact evaluation study should typically include :-

(a) Preparation of key plan, location plan and site plan showing the siting and layout of proposed development or engineering works.

(b) Topographical, hydrographic, engineering and socio-economic conditions of the project site and its vicinity.

(c) Determination of the local wave climate, current, tides, storm surge, sediment characteristics.

(d) Study of historical information to determine trends and rates of accretion and erosion.

(e) Prediction or measurement of the movement of sediment, littoral transport, sediment budget analysis under the without and with project assumptions.

(f) Determination of the influence of proposed development works on the neighbouring sections of coastlines and any future trends. This should include quantitative estimation of shoreline changes such as erosion and accretion and their socio-economic implications.

(g) Evaluation of environmental impact with regard to all of the uses of the shoreline/ estuaries such as aquaculture, recreation, including potential impacts on water quality and marine ecology.

(h) Identify feasible mitigative measures to overcome the various adverse effects arising from (f) and (g) above. This should cover capital works as well as the operation and maintenance measures, where applicable.

2.2 For the larger and more complex projects, physical and/or computer modelling studies are strongly recommended. Computer models, however, are less time consuming and more suitable for problems involving coastal sediment transport. For some projects, it may be possible to resort to expert opinion of experienced scientists/ engineers for a preliminary impact assessment and to decide on the need and/or scope of more detailed modelling studies.

2.3 Where computer models are used in the analysis, they must be of the proven or well-tested types and in addition, proper attention must be given to data collection, model calibration and verification. All raw data and boundary conditions must be clearly stated and made available to enable the Review Agency to verify the model predictions by similar or independent means. It is advisable that the Consultants have prior consultation with the Review Agency regarding the acceptability of a particular computer software for a project-specific applications.

## 3. BACKSHORE DEVELOPMENT PROJECTS

3.1 Backshore development projects include works such as construction of hotels, housing, agricultural and industrial development, etc.. These projects, by far represent the bulk of the economic development activities taking place in the coastal zone. The impact of such projects can range widely. In the case of projects involving extensive clearing of vegetation, backfilling of land, bunding, etc, full impact evaluation studies along the lines of 2.1-2.3 would be required. However, in the majority of cases comprising small scale housing, resort and industrial development, it is advised that such development be sited at a suitable distance from the shoreline (development setback) to minimise the risk of damage or losses due to coastal erosion

and the undue interference on the nearshore biological and marine environment. If this is complied with, an impact evaluation studies (on the coastal erosion aspect) is not necessary. It is, however, cautioned that the need for an environmental impact study may still be required by the Department of Environment.

3.2 Based on the findings of South Johor Coastal Resources Management Study completed in 1991 and the other experiences of the Department of Irrigation and Drainage, the following setbacks limits are proposed :-

(a) 60 meters for sandy coast
(a) 400 meters for muddy coast

The setback distances are measured from the Mean High Water Line.

3.3 An additional setback in mangrove- covered coastal areas is also recommended to help protect this resource from pollution discharge and runoff. In general, the recommended setback is 100 m for tourism development, 500 m for housing estate development, and 1000 m for industrial estate development.

3.4 Where beach dunes are present, they should be preserved in their natural state. New development or re-development activities on sand spits and sandbars should not be permitted.

3.5 The above setback limits are not dependent on the current stability of the coastline or classification of erosion hazard (critical, significant or acceptable). They are considered as good management/ engineering practices for shoreline in recognition of the dynamic nature of coastal processes and the potential risk of shoreline erosion.

3.6 The minimum setback requirements may be reviewed on account of site specific conditions. Examples of conditions warranting such review are :-

(a) Where it is in the near vicinity of a well developed area with high-value permanent buildings located at distances less than the recommended setback.

(b) Where the proposed development is landward of an existing public access eg. JKR road or coastal bund, the loss or failure of which is unacceptable.

(c) Where the developer undertakes to provide coastal erosion protection works based on a design acceptable to the Government.

(d) Where the prevailing backshore is steep, rocky or is a headland.

3.7 For development projects sited in critical erosion areas, the developers would be required to construct feasible erosion protection works at their own cost.

## 4. LAND RECLAMATION AND DREDGING

4.1 All sizeable land reclamation projects should be subject to environmental impact evaluation studies as detailed in 2.1- 2.3 above. The impact assessment should capture the hydrodynamics and morphological changes using a modelling approach.

4.2 Materials for landfill should be secured from sources approved by the Government. Sand mining is not permitted in nearshore areas which are less than 1.5 km from the Mean Low Water Line or 10 meter water depth (from Mean Low Water Line) whichever is the further.

4.3 If it is not possible to comply with 4.2 above due to technical, practical or economic reasons, a suitable study should be conducted to demonstrate that the proposed site of sand dredging operation would not lead to adverse impacts on the coastal processes, marine eco-systems and the stability of the adjacent shorelines.

4.4 There should be proper provisions for passing the drainage/ flood flows of the hinterland catchment intercepted by the reclamation landfill.

## 5. OTHERS

5.1 For jetties construction, an open piling system is preferred over solid barriers because the latter could interfere with the continuity of littoral sediment transport.

5.2 The use of vertical faced shore front protection works (e.g. sea wall) is not recommended.

5.2 Sewage outfall pipes should be extended to beyond the Mean Low Water Spring (MLWS) and buried with a minimum cover of 1 meter to avoid any obstruction to the littoral drift.

5.3 Dredging or deepening of natural river mouths may result in creation of sediment sinks leading to problems of erosion in adjacent coastlines. The dredged material should be deposited on dumping sites approved by the Government. Sand mining at river mouth or sandspit for commercial uses should be prohibited.

Department of Irrigation and Drainage,
Malaysia
January 1994