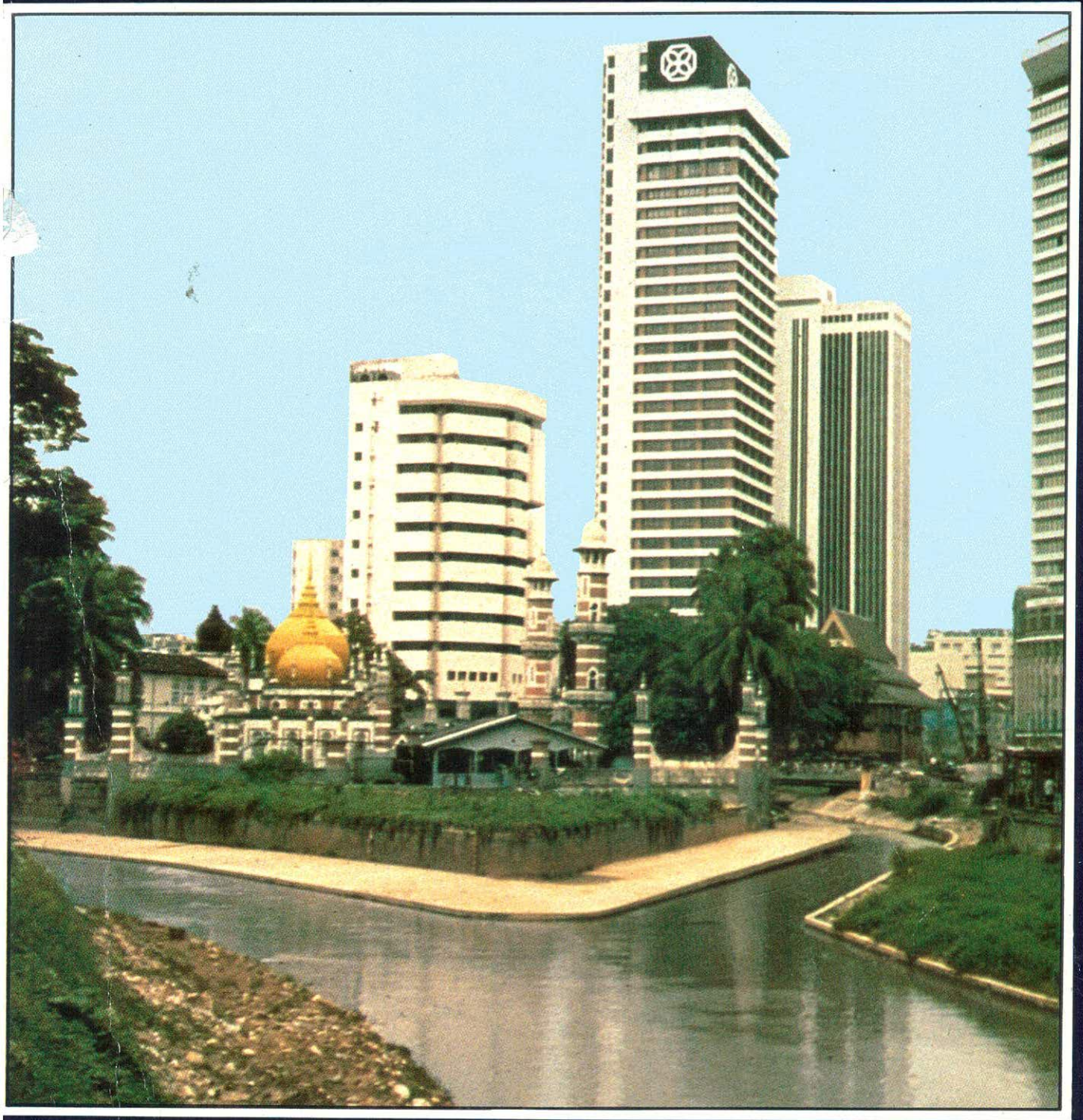
MALAYSIA



ENVIRONMENTAL QUALITY REPORT 1981 - 1984

MALAYSIA

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1981–1984

Department of Environment
Ministry of Science, Technology and the Environment

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ENVIRONMENTAL POLICIES AND ADMINISTRATION

Introduction

The present prosperity and relatively high living standard of Malaysians draw heavily on Malaysia's rich resource base, both renewable and non-renewable ranging from forestry, land, fossil fuels, minerals, to the most basic resource of all, water.

For many years the major environmental problem in Malaysia stemmed predominantly from the lack of development and inadequate infrastructure facilities, in short poverty itself seemed polluting. It was thus that the country after Independence opted over successive plan periods for accelerated development programmes spanning mining, forestry, agriculture, land settlement, urban and industrial development.

The high rate of economic development experienced in recent decades, particularly in the 25 years since Independence has made substantial inroads into the reserves of minerals, soils, forests, land and water. The Government, sensitive to the implications of reaching a condition of near utilisation of these resources by the turn of the century, took timely action to head off such a situation through gradual transition from an exploitive, resource-based economy to a more balanced semi-industrialised condition during the Second and Third Malaysia Plan periods.

Malaysia has now entered the 1980s, characterised as the decade of development of its resource-based industries with a shift in industrial development strategy favouring basic industries and in the process ushering in the country's involvement in heavy industries under the Fourth Malaysia Plan. The rapid development and structural change of the economy brought in its wake several problems. One among them tacitly recognised by the Government was the compelling need to manage the environment following the realisation that development cannot confer lasting benefits unless environmental considerations of man and related ecosystems become central to development planning and decision-making and man in effect, operates in harmony with his environment.

The environmental problems of major public concern in Malaysia have been identified as follows:-

(i) Rural-Urban drift contributing to urban concentration and congestion with enormous pressure on water supplies, waste disposal and other public services as well as giving rise to serious squatter problems;

(ii) Polluting emissions, both gaseous and liquid, from a wide range of vehicular traffic and industries – including agro-based ones such as palm oil and rubber processing facilities;

(iii) Particulate matter – such as smoke emissions from stacks and vehicle exhaust, and dust from quarrying and crushing activities, vehicular traffic, construction activities and open burning of solid wastes;

(iv) High ambient lead levels of concentrations 2 to 4 times higher than the allowable ambient level at busy road junctions in urban areas;

(v) Occurrence of haze coupled with long dry spell leading to localised high temperatures especially in the urban setting and resulting in poor visibility and interruption of flight schedules;

(vi) High noise levels measured at the boundary of many residential buildings and schools located at new main roads;

(vii) Erosion and sedimentation of rivers and canals, arising from housing, land settle-

ment, urbanization and infrastructure construction and logging causing perennial and recurring floods in the country;

(viii) Excessive deforestation and logging, shifting cultivation and dam construction for irrigation and hydropower projects which disrupt and dislocate traditional human settlements and wildlife;

(ix) Mining and industrial effluents polluting rivers and inland waterways, resulting in fishkill in river systems;

(x) Discharge of untreated sewage into watercourses;

(xi) Oil spills and the discharge of wastes from ships near coastal areas causing fishkill, loss of other marine life and oil contaminated beaches;

(xii) Indiscriminate dumping of solid wastes, poor refuse collection system and rampant littering;

(xiii) Misuse of fertilizers, pesticides and herbicides in agriculture leading to the eutrophication of inland waters;

(xiv) The build-up of dangerous pesticide residues in fish and other marine biota and adverse impacts through the food chain; and

(xv) Indiscriminate disposal and dumping of toxic and hazardous wastes generated by industries.

Since the environment is complex and Man's activities both influence and are influenced by the environment, inter-disciplinary action on a broad front is required to cope effectively with environmental problems. To be effective such inter-disciplinary endeavours need the closest rapport among all actors on the environment scene.

Strategy For Environmental Management

Whilst the concern with human environment can only reinforce the commitment to development, it should serve, however to provide new dimensions to the development concept itself — a concept which has as its aim the satisfaction of human needs without destroying the environment from which these needs are met. In this respect, therefore, in view of the interaction that exists between resource development and environmental quality, environmental management should be understood to mean prudent management of the quantity and quality of our national resources.

As the prospects of a long run abundant supply of natural resources are weak and technological innovations are inadequate, discrete and unpredictable, Malaysia has to take a serious look at its resource limitations, especially renewable resources and tailor its development efforts suitably. This does not imply sacrificing development itself. What it does imply, though, is that the patterns of resource development and resource use have to be restructured by adopting policies of resource management which are innovative and imaginative, and focus on employment and efficiently organised productive activities. Resource development, therefore, has to be approached on an integrated basis, treating environment as an important parameter in order to bring maximum economic and social benefits to improve the quality of life. Essentially it should aim at:-

(i) Minimizing wastes in the process of resource development and utilization of wastes;

(ii) Developing appropriate technology for management and control of wastes; and

(iii) Limiting the environmental problems.

Since development of natural resources itself is a continuous process which involves intentional changes to the environment through the various activities, it must therefore be accompanied by conscious efforts in guiding these environmental changes so that the economic growth could be sustained to provide an increasingly better standard of living not only in the material sense but also in the value of life itself. The essential task of guiding this change must be carried out through a proper long-term management of the resources, for maintaining an equilibrium between the modes of resources and the rising needs. It simply means a farsighted view of the users of the resources such that it is possible to continue to use them or even improve their yield for a long time to come.

The present environmental problems have been the results of neglecting environmental considerations at Federal, State and private sector levels. There has been a lack of anticipatory planning which is the most sensible and less expensive strategy for dealing with environmental problems. In the absence of such planning, Malaysia had no choice but to adopt a problem-responsive strategy to start with, which means reacting to a problem after it has taken place and damage is done. In most cases problem-responsive situation has been found to be expensive, inconvenient, time-consuming and sometimes, insoluble in economic sense.

The Environment Department has therefore developed a three-pronged strategy encompassing short-term, medium-term and long-term measures designed to ensure that development projects by dint of environmental planning will avoid costly remedial measures at a later stage. Essentially this strategy will also help ensure that no new environmental problems are created.

The short-term measure calls for the control of liquid effluent discharges and air pollutant emissions from existing and new factories. A number of regulations have been gazetted by the Minister in charge of the environment on the recommendation of the Environmental Quality Council. These regulations, relating to control of pollution from palm oil mills and rubber factories and the control of air and water pollution from other industries, prescribed various standards both for the discharge of liquid effluents and the emission of air pollutants.

The aim of the second measure which is a medium-term measure is to provide environmental guidelines for planning and development agencies in order to assist them in taking into account environmental protection measures in the planning and implementation of their projects.

The third measure, which is a long-term measure, is to ensure that environmental quality including the quality of the physical environment and the quality of life of the people affected by the project is taken into account in development. This would mean a development strategy which includes an integrated approach entailing advance or forward planning in the environmentally related activities with a view to incorporating environmental dimension into development planning right at the base level in order to achieve sustained development and long-term conservation of environmental assets and at the same time improving the quality of life for all.

Main Task

The significant activities of the Environment Department among other things included:-

(i) Review of the Environmental Quality Act 1974;

(ii) Preparation of the draft for the Chapter on 'Environment' in the Fifth Malaysia Plan Document;

(iii) Review of the standards for the Latex Concentrate and SMR Rubber factory effluents;

(iv) Review of the standards for palm oil mill effluent to determine the limits of B.O.D. and other parameters applicable for the period 1st July, 1982 to 30th June, 1983 and the years thereafter;

(v) Enforcement of the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979 for those industries which had been in existence prior to 1st January, 1979 and were given a two year gestation period until 31st December, 1980 to comply with the Regulations;

(vi) Establishment of three additional units in the Environment Department to help promote wider application of integrated development strategies, namely, Resource Management Monitoring Unit, Environmental Impact Assessment Unit and Environmental Information and Education Unit;

(vii) Establishing of Air Quality Network and Task Force for air quality monitoring;

(viii) Enhancement of awareness of environmental changes and appreciation of their bearing on social and economic changes;

(ix) Holding of the 'Exercise Malacca 1984' to assess the preparedness and efficiency of the National Contingency Plan for the Mitigation and Control of Oil Spills in the Straits of Malacca;

(x) Initiation of studies pertaining to development of Water Quality Criteria and Standards;

(xi) Joint Monitoring programme of acid rain by the Environment Department, Chemistry Department and Department of Meterological Services;

(xii) Joint study by the Environment Department and an Australian firm of consultants under Commonwealth of Australia Technical Co-operation arrangement with a view to preparing policy guidelines for the disposal of toxic wastes; and

(xiii) Initiation of action on the formulation of regulations for the control of noise pollution and marine pollution, disposal of toxic and hazardous wastes and reduction of lead in gasoline.

Enforcement

The first echelon environmental management constituting the enforcement of the various Regulations under the Environmental Quality Act 1974 continued to be the priority task of the Environment Department. The palm oil mill and rubber factory effluents control regulations were enforced with more stringent standards. In the case of palm oil industry, all the mills had to meet the Biochemical Oxygen Demand (B.O.D.) standard of 500 ppm (parts per million) on 1st July, 1981 and 250 ppm on 1st July, 1982 compared to 1000 ppm on 1st July, 1980. Similarly the standards for rubber factory effluent were made more stringent. Latex concentrate factories had to comply with a discharge standard of 300 ppm for BOD on 1st April, 1981, 200 ppm on 1st April, 1982 and 100 ppm as from 1st April, 1983. The SMR block rubber factory had to meet the desirable standard of 100 ppm for BOD as from 1st April, 1981.

Environmental Quality (Clean Air) Regulations 1978 and Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977 were enforced to curb pollution problems arising as a result of smoke, dust and gaseous emissions from factories, industrial activities and motor vehicles.

As regards marine pollution problems, discharges from land-based sources continued to be controlled through the various Regulations under the Environmental Quality Act, 1974. In addition, the Environment Department commenced prosecution action on vessels for deliberate discharge of oil through the enforcement of provisions in the Environmental Quality Act, 1974.

Apart from the enforcement of Regulations, the Environment Department also carried out baseline studies and monitoring of water and air quality including marine environment and pre-siting evaluation of new industrial sources, licensing of prescribed premises and other industries which could not meet the acceptable conditions due to reasons beyond their control and review of environmental impact assessments of selected projects.

Federal-State Co-operation

Another notable feature was that the establishment of the Regional Offices paved the way for the sharing of the task of environmental management with State Governments and Local Authorities, who, in view of their legislative and administrative competence in specific fields, have a considerable role to play in solving environmental problems. Through effective co-ordination and willing co-operation they could contribute considerably towards effective performance in environmental protection and management so that available resources of manpower and funds are deployed to good purposes and duplication of efforts are avoided. In this respect the Environment Department has undertaken the leadership role in providing the necessary instruments of control. It responded to this task positively through the preparation of guidelines which are intended to help State Governments and other agencies to incorporate environmental considerations into their development plans. In the performance of this responsibility, the Environment Department has given priority to the formulation of guidelines for environmental control in land uses which are the root cause of environmental pollution and as a first step the Environment Department has prepared the 'Guidelines for the Siting and Zoning of Industries' for implementation by the State Authorities.

Environmental Quality Council

The Environmental Quality Council established under Section 4 of the Environmental Quality Act, 1974 continued to function under

the chairmanship of Yang Berbahagia Tan Sri Hamzah Sendut, DMPN., PGDK., PSM., DJN., PPT.

Ever since its formation and launching of the first Council on 12th April, 1977, the main thrust of the Council's activities has been in the direction of helping to formulate the various sets of control Regulations under the Environmental Quality Act, 1974. During the tenure of the second Council launched on 23rd December, 1980 the Council contributed significantly to galvanise the public sector, industry and the scientific community including researchers to exert best endeavours to minimise environmental degradation and increasingly harness energies of all concerned to the task of environmental improvement.

The third Council was launched by the Honourable Minister of Science, Technology and Environment, Datuk Amar Stephen K.T. Yong, D.A., P.N.B.S., on 24th March, 1984. The third Council shifted its emphasis on the relationship between environment, development and resources embodied in the environmental assessment of development projects. It also deliberated on several pressing issues such as pollution of the Malacca Straits, air pollution in urban centres and suggested to the Minister possible solutions for his consideration.

Organisational Set-Up

The organisational set-up of the Environment Department still reflected the priority accorded to the first echelon environmental management with considerable efforts made towards moving into the second and third echelon environmental management. The departmental status was accorded in September, 1983. It has grown to the present complement of 388 with 3 additional units, namely, Resource Management and Monitoring Unit, Environmental Impact Assessment Unit and Environmental Information and Education Unit and 7 Regional Offices as in Figure 1. The States covered by each of the Regional Offices are as follows:-

- Northern Region – Penang, Perak, Kedah and Perlis
- Central Region – Federal Territory, Selangor, Negeri Sembilan and Malacca
- North-Eastern Region – Trengganu and Kelantan
- Eastern Region – Pahang
- Southern Region – Johore
- Sarawak Region – Sarawak
- Sabah Region – Sabah

Conclusion

It is perhaps some measure of the strides made in terms of progress and development that today Malaysia is engaged in a variety of activities to restore, protect and preserve its environment and at the same time make the most effective use of the national resources to provide a better life for the people and the succeeding generations.

A significant development has been the forging of closer rapport with the State Governments for effective coordination and willing cooperation in environmental management and rightly moving towards a preventive approach through proper environmental planning by incorporating environmental dimension in an integrated way into development planning right at the base level.

CHAPTER II

STATE OF THE ENVIRONMENT

STATE OF THE ENVIRONMENT

Introduction

While on balance the general conditions of the environment have improved, the specific state of the environment is still short of the desirable level. The significant amount of pollutants released uncontrolled into the environment certainly does not give the country the total assurance that the air is always clean, the water is completely safe for drinking or relatively uncontaminated for commercial, industrial, agricultural and other beneficial uses, and for that matter, the land and the surrounding seas remain productive.

Air Quality

Although it is generally true that human beings and other living organisms can be selective in the choice of their basic needs in food and shelter, there is no practical alternative to all mankind and other living beings having to breathe in, almost every second, other than clean and uncontaminated air.

On balance, the available data suggest that the nation's air quality continued to improve, although serious problems do exist in some urban areas, particularly in respect of dust fallout, suspended particulate matters and lead (Pb) in the air along congested roadsides indicated in Table 1.

The ambient air quality over 80 percent of the areas monitored in 1983 failed 50 percent or more of the time to comply with the proposed standard for total suspended particulate matters of 75 $\mu g/m^3$ (24-hour average), and moreover, the quality of the air in 40 percent of these areas continued to deteriorate. Notably, the standard was not met 99 percent of the time in Kuala Lumpur near Puduraya. In fact not a single area monitored was free from dust pollution at all times.

The proposed standard for sulphur dioxide of 50 $\mu g/m^3$ (24 hour average) was satisfactorily met in most areas monitored, except Johor Bharu and Prai, even though the sulphur content in the air of these areas continued to drop as much as 14 percent and 22 percent in the respective places between 1981–1983. However, Penang and Ipoh were free from such pollution.

Lead (Pb) in the air continued to be present at high level, particularly in the central business districts of major cities, namely, Kuala Lumpur and Georgetown. In 1982, the air quality standard for Pb of 1.5 $\mu g/m^3$ (24 hour average) was not met 75 percent of the time in Kuala Lumpur near Puduraya, and 42 percent of the time in Bangsar as well as in Georgetown.

The country's air has also been monitored for other contaminants, namely, carbon monoxide, the oxides of nitrogen and ozone, but none of these potential pollutants is yet to pose a significant threat to the public and the environment. Nonetheless, localised problems are fast becoming serious, as these problems are largely attributed to the emission from motor vehicles. The diurnal variations of the oxides of nitrogen measured at City Hall, from 29th October to 18th November, 1984, persisted beyond the recommended level of 60 parts of nitrogen per billion parts of air (ppb) from 06:30 to 11:30 hours, and from 15:00 hours to 01:30 hours.

River Water Quality

The state of water quality in Peninsular Malaysia is not as serious as that of its air quality. In terms of Biochemical Oxygen Demand (BOD) Index for drinking water, the overall quality of the country's rivers is no longer deteriorating, and in fact, it has been improving at an overall rate of 5.5 percent per year in the period 1979–1983. Specifically, 50 percent of the rivers in Peninsular Malaysia have improved in quality at the rate of 13.3 percent compared to the rate of deterioration of 4.5 percent for the rest of the rivers that remained polluted in 1983

and continued to deteriorate. These rivers were, in the order of severity, Sungai Klang, Sungai Buloh, Sungai Skudai, Sungai Merbok, Sungai Langat, Sungai Sepang, Sungai Linggi and Sungai Kedah as shown in Figure 2. Also found polluted in 1983 were Sungai Juru in Seberang Prai and Sungai Air Tawar in Perak, although the conditions therein continued to improve.

Only 11 percent of the rivers in Peninsular Malaysia were polluted by the presence of high ammoniacal nitrogen content. However, the overall conditions were far from satisfactory. Sixty three percent of these polluted rivers continued to deteriorate, largely because of the continuing discharge of untreated or partially treated sewage and animal wastes. The most affected rivers in 1983 were, in the order of severity, Sungai Juru, Sungai Klang, Sungai Buloh, Sungai Sepang, Sungai Linggi and Sungai Merbok as shown in Figure 3.

In general, the majority of the country's rivers were polluted mostly by silt. In Peninsular Malaysia 48 percent of the rivers were polluted because of the presence of high suspended solids content as indicated in Table 2. The most affected rivers in the order of severity were Sungai Klang, Sungai Bernam, Sungai Tengi, Sungai Benut, Sungai Kuar, Sungai Linggi, Sungai Langat, Sungai Selangor, Sungai Buloh, Sungai Balok, Sungai Perlis, Sungai Juru, Sungai Pontian, Sungai Melaka and Sungai Muar as all shown in Figure 4. The prospects for the conditions to improve were however bright. The quality of these rivers, in terms of suspended solids content, had improved at the rate of 8.5 percent per year. Notable improvements were however in the rivers largely affected by the discharge of mine tailings and open-mining surface runoffs, namely Sungai Klang, Sungai Selangor, Sungai Langat and Sungai Sepetang, although these rivers including Sungai Bernam continued to remain polluted.

Mining, as a single activity, continued to affect significantly the water quality of most rivers. Of the 20 rivers polluted by silt, 12 were attributed to the discharge and runoffs from tin mines as reflected in Table 3. Similar surveys of these rivers since 1978 also have consistently shown that the quality of rivers downstream of mining activities is very much significantly lower than that of the same rivers upstream. Figure 5 shows the quality of Sungai Klang, the most polluted river in the country, where its quality is further deteriorated by the deliberate discharge and uncontrolled runoffs from mining areas. Similar pattern is observed in other rivers affected most by mining, as indicated earlier in Figure 4.

Coastal Water Quality

Pollution of the marine environment in Malaysia should be viewed as even more critical than that of the freshwater environment since the country continues to depend heavily on marine fisheries for over 75 percent of the country's animal protein supply. Other than supporting the viability of these basic resources, coastal waters are also used as much to receive and assimilate all types of wastes from both vessel sources and land-based discharges, as to provide readily the most accessible segment of the environment for recreation and other amenities.

The coastal waters continued to be grossly polluted mostly by silt as shown in Table 4. The most-affected coastlines were of Pahang, Terengganu, Johor and Kedah as shown in Figure 6. Also polluted by oil 100 percent of the time were the coasts of Johor, Melaka, Negeri Sembilan, Terengganu and Kelantan as reflected in Figure 7. Faecal contamination also prevailed along the coasts of Johor, Melaka, Perlis, Penang, Perak, Kelantan, Kedah and Negeri Sembilan as shown in Figure 8. The presence of heavy metals was detected in traces in the coastal waters of all states of Peninsular Malaysia except Terengganu.

Oil pollution was found to be most serious in that part of the Straits of Malacca bordered by the States of Malacca and Negeri Sembilan in the West Coast of Peninsular Malaysia and in the East Coast States of Kelantan and Terengganu. The pollution originated largely from vessels and other marine sources and less from river discharges and other land-based sources as inferred from Figure 9.

Land Use

Economic and other human activities, whether in effect carried out in harmony with the environment or not, are in fact reflected in the pattern of land use. Over 35 percent of the land in Peninsular Malaysia has been developed for agriculture, mining, urbanisation and other infrastructural development purposes, particularly in areas that were once rich in natural resources and diverse in the characteristics of their flora and fauna. However, about 20.4 million

hectares or 62 percent of the land area in Peninsular Malaysia is still under natural forest cover, although only 10 percent of the protected area or less could be considered to be rich and diverse eco-types of the tropics and to be of any scientific significance or interest.

To regulate surface runoffs, particularly in rivers either for flood control or for the maintenance of reliable flow to meet growing water demand, especially during dry seasons, a substantial portion of the land within any river water catchment or basin ought to remain under forest cover. To date only 47 percent of the river basins are left with 50 percent or more of their respective catchment areas under forest cover as shown in Figure 10. The pattern is worse off in the West Coast than in the East Coast of Peninsular Malaysia, 79 percent of the river basins in the West Coast are left with such little cover compared to only 29 percent in the East Coast as reflected in Table 5 or Figure 11. Moreover, the impact of deforestation is more pronounced in small catchments than in large river basins. Indeed, two thirds of the small river basins, with catchment size of 300 square miles or less each, have been fully developed for agriculture, mining, urbanisation and other purposes. No forest land should be further alienated in these critical river basins, namely in the order of severity, Muar, Jejawi, Buyong, Prai, Juru, Besut, Buloh, Sepang, Kesang, Melaka, Perlis, Johor, Linggi, Skudai, Pulai and Pontian.

Notable in the landscape is the widespread occurrence of both underutilized and unused land that are no longer under production, productive or economical in their present use. Continued economic development programmes could be based on the rehabilitation and consolidation of these types of land use rather than on further alienation of forest lands for the development of new land for agricultural purposes, particularly in the 16 critical river basins identified earlier.

Moreover, the maximum carrying capacity of the land, particularly, in the West Coast of Peninsular Malaysia, has been reached long before the regional economy could continue to grow solely on the continued exploitation of its natural resources either in mining, logging, cash-crop agriculture and production of other raw commodities. The comparative unit value and production of major commodities per unit land area, as shown in Figure 12, reflects the need for the regional economy to reassess its land-use and development strategy. Sound land use and optimal agricultural and forestry development are essential for creating employment and income opportunities to eradicate poverty and restructure society. Logging in primary forest continues to be very predominant despite the fact that timber production per unit land area is higher in forest plantation than in natural forest areas. Good agricultural land in the country has not been necessarily used more for the production of high value commodities such as cocoa and pepper, and even rubber, than for the plantation of low value crops. Mining, particularly for tin and other high value minerals, have not been given priority at times when the prospected areas need to be developed for other purposes such as water catchment for hydroelectric generation.

Noise

The incompatibility of competing land-use particularly for residential and commercial purposes, roads, highways and industrial development in major cities, towns and other growth centres as well as the heavy dependence of the working population on private rather than public mode of transportation have also led to a growing concern of the general public over noise, as much a nuisance as a threat to their health. Over 80 percent of the citizens interviewed in 1983 expressed the need to control noise, particularly, in the school districts, residential and commercial areas.

A survey of noise level at school in Kuala Lumpur, Ipoh and Pulau Pinang in 1981–1982, indicated that over 85 percent of the time the level exceeded the acceptable noise standard of 55 dBA. A similar survey in selected residential areas in 1982 indicated that the noise level in 96 percent of the areas failed to meet the standard. A comparative study of noise level in major cities in 1982 showed that the level in Kuala Lumpur exceeding the equivalent noise standard of 65 dBA for commercial and urban areas by 97 percent of the time, in Ipoh and Pulau Pinang 92 percent and in Johor Bahru 72 percent.

The conditions continued to deteriorate. A follow up survey in 1984 indicated that the noise level in residential areas had exceeded the recommended standard 100 percent of the time, in commercial areas 96% percent of the time and in industrial areas 88 percent of the time, compared to 96 percent, 88 percent and 80 per-

cent respectively as indicated by earlier survey in 1982.

Domestic and Commercial Solid Waste

The use and abuse of land are also reflected in the extent of solid and other hazardous wastes being disposed of indiscriminately in the neighbourhood and more often than not inappropriately on the scarce municipal dumping grounds. The seriousness of indiscriminate dumping of solid wastes into natural watercourses and littering in public is further aggravated by the growth of human settlements along river banks and coastlines that the occupiers continue to regard these natural amenities as backyards rather than their own frontyards. The prevailing unhealthy attitude of most citizens towards these natural assets and common heritage also has its roots by the fact that their houses, buildings and other premises are indeed built facing the roads but not necessarily the immediate river or coastal fronts.

The current municipal practices in waste collection, handling and disposal remain unsatisfactory. By and large, over 76 percent of the municipalities in Peninsular Malaysia continued to carry on with their traditional practices of haphazard dumping and rampant burning in the open as shown in Table 6. However, the standard of various practices has improved slightly in the last eight years. Twenty three percent of the municipalities in Peninsular Malaysia practised the recommended methods of disposal among others, by controlled-tipping, in 1984 compared to 19 percent in 1977. Moreover, less number of municipalities resorted to open burning as a means to dispose of their collected wastes.

In terms of the quantity of wastes being disposed of, it is heartening to note that about 95 percent of the wastes were disposed of by the standard controlled tipping in 1984 compared to 45 percent in 1977. The percentage of wastes burnt in the open ground dropped from 24 in 1977 to 10 in 1984. The amount of wastes disposed of by other unacceptable practices of dumping along roadsides and into watercourses, thus, dropped drastically from 30 percent in 1977 to 5 in 1984 as indicated in Table 7.

The satisfactory method of waste disposal by controlled tipping or rather the sanitary method of landfill has, however, some limitations. It is always subject to the question of availability of land close to populated centres and yet, the sites have to be at a distance not objectionable to the nearest residents.

Toxic and Hazardous Wastes

The problem of some local authorities, particularly those having jurisdiction over industrial areas, is further compounded by the fact these authorities have to deal with the urgent need and pressure of the manufacturing and engineering industries to dispose of the fast accumulating toxic and hazardous wastes generated. Most industries have tried their best to hold on to the generated wastes within their industrial premises as long as they could, until the local authorities have found or designated a safe place for the reception, treatment and disposal of these highly contaminated wastes. Some industries, having little option, resort to engaging private contractors to haul the wastes to domestic waste disposal sites or to the nearest roadsides, streams, and even to any open and unattended plots of land.

According to an initial survey carried out by the Environment Department in 1983/4, over 52 percent of the toxic and hazardous wastes are generated by the electronics industry, 14 percent by the metals and electroplating industries and the remainder by the chemical, rubber, plastics, printing, packaging, tannery and pharmaceutical industries. The nature of the wastes varies rather widely. Most of the waste, about 52 percent in volume, is in the form of galvanized metals. However, in terms of weight, over 74 percent of the waste is in settling-sludge generated by the metal and electroplating industry and 12 percent in solid pieces of highly contaminated waste generated by the electronics industry alone.

Marine Environment

Valuable resources of the sea are most vulnerable to both over exploitation or adverse modifications of the environment, and the impact of marine pollution generated within and transported from beyond into the limits of national jurisdictions. Generally, these resources are highly productive estuaries, rapidly propagating mangroves, primarily thriving natural and artificial coral reefs and densely "populated" shallow sea-bottoms.

Not a single estuary, being the most productive eco-type compared to other marine ecosystems, is protected in the country. Most of the

esturies in the country are now heavily silted up by the deposition of sediments transported by rivers and generated by various activities upstream. A significant number of estuaries is no longer productive, as they have been heavily polluted by numerous types of wastes of diverse origins, partially treated and untreated sewage, incompletely treated agro-based and other industrial wastes, agricultural and urban runoffs.

Pollution alone does not fully explain the absence of both plant and animal life in some estuaries. For example, the estuaries of Batu Pahat, Benut and Pontian for example, are natural deserts, because of their acidic characteristics by nature.

Other than providing habitats for terrestrial and aquatic animals, mangroves are known to have supported valuable fish and other sea products and occur along almost the entire West Coast of Peninsular Malaysia, the coast of Sabah and in some stretches along the coast of Sarawak. In the absence of any mangrove reserves along these coastlines, the standing forests are continually subject to heavy exploitation by man.

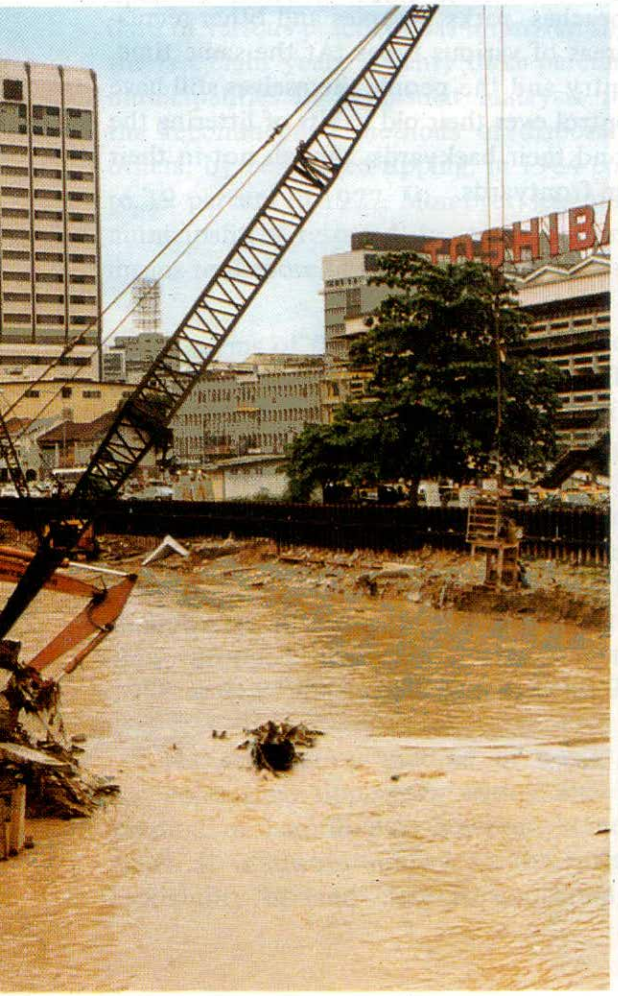
In undisturbed areas where there is a break in the mangroves or mud-flats, there are short stretches of sandy beaches. Beyond these beaches, there may be found small colonies of coral reef. In terms of primary production, coral reef is the most productive marine ecosystem in which the reef surface provides a substrate for growth of algae, both free-living and symbiotic with coral polyps. In Peninsular Malaysia, this natural system is almost absent, other than those found in the eastern part of Pulau Redang in Terengganu and off Pulau Paya and Pulau Segentang in Kedah. Although the surrounding waters are shallow, other conditions are not favourable to nucleation and abundant growth of coral reef. The waters are too turbid with densely suspended sediments, salinities lower than the minimum value of 30 parts by the equivalent calcium and magnesium salts per thousand parts of water, temperatures are around 29°C slightly higher than the normal range of 20°C to 28°C for optimum growth.

In short, the three basic supports of biological productivity in the country's marine environment – estuaries, mangroves and coral reefs – are on the verge of depletion. Any additional pressure on the already deteriorating natural systems will raise concerns, in proportion to the value attached as much to the whole fishing industry of the country as to the plight of 110,000 fishermen engaged in this important sector of the economy.

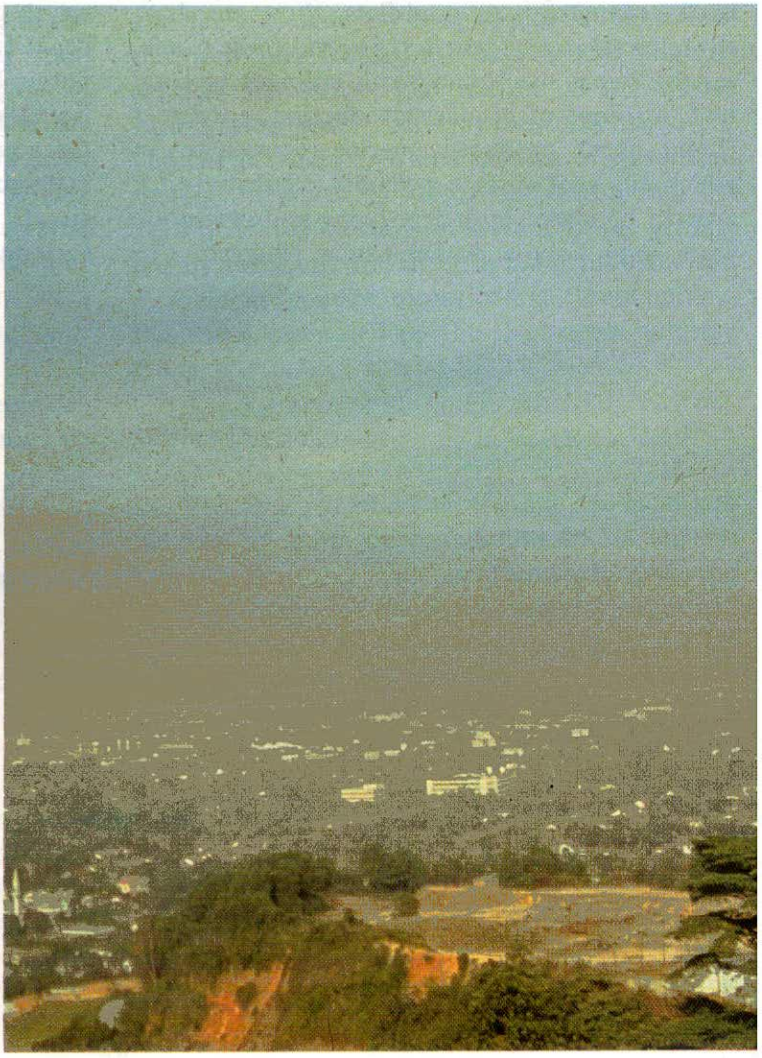
Cleanliness and Recreational Value

The country and its people are increasingly aware of the need to have not only clean and beautiful environment but also access direct to public beaches, parks, reserves and other recreational areas of various types. At the same time, the country and the people themselves still have little control over their old habits of littering the streets and their backyards, though not in their very own frontyards.

A clean river is a healthy river



River Clean-Up



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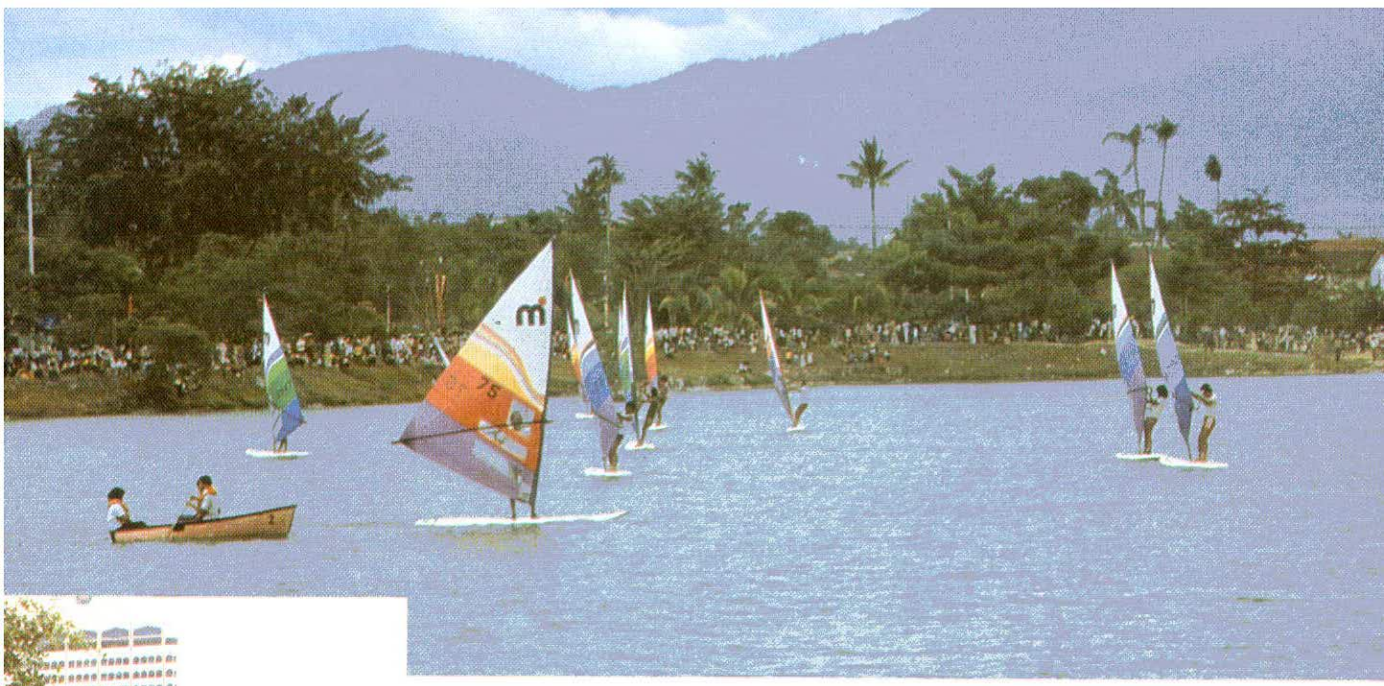
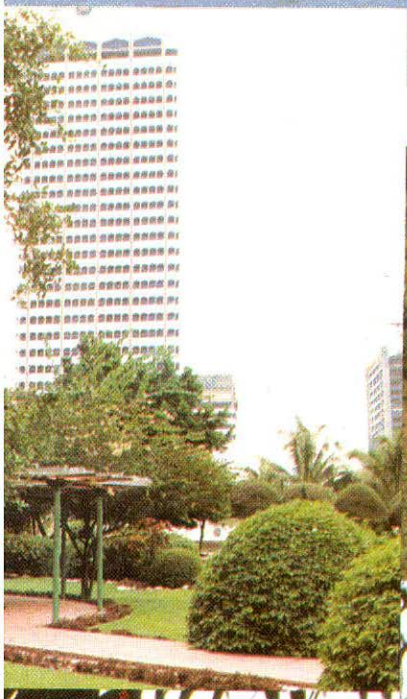
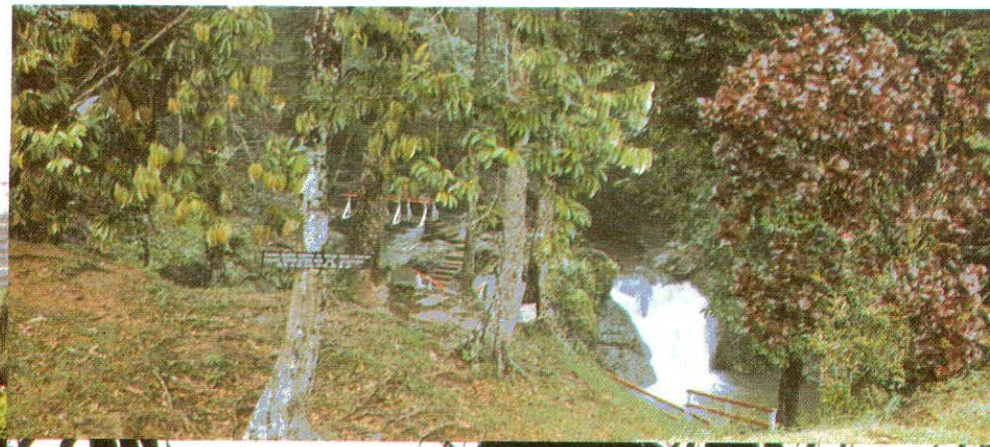


Parks and Recreational Areas – a break from harsh urban environment





Development Without Destruction

Photo by courtesy of Tourism Development Corporation

CHAPTER III

POLLUTION ABATEMENT AND CONTROL

POLLUTION ABATEMENT AND CONTROL

Legislation and Controls

There are currently at least 34 environment-related legislations as shown in Appendix A. These pieces of legislation, while not necessarily devoted entirely to environmental matters, contain provisions or references that are related to environmental matters.

For example, the National Land Code 1965 divides land use into four categories:-

(i) agriculture
(ii) building
(iii) industry
(iv) others including national parks and water catchments.

The National Land Code therefore enables proper land use planning taking environmental considerations such as control of siltation into account. The Land Conservation Act 1960 helps to control soil erosion and siltation.

The Waters Enactment, 1920 prohibits the disruption of any river so as to interfere with the flow of water as well as restricts the discharge of specific substances detrimental to the beneficial uses of the river.

Similarly, the Factories & Machinery Act, 1967 takes care of the working environment, the Mining Act controls discharges from mining activities into water courses, the Forest Enactment (1934) and Rules (1935) provide for the establishment of forest reserves as well as control of logging.

However with passage of time and with the environmental problems becoming more complex, these legislations have been found to be limited in scope and inadequate to deal satisfactorily with the newly emerging problems. Hence the Environmental Quality Act 127, 1974 has been enacted as a comprehensive piece of legislation and provides a common legal basis to co-ordinate all activities on environmental control throughout the country. This Act gives the Environment Department under the Ministry of Science, Technology and Environment the mandate and means to accomplish national goals in environmental protection.

However the Environmental Quality Act 1974 and the various Regulations under it are by no means sufficient in themselves in tackling the broad environmental issues emanating from the development of land and natural resources as well as disposal of sewage, solid wastes and toxic and hazardous wastes. The difficulty is compounded by the fact that Malaysia has a three-tier system of Government – Federal Government, State Government and Local Authorities with each level having legislative and administrative competence in specific fields and each of their actions sometimes even inaction, has potential to pollute. This implies taking into account division of responsibilities among the three levels of Governments in our approach to solving environmental problems through effective co-ordination and willing co-operation so that available resources of manpower and funds are deployed to good purpose avoiding both duplication of efforts and resources being spread too thinly to be effective.

The Environment Department, therefore, while continuing its efforts towards controlling pollution through the enforcement of the various Regulations under the Environmental Quality Act 1974, resorted to the environment-related legislations containing suitable provisions for dealing with specific environmental issues through existing Federal or State institutions. The Environment Department responded to this task positively through provision of appropriate guidelines to help State Governments and other Agencies to incorporate environmental considerations into their development plans.

Air Pollution Control

The problems of air pollution have become prominent in recent years as a result of accelerated development activities including urbanisation, infrastructure development, deforestation and industrialisation. Urban and industrial areas experience the greatest adverse impact in air quality.

The air pollution sources can be broadly divided into stationary sources and mobile sources. Stationary sources comprise industrial combustion, solid waste incineration, evaporative losses and industrial processes including thermal power plants. Mobile sources are accounted for by internal combustion engines such as motor vehicles, aircrafts, railway engines, construction equipment and powered vessels. Some of the most common air pollutants include particulate matter, sulphur dioxide, carbon monoxide, hydrocarbons, oxides of nitrogen, ozone and a host of toxic fumes, gases and malodorous fumes.

An integrated approach for air pollution control would require that air pollution and meteorological factors be taken into account by landuse planners. Besides, buffer zones between industries and residential areas have to be provided. In the light of these factors Malaysia is using an air pollution control approach which combines features from 'air quality management' and 'best practicable means'. As a result, Regulations have been formulated and implemented for the control of air pollution. These are the Environmental Quality (Clean Air) Regulations 1978 under the Environmental Quality Act 1974 which control air pollution essentially from the stationary sources and the Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977 under the Road Traffic Ordinance 1958 which among other things control dark smoke emission from diesel vehicles. These Regulations came into force on 1st October, 1978 and 15th March, 1978 respectively.

The major features of the Clean Air Regulations are:-

(i) The use of 'best practicable means' to reduce emissions including odour. This means that standards are prescribed for the emission of air impurities such as solid particles, metallic compounds, gaseous substances etc. These standards are shown in Table 8 where three types of standards are prescribed. Standard C is for compliance by all new factories established after 1st October, 1978. Existing factories in operation before 1st October, 1978 were required to comply with Standard A before 1st October, 1980 and Standard B by 1st October, 1981.

(ii) Certain industrial installations which are potentially polluting to be located beyond 1000 metres of the nearest dwelling house in a housing estate unless prior approval has been obtained from the Director-General.

(iii) No open burning of industrial waste or refuse is permitted except in an approved incinerator. Exceptions are burning leaves or tree branches, fires purposely set to agriculture lands for disease and pest control and fires set for fire fighting purposes. In all other cases a licence has to be obtained from the Director-General.

(iv) The installation, resiting or alteration of fuel burning equipment such as incinerators, boilers, kilns, furnaces and chimneys must have the prior written approval of the Director-General.

(v) The prohibition of the operation of certain equipment that affects health or causes nuisance.

The Motor Vehicles (Control of Smoke and Gas Emission) Rules stipulate an emission standard of 50 Hatridge Smoke Units for exhaust smoke from diesel vehicles. The Rules also require that all new motor vehicles powered by a four stroke engine to be equipped with anti blowby devices to prevent the escape of gas from crankcase.

Besides the two Regulations mentioned above, action has been initiated to formulate Regulations for the control of petrol vehicle exhaust emissions, particularly carbon monixide and hydrocarbon levels as well as for the reduction of lead content in petrol from 0.84 gm/litre to 0.4 gm/litre and subsequently to 0.15 gm/litre.

Stationary Sources

Enforcement of the Clean Air Regulations has been most useful in regulating the establish-

ment of new sources since the coming into force of these Regulations on 1st October, 1978. These new sources having the benefits of adequate resources, space, available technology and early planning have been able to comply with the Clean Air Regulations.

The experience with sources that had been established prior to 1st October, 1978 has not been very satisfactory. Numerous measures have been taken against these factories for non-compliance with the Regulations that ranged from enhancement of enforcement inspections, dialogue sessions, issue of warning letters, licensing of factories, compounding of offences, prosecution and issue of prohibition orders.

Between 1981 and 1984 a total of 108 factories were taken to court for various offences under the Clean Air Regulations. In addition 435 have been compounded and for a further 154 cases warnings in writing have been issued giving directions to upgrade pollution control equipment. Table 9 gives the breakdown of these cases.

Difficulty however is continued to be faced by small scale industries particularly the small wood based industries and rice-millers to comply with the Regulations due to lack of economically viable technology for waste disposal. These factories continue to practise open burning as a means of disposal of their wastes.

The practice of open burning has also been found to be rampant at several refuse dumping grounds. In fact more than 55 percent of the 210 refuse disposal sites in Peninsular Malaysia have been found to be practising open burning. Constant effort is being made to overcome these problems through dialogue sessions and awareness programmes.

A notable feature in the control of air pollution from stationary sources is the joint enforcement action by the Environment Department and the Local Authorities since September 1984. Through this process it has been possible to impose more effective and deterrent control through the complementary enforcement of provisions both in the Clean Air Regulations and in the Local Government and Federal Territory Acts.

Mobile Sources

For the purpose of controlling excessive smoke from motor vehicles, the Environment Department together with the police has been conducting regular enforcement campaigns of kerbside smoke-meter checks. So far some 25,000 vehicles have been screened and about 2500 vehicles have been issued with summonses for emitting dark smoke. Table 10 gives the year by year breakdown of the motor vehicles prosecuted.

Even though a number of campaigns have been carried out, the problem of smoky vehicles is still evident in the major towns. Public transport vehicles, for example buses, taxis, lorries etc. constitute about 75 percent of such offences. Regular dialogue sessions to encourage fleet owners to install testing facilities in order to carry out their own regular checks etc. have been held.

Water Pollution Control

The underlying objective of water pollution control is to restore and maintain the chemical, physical and biological quality of the country's waters for such beneficial uses as domestic water supply, fisheries, irrigation, industrial water supply and recreation and to maintain reasonably good aesthetic conditions. The main sources of water pollution comprised both non-point sources and point sources. Non-point sources of pollution arise as a result of the development of Malaysia's land and natural resources.

The major activities in land and resource development which affect water are mining, new agriculture settlements, replanting of existing agriculture lands, logging, housing, establishment of new townships and general infrastructure development. These activities affect water in broadly similar ways, namely, soil erosion, siltation of rivers and alteration of once stable hydrological regimes.

The point sources of pollution are attributable to the discharge of effluents from agro-based industries including the processing of palm oil, rubber, pineapple, tapioca, sugar and sago; manufacturing industries such as tanneries, chemical works, distilleries, food processing, chloro-alkali plants, electronics and electroplating, rubber products manufacturing and palm oil refineries; and to the discharge of domestic sewage and pig wastes.

Palm Oil Industry

The control of effluent discharge from the palm oil mills was effected through both the prescription of the industry by an order from the Minister in charge of the Environment under Section 18 of the Environmental Quality Act and the enforcement of the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977.

By the end of the year 1984, a total of 224 mills were in operation with sizes ranging from 10 tonnes/hour to 60 tonnes/hour in terms of the fresh fruit-bunches (FFB) processed. The total Biochemical Oxygen Demand (BOD) load generated amounted to nearly 1,640 tonnes/day having a population equivalent of 33 million people while the total wastewater discharge amounted to approximately 65,600 cubic metres/day. Under the above Regulations control is effected through a system of licensing in respect of prescribed premises within the meaning of Section 18 of the Environmental Quality Act, 1974. This approach has proved an unqualified success for the control of pollution from the palm oil industry.

Appropriate conditions are attached to licences with technology based effluent standards being the principal conditions. These standards for the years 1978 to 1984 are shown in Table 11. While these effluent standards are generally applied on a Malaysia-wide basis, the Director-General is empowered in appropriate cases to impose more stringent conditions if warranted by the environmental situation in specific cases. A novel feature of the palm oil mill effluent Control Regulations is the levy of effluent related fees based on the pollution load discharged in terms of B.O.D.

During the first year of implementation of the Regulations in 1978, compliance with the discharge standards of 5,000 ppm BOD in the case of palm oil mills was not mandatory, both to allow sufficient lead-time for the building and commissioning of treatment systems and for the further development of relevant technology. However, to give industry a push in the direction of installing treatment systems, an effluent-related fee pitched at a realistic level was charged applying 'the polluter pays' principle. Mills were allowed to discharge their effluents with BOD higher than 5,000 ppm, but they were charged fees for polluting the river systems based on the amount of BOD load over and above that which corresponded to the BOD concentration of 5,000 ppm at the rate of M$100 per metric ton of the BOD load. In addition to this, a lesser rate of fee of M$10 per metric ton of the BOD load was charged for BOD discharged equal to 5,000 ppm or less.

On the basis of the above rate-charge, an average sized-mill (20-30 metric tons capacity) which discharged effluent having a BOD concentration of 5,000 ppm paid an effluent-related licence fee of approximately M$4,500 for the first year. The same average sized-mill, if discharging raw effluent (i.e. effluent without any form of treatment), was required to pay approximately M$140,000 irrespective of the ultimate mode of disposal.

Table 12 summarizes the response of the palm oil industry and shows the range of fees paid by various mills. A total of M$3.5 million was collected by way of fees during the first year of implementation of the Regulations.

Mills were also permitted to dispose of their untreated effluent onto land, in which event a licence fee was charged at the rate of M$50 per 1,000 metric tons of effluent disposed onto land. In addition, the higher rate-charge of M$100 per metric ton of BOD was levied except where the Director-General of Environment was satisfied that the discharge of effluents with BOD in excess of 5,000 ppm would not cause any adverse environmental effects.

During the second year of enforcement which commenced on 1st. July, 1979, it was mandatory for mills to reduce their BOD to 2,000 ppm and a licence fee was levied at the rate of M$10 per ton of BOD discharged.

The overall progressive reduction in the total BOD load discharged by the palm oil industry over the period 1979–1984 is shown in Figure 13. Although palm oil production had steadily increased with the number of mills increasing from 130 in 1978 to 224 in 1984, the actual BOD load cutback effected increased from 68 percent in 1979, (BOD Standard – 5,000 mg/1) to 99 percent in 1984.

Similarly with the BOD standard of 100 mg/1 coming into effect on 1st January, 1984, the BOD load was reduced to 5 tonnes per day with a population equivalent of less than 100,000 people. Table 13 shows the pollution control performance in the palm oil industry

during the years 1979–1984.

The major challenge for the future in the palm oil industry is the approach towards the ideal state of 'zero discharge' in view of the high potential of the palm oil effluent for use as fertilizer, production of animal feed and production of bio-gas. Research in this direction is being actively pursued.

It is unfortunate that despite the good response and co-operation from the palm oil industry in general in the protection of the environment, a few have been found to be lax in complying with the standards despite repeated warnings and sufficient time being given. In those cases the Environment Department had no alternative but to resort to legal action. By the end of 1984 a total of 27 palm oil mills had been prosecuted for various offences under the Regulations. The breakdown of the mills prosecuted year by year commencing from 1980 and the amount of fees collected are given in Table 14.

Rubber Industry

The Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978 for the control of effluent discharge from rubber factories came into force on 1st April, 1979. By the end of the year 1984, a total of 215 factories were in operation.

The approach to control was similar to that of palm oil mill effluents. As technology had already been developed locally to conform with the standards for effluents from rubber factories stipulated in the Regulations, compliance with the standards was mandatory from the start without the option of payment of effluent-related fees. The standards are shown in Table 15.

The total estimated BOD load reduction in the rubber industry over the period 1979–1984 is shown in Figure 14. The total BOD load of 208 tonnes per day generated by the industry in 1979 with a population equivalent of 4.2 million did not change significantly over the period and the cutback achieved on the pollution load discharged was 53 percent in the first year of enforcement. The total load was reduced to less than 5 tonnes per day with a population equivalent of less than 100,000 when the current 100 mg/l BOD standard became fully effective for the industry on 1st April, 1983. Table 16 shows the pollution control performance in the rubber industry for the period 1979–1984.

By the end of 1984 almost all the rubber factories had implemented their treatment systems. However a total of 10 factories were prosecuted for various offences, the details of which are given in Table 17.

Discharge of Sewage and Effluent from Manufacturing Industries

BOD load generated from human waste in terms of sewage and sullage discharge was 715 tonnes/day from a population of 14.3 million people. The estimated BOD load from the manufacturing sector amounted to 124 tonnes/day with a population equivalent of 2.5 million persons. About 96 percent of the BOD load was from 3 manufacturing categories, namely, food manufacturing, industrial chemicals and textiles.

Power derived under Section 21 of the Environmental Quality Act, 1974 specifying acceptable conditions of discharge were deemed to be the most suitable regulatory approach for the control of discharge of sewage and industrial effluents from the manufacturing sector. These are contained in the Environmental Quality (Sewage and Industrial Effluent) Regulations, 1979 which came into force on 1st January, 1979.

One of the major problems in the formulation of the Regulations was the consideration that had to be given to factories that had already been in existence for a decade or longer at the time of the Regulations coming into force.

Consultative meetings held between the Environment Department and diverse industrial groups pinpointed the various difficulties that the existing industries would come up against in complying with the Regulations. These served as useful inputs for the formulation of the Regulations and included the following as the major factors:-

(a) The industries by and large had not yet sensitized themselves to existing pollution problems and any effort to tackle the problems was still regarded as 'external' to the normal functioning of the industry.

(b) The industries had not, in most cases, quantified their pollution problems

even to the extent of determining the nature and characteristics of their discharges.

(c) Having not incorporated anti-pollution measures at the time of planning a factory, the industries were concerned about technical and cost aspects.

(d) Most existing factories faced shortage of land for installing wastewater treatment facilities, and this physical limitation might compel them to resort to compact, highly sophisticated and energy-intensive treatment units involving high capital and operational costs.

(e) Industries situated in areas earmarked to be sewered preferred to have their wastewaters admitted into sewers and to pay any charge levied for treatment of the wastewater at a central municipal treatment plant.

(f) Industries in industrial estates located in areas not earmarked to be sewered early did not have access to centralized wastewater collection and treatment systems.

In the light of these factors, some compromise, in the formulation of the discharge standards, had to be made between the use of ideal approach geared towards protecting the beneficial uses of the receiving waters and the administratively simpler approach of applying a single uniform set of standards. In doing so, the Environment Department has applied the principle of relating the effluent discharge standards to beneficial uses of the receiving waters, initially confined to important beneficial uses only for which necessary data was available.

A special feature of the Regulations is that two uniform sets of standards have been formulated as given in Table 18. Standard A, a more stringent standard, is applicable to discharges of effluents into inland waters within the total catchment areas for water supply and Standard B, a less stringent standard, applicable to discharges into any other segment of inland waters. In the formulation of these standards, the following factors were taken into consideration:-

(i) Conclusions and extrapolations from the data gathered from the pollution survey of the Klang River Basin and the Juru River Basin.

(ii) The availability of technology and expertise locally to treat wastes from existing industries in Malaysia.

(iii) The relative cost burdens of the range of practical technology available locally.

In addition, with a view to accommodating the genuine difficulties voiced by industries, the following measures were taken:-

(i) All manufacturing industries which already existed at the time of gazetting of the Regulations had the benefit of a 2 years grace period incorporated into the Regulations to enable them to build, install and commission treatment plants.

(ii) The provisions of Section 21 of the Environmental Quality Act, 1974 have been given full effect in the Sewage and Industrial Effluent Regulations. Accordingly, if for genuine reasons any industrial establishment is unable to comply with the acceptable conditions of discharge, in particular existing industries, they may contravene these conditions with a licence from the Director-General of Environment, if he is satisfied that the reasons are genuine and justified. A fee is charged for such licence at the rate of M$100 per metric ton of BOD discharged into inland waters within the water catchment areas and M$100 to M$500 per kilogram (depending on the toxicity) of the toxic chemicals discharged, and for any other inland waters, the corresponding fee will be M$10 per ton of BOD and M$10 to M$50 per kilogram for toxic chemicals. By the end of 1984 a total of 113 contravention licences had been issued. These are licences of a temporary nature which are withdrawn as soon as the treatment systems have been installed.

The enforcement of the Environmental Quality (Sewage and Industrial Effluents) Regulations since 1981 has reduced the BOD load from these industries by 60 percent from 124 tonnes/day to 50 tonnes/day. Through effective

prosecution action factories that have been somewhat lethargic are satisfactorily proceeding to implement their pollution control measures which is expected to reduce further the pollution load from these industries. So far a total of 68 factories have been prosecuted for various offences under the Regulations stated above details of which are given in Table 19.

In the case of sewage, the control depends on the progress of water borne sewerage systems which in turn is dependent on the quantum of financial allocations for sewerage projects. As of December 1984, comprehensive central water borne sewerage system were available only in Georgetown, Kota Kinabalu, Shah Alam and Kuala Lumpur. These systems, however, have yet to be extended to serve all the households within these urban areas.

The sewerage system for Butterworth and Bukit Mertajam is under construction. Master Plan studies have been completed for a number of major towns including Alor Star, Ipoh, Klang, Seremban, Kuantan, Kuala Trengganu, Malacca and Johore Bahru. However it should be mentioned that in view of the high concentration of pig farms in the State of Negeri Sembilan, Malacca, Selangor, Perak, Penang and Johore as shown in Figure 15, sewerage systems will only be effective if control of piggery waste discharges is instituted at the same time.

Piggery Waste

Pig industry forms the major source of farm waste in Malaysia and is concentrated in the States of Negeri Sembilan, Malacca, Selangor, Perak, Penang, Johore, Sabah and Sarawak. Figure 14 gives the distribution of pig farms in Peninsular Malaysia. The pig industry in Peninsular Malaysia has expanded at an exponential rate averaging 7 percent per year between 1965 and 1980. In 1965 the pig population was 504,500 and this has increased to about 1.4 million in 1980. Projections to the year 2000 show that the pig population will be in the region of 3 million.

Waste from the pig industry consists mainly of faeces and urine, the amount discharged depends on the age and weight of the pig and the quality and quantity of food and water. The total per day varies from 2.5–3.4 kg for piglets, sows or boars. The volume of wastewater discharged per pig per day varies depending on the frequency of wash and the amount of waste produced. Typically some 20 litres or more of wastewater is required per pig per wash.

Table 20 shows the analysis of wastewater taken during routine cleaning and bathing of pigs. About 122 tonnes of BOD is generated per day from the pig industry constituting about 4.6 percent of the total pollution load generated in Peninsular Malaysia and the population equivalent is about 2.6 million people.

The control of effluent from pig farming in Malaysia has met with considerable difficulty due to the following reasons:-

(i) Farms vary in sizes from about 10 pigs to over 1000 pigs per farm and are widely scattered. The available technology for controlling the problem is therefore not readily applicable.

(ii) In many of the farms, there is inadequate land for building treatment plant.

(iii) The pig farmers do not have the expertise to operate treatment plants.

The above factors have made the enforcement of the Sewage & Industrial Effluent Regulations rather impractical.

The Environment Department has therefore adopted the following approach to control the environmental problems of pig farming.

(i) A Task Force has been established to develop suitable strategy for overcoming pollution problems including technology for treatment and disposal of pig waste. The task force is made up of personnel from Environment Department, Standards & Industrial Research Institute of Malaysia (SIRIM), Universiti Pertanian Malaysia (UPM), Department of Veterinary Services, Chemistry Department, Ministry of Agriculture and Ministry of Health and is chaired by the Secretary-General of the Ministry of Science, Technology and Environment.

(ii) Surveys to be carried out in all the States having pig waste problems to obtain data with respect to size of the farm, land area available and other relevant information. So far surveys have been carried out in Sabah, Sarawak,

Penang, Selangor and Malacca.

(iii) The Task Force is to design and operate pilot scale plants for pig waste treatment. So far two plants have been designed – one suitable for pig farms with 100–1000 pigs and the other for 1000–5000 pigs. The plant for 100–1000 pigs is already operational at the Government Veterinary Department farm at Sg. Buloh. Plans are underway by Universiti Pertanian Malaysia to undertake an appraisal of some of the treatment plants in operation in Malaysia and formulate suitable design criteria for treatment systems.

(iv) The Task Force will then recommend suitable treatment technology and disposal method for each farm on the basis of data obtained from the survey and pilot plant operation.

(v) Enforcement of control to be effected through the State Veterinary Services Department by stipulating appropriate conditions in the licence.

(vi) In the case of new farms, proper zoning and siting will form an important strategy.

(vii) The State Governments should also look into the possibility of relocation of existing farms so as to enable the implementation of suitable and economically viable treatment systems.

In addition, the Selangor State Veterinary Department and the Ministry of Agriculture in collaboration with other Government agencies and international funding agencies has initiated a number of projects, namely:-

(i) development of a centralised Pig Waste Treatment System, Bukit Pelandok, Port Dickson, Negeri Sembilan, under the sponsorship of the International Development Research Centre (IDRC) of Canada, 1984;

(ii) development of Biogas Plants in Rawang and Shah Alam, Selangor under the Technical Assistance Programme of Italy, 1985; and

(iii) Techno Economic Studies in the Resettlement of Pig Farms in the State of Selangor under the financial assistance of the UNDP.

To regulate the pig rearing industry, the Ministry of Agriculture has also initiated necessary steps for the Government to introduce a uniform Federal Law in an effort to harmonize the various State Enactments for the control of pig farming. As of December 1984, 4 States, namely, Johore (1975), Trengganu (1976), Melaka (1980) and Negeri Sembilan (1980) have introduced their own enactments on the control of the industry.

Soil Erosion and Siltation

Soil erosion and siltation could be considered the most serious water pollution problem faced by Malaysia. The widespread occurrence of soil erosion in the country has been closely associated with the opening up of new land for agricultural purposes, logging activities, urbanisation, infrastructure development and mining.

The problems of soil erosion and siltation can only be overcome by means of a preventive approach through measures taken right from the initial stages of project implementation. This requires the co-operation and effective co-ordination among the three levels of Governments namely the Federal Government, State Governments and Local Authorities. In this context the Environment Department has proposed the following strategy:-

(i) Strict enforcement of Earthworks Laws by the Federal Territory.

(ii) Adoption and strict enforcement of Earthworks By-Laws of the Federal Territory by other Local Authorities;

(iii) Adoption of the Guidelines for the Prevention of Erosion and Siltation by all implementors of projects including the Government Agencies;

(iv) Stabilisation, beautification and utilisation of ex-mining land;

(v) Adoption of closed system for mining discharges;

(vi) Desiltation of rivers by the Drainage and Irrigation Department.

Mining Industry

The discharge of effluents from tin mines is controlled by the Mines Department through provisions in the Mining Act and States Mining Enactments and Rules. The control exercised has been found to be inadequate in order to bring about the expected improvement in the conditions of most rivers and watercourses affected by tin mine discharges. The Mines Department has reviewed the discharge standard of 800 grains/gallon for suspended solids. For the existing tin mines this standard has been reduced to 400 grains/gallon and for new mines the standard imposed is 200 grains/gallon. In the Federal Territory, the mines are required to comply with a discharge standard of 50 grains/gallon for suspended solids with effect from 1st January, 1987.

The Mines Department also regulates the siting of settling ponds, point of discharge, the method of treatment and the channelling of mining effluent through a series of settling ponds prior to discharge. Water conservation, either through close-circuit system without discharge or through the disuse of water jets in mining operations is also promoted in the industry.

Marine Pollution Control

Marine pollution is complex and involves both sea-based and land-based sources. Sea-based sources include pollution from oil spills due to tanker accidents and deliberate discharge of ballast waters and slops, operational discharges and offshore exploration and exploitation of hydrocarbons as well as pollutants brought in by wind, currents and drifts. Land-based sources are those caused by developmental activities, domestic and industrial wastewater outfalls and combustion of fossil fuels. Between 1981 and 1984 a total of 61 oil spills were reported. It was also found that considerable stretches of our beaches were contaminated with oil residues in the form of tar balls.

Pollution from sea-based sources are controlled through the following measures:-

(i) Traffic Separation Scheme

The scheme has been in operation since 1981 and is aimed at navigational safety in the Straits of Malacca. It had indeed reduced the rate of accidents and as a consequence the incidence of oil spills. Under this scheme all deep draught vessels and Very Large Crude Carriers or VLCCs shall allow an underkeel clearance of at least 3.5 meters at all times during the passage through the Straits. East-bound traffic is required to follow the western side of Straits close to Sumatera and west-bound traffic to the eastern side close to Malaysia.

(ii) Enforcement of the Provisions under the Environmental Quality Act 1974.

The Environmental Quality Act, 1974 provides powers for the control of discharge of oil and oily water mixtures and wastes into the environment. It also provides for recovery of costs and expenses incurred in oil spill clean-up operations and, if necessary, for the detention of any ship involved in a spill. Initially action against polluters was confined to recovery of clean-up costs but since 1982, the Environment Department has prosecuted those who discharge oil deliberately. The penalty for such offences amounts to $10,000/- fine or two years jail or both. To date 6 vessels have been prosecuted in court for deliberately discharging oil into the marine environment. Enforcement action is taken jointly with the Marine Department.

As a further measure towards effective enforcement, the Ministry of Science, Technology and Environment and the Ministry of Transport are in the process of introducing complementary amendments to both the Environmental Quality Act, 1974 and the Merchant Shipping Ordinance 1952 respectively. As a result of these changes in the Statute, the Director of the Marine Department will be fully responsible for pollution from vessels, enabling the Director-General of Environment to concentrate his efforts in addressing the problems of pollution from land-based sources.

To enhance the effectiveness of these two pieces of legislation the relevant Ministries are considering ratification of the three IMO Conventions namely:-

(a) International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969;

(b) International Convention on the Establishment of an International Fund for

Compensation for Oil Pollution Damage (FUND), 1971; and

(c) International Convention for the Prevention of Pollution by Ships (MARPOL), 1973.

(iii) The National Contingency Plan

The National Contingency Plan for the mitigation of spills in the Straits of Malacca became fully operational in 1984 with two operational centres namely, Port Kelang and Port of Johore with the respective harbour masters as the area co-ordinators. The centres are equipped with the following:-

(a) 500 metres RFD oil boom;

(b) 2 pairs of oil skimmer (Cyclonet 100);

(c) 6 units of non-self propelled oil barges each of 200 metric ton storage capacity;

(d) 2 units of large workboats (Lang Siput and Lang Tiram, each 48.4 metre in length), fitted with cyclonet, fire-fighting and dispersant spray equipment. Each boat has a cargo tank of 500 metric ton capacity and a 10 ton tank for foam/dispersant;

(e) 4 units of 28 metre tugboats (Lang Merah, Lang Sewah, Lang Kangok and Lang Hindek);

(f) 1 unit of fast petrol craft (Lang Rajawali);

(g) Telecommunications equipment.

A response procedure entitled "Marine Pollution Response Procedure" has been introduced to implement the Plan as well as to provide specific guidelines to the relevant agencies in the conduct of anti-oil pollution response action.

The Plan was tested for the first time by holding a six day exercise in November, 1984 termed "Exercise Malacca" with the support of 19 relevant Government Agencies and oil industry and with technical assistance from the Danish Government by way of consultancy.

The aim of the Exercise was to test the state of readiness of Malaysia to respond to any major incident of oil spills in the Straits of Malacca. This Exercise has helped to review and update the 1975 National Contingency Plan including the National Oil Spill Committee which has the overall responsibility for co-ordinating the operation in the event of an oil spill. This committee now comprises representatives from the following agencies:

- Department of Environment (Chairman)
- Marine Department
- Maritime Enforcement & Co-ordination Centre
- Ministry of Foreign Affairs
- Ministry of Science, Technology and Environment
- Ministry of Transport
- Ministry of Housing and Local Government
- The National Security Council
- Public Works Department
- Department of the Army
- Department of the Navy
- Department of the Air Force
- Royal Malaysia Police (Marine Branch)
- Royal Customs and Excise Department
- Fire Services Department
- Chemistry Department
- Fisheries Department
- Drainage and Irrigation Department
- Telecommunication Department
- Malaysian Meteorological Services Department
- Universities

Other developments with respect to marine pollution control are:-

(i) Promulgation of the Exclusive Economic Zone (EEZ) by the Yang Di Pertuan Agong on 25th April, 1980 and the formulation of the EEZ Act.

(ii) Formulation of Marine Pollution Control Regulations and Guidelines for Coastal Zone Development.

(iii) Baseline studies and monitoring and surveillance of coastal waters.

(iv) Review and co-ordination of research activities on the marine environment by the Marine Pollution Sub-Committee under the aegis of the National Scientific Development and Research Council.

Another significant activity in the marine

pollution control programme is the Regional Seas Programme for the Protection of the East Asian Seas. Under this programme an Action Plan involving all five ASEAN Member States and relevant United Nations organs has been formulated for the development and protection of the marine environment and the coastal areas of South East Asia for the health and well-being of present and future generations. The Action Plan aims to provide a framework for an environmentally-sound and comprehensive approach to coastal area development geared to the needs of the region and covers the following activities:-

(i) Assessment of the state of the environment, including assessment of marine and coastal development activities as they affect environmental quality, so as to assist Governments to cope properly with environmental problems, particularly those concerning the marine environment.

(ii) Management of those marine and coastal development activities that may have an impact on environmental quality or on the protection and use of renewable marine resources on a sustainable basis.

(iii) Development of legal instruments, both at a regional and national level, to provide the legal basis for co-operative efforts to protect and develop the region.

The following projects under the above programmes are currently in the process of being implemented:-

* Oceanography
* Assessment of Oil Pollution
* Assessment of Non-Oil Pollution
* Mangrove and Coral ecosystems
* Oil Pollution Control
* Pollution Control and Waste Management
* Information and Data Exchange

Pollution from land-based sources are largely controlled by the enforcement of various Regulations under the Environmental Quality Act 1974. In addition strategies are being worked out for an integrated development aiming at a preventive approach in pollution control, encompassing proper environmental planning.

Noise Pollution Control

Data Collection and Assessment

Noise measurements provide basic data on the status and trend of noise pollution and help to identify the various noise sources. Data collected since 1981 are useful for the formulation of noise control strategies and regulations.

Through the assistance of a Japanese Colombo Plan Expert Dr. S. Kono on noise control who was attached to the Department of Environment from May 1981 to January 1982 studies were initiated on environmental noise from motor vehicles, industries and aircrafts and on the noise levels emitted by various categories of motor vehicles.

Since then, a number of noise studies have been conducted. These included traffic noise in major cities and towns such as Kuala Lumpur, Penang, Ipoh, Petaling Jaya, Johor Bahru, Alor Setar and Kelang; noise climate for selected roads in Kuala Lumpur, traffic noise at residential areas; industrial noise in the States of Penang, Kedah, Perak, Selangor, Negeri Sembilan, Melaka and Johor; noise for factories emitting pure tone noise; noise from factories emitting low frequency noise; noise from factories located near housing estates and aircraft noise in Subang and Bayan Lepas International Airports.

The threshold of noise nuisance depends on various factors such as degree of awareness, individual attitude, sources of noise etc. Therefore it is equally important that social noise survey be carried out to assess the views and opinion of the public on the various noise sources namely aircraft noise, traffic noise and industrial noise, they are exposed to. The Environment Department conducted several studies in 1983 involving a total of 2671 people living in Kuala Lumpur, Petaling Jaya, Kelang, Ipoh, Penang, Kuantan and Johore Bahru. A total of 1695 respondents answered the questionaires on traffic noise exposure, 490 answered the questions on industrial/construction noise exposure and 502 answered the questions on the effects of aircraft noise exposure.

From the results of the various noise studies, it was seen that more than 50 percent of the schools sampled in Kuala Lumpur, Penang and Ipoh recorded traffic noise levels exceeding 62 dBA at their fence as shown in Table 21, where-

as Table 22 shows that more than 50 percent of residential dwellings sampled in the major cities and towns in Peninsular Malaysia had traffic noise levels exceeding 66 dBA at the fence. Similarly, results of industrial noise studies in Table 23 revealed that more than 50 percent of industry measured at the fence exceeded 64 dBA. Assuming a 10 dBA reduction, the noise levels indoor for the schools and residential dwellings concerned would be 52 dBA, 56 dBA and 54 dBA respectively, this being much above the noise level of 45 dBA Leq recommended by World Health Organisation (WHO) for indoor/domestic environment during the day. Furthermore, the results of traffic noise study at urban centres as in Table 24 showed that more than 50 percent of the sampling sites in urban centres in Peninsular Malaysia recorded traffic noise exceeding 70 dBA, compared with the WHO recommended noise exposure limit of 55 dBA Leq for community or urban environment during the day. Theoretical noise contours were computed for the Subang and Bayan Lepas International Airports by Dr. S. Kono, a consultant in 1981. In 1982 measurements were conducted at the vicinity of the two airports to verify the theoretical noise contours. There were 41 sampling points at Subang and 15 at Bayan Lepas. Table 25 gives a tabulation of theoretical Weighted Equivalent Continuous Peak Noise Level (WECPNL) versus the range of calculated WECPNL at the two airports based on measurements.

The prime consideration of the social noise survey was the relationship between site and noise exposure level and the annoyance generated by the exposure. On the effect of traffic noise exposure 54 percent respondents felt they were disturbed. On the effect of industrial noise 51 percent felt the noise was disturbing. Respondents' opinion on aircraft noise gave a figure of 74 percent being disturbed. On the whole 82 percent of respondents experienced noisy environment and 31 percent of them felt the situation was deteriorating. 78 percent of respondend felt that noise pollution should be controlled immediately.

Noise Control Strategy

In December, 1984 a World Health Organisation noise and vibration consultant was attached to the Environment Department for a period of three weeks. He was assigned to review the findings on the environment noise studies and social noise surveys conducted earlier on and subsequently to assist the Environment Department in formulating appropriate noise control regulations/guidelines for the control of noise from motor vehicles, industries, community as well as aircraft noise.

In the case of aircraft noise, noise contours or zones around each airport will be mapped to provide assistance to State Governments in land-use planning around airports. This is to ensure that no residential areas are established within those noise zones where the noise levels are likely to cause nuisance.

In respect of motor vehicles and industrial noise, a framework for the development of control regulations has been recommended.

Control of Toxic and Hazardous Wastes

Following plans that were initiated in 1980, a joint study by Environment Division and an Australian firm of consultants was conducted commencing on 24th August 1981 on the generation of toxic and hazardous wastes in Malaysia. The study comprised:-

(i) surveys of industries to quantify the rate and volume of hazardous wastes generated;

(ii) visits to selected industries in the study area;

(iii) visits to existing domestic disposal sites.

The aim of the study was to formulate appropriate recommendations for the collection and disposal of toxic and hazardous wastes. In March 1982 the report of the study was completed. It identified, categorised and to the extent possible quantified potentially toxic and hazardous wastes generated by the Malaysian industries and formulated the main elements of a general strategy for the management of such wastes. The report recommended the formulation of adequate legislation as well as a management infrastructure to effectively control the disposal of toxic and hazardous wastes.

Following the recommendations of the report, a national committee was set up in April 1983 to draft policy guidelines on the handling, storage, treatment and disposal of toxic and hazardous wastes. The guidelines formed the basis upon which the regulations on toxic and hazardous wastes management should be formulated.

In April 1984, the Environment Department initiated work in collecting detailed information on quantities, categories of waste produced, waste generators and waste disposal practice. Based on the information a national plan or strategy for the management of toxic and hazardous wastes was prepared. The plan included the following elements:-

(a) disposal facilities consisting of:
* secure landfill sites to receive toxic sludges produced by wastewater treatment plants installed within the premises of individual industries and slag/ash residue from incineration plant;

* incineration plants equipped with gas scrubbing facilities for certain categories of wastes that require thermal destruction such as halogenated hydrocarbon solvents and pesticides;

* chemical/physical treatment plant for liquid wastes containing heavy metals such as wastes from metal finishing industries; and

* special storage compartments/areas to temporarily contain toxic wastes such as mercury, arsenic and polychlorinated biphenyl/triphenyl.

(b) collection and transportation of wastes from wastes generating areas to disposal facilities, transfer stations and pre-treatment facilities.

The existing facilities for toxic and hazardous waste disposal in Malaysia are not suitable for handling the type of wastes identified as potentially hazardous or toxic. In addition existing disposal practices are unsatisfactory and may pose long-term environmental problems.

A survey of the domestic dumping grounds showed that they were located where the static water table or ground water level would make leachate controls impractical and any leaching of materials dumped at the site contaminating the groundwater or water bodies would be virtually impossible to control. Hence disposal of toxic and hazardous wastes at these dumping grounds was not recommended.

It was, therefore, proposed that an environmentally acceptable secure landfill sites as a disposal facility should be established immediately while facilities such as centralised chemical/physical treatment plant to treat inorganic wastes for small and medium size industries and incineration plant could be established subsequently.

In October 1984 a Danish consulting firm was appointed under the ASEAN/EEC Scientific and Technological Co-operation Programme to assist the Environment Department in the formulation of regulations/guidelines on the management of toxic and hazardous wastes in Malaysia. A report that include a set of draft regulations – Environmental Quality (Scheduled Wastes) Regulations 1985 was made available in December 1984. The proposed regulations would apply to:-

- waste generators
- waste contractors
- waste disposal site operators

It covers the following aspects:-

(i) notification system to register all generators of toxic and hazardous wastes;

(ii) Licensing system for waste generators to dispose of toxic and hazardous wastes;

(iii) Licensing system for contractors to handle, store and transport toxic and hazardous wastes; and

(iv) Licensing system for disposal site for operators to carry out any work or activity for disposal of toxic and hazardous wastes.

The toxic and hazardous wastes to be prescribed have been broadly classified into 3 categories:-

- waste oil
- chemical wastes
- biological wastes

Acceptable limit of discharge for each category of wastes is not specified in order to avoid unnecessary complication in the enforcement of the regulations. The aim of the regulations is to prescribe ways in which wastes shall be managed so as to render them innocuous to the environment. The Director-General of Environment shall control the manner of operations of these wastes by way of licensing and inspection. Prosecution action against illegal dumping of toxic and hazardous wastes, will be instituted strictly.

It is envisaged that the enforcement of the regulations will be less effective without the establishment of a comprehensive management facility for toxic and hazardous wastes. On the other hand regulations must be enforced to guarantee the proper control of the wastes. Regular visits by enforcement officers to examine records, to take samples of wastes and to examine operational management of treatment plants or disposal facilities are necessary.

Acid Rain

A join monitoring project was initiated in May 1983 by the Chemistry Department, the Meteorological Services Department and the Environment Department to monitor acid rain in the Klang Valley. A network of 19 monitoring stations was set-up. The project was conducted for a period of one year and the results were reviewed in April 1984.

The overall results indicated that acid rain was hardly a problem in the Klang Valley. From a total of 1860 samples, only 6 percent recorded a pH below 4.6.

Haze

In late August and September 1982 a dense haze occurred throughout Peninsular and East Malaysia as well as in neighbouring countries. The hazy phenomenon was due to thermal inversion causing dust particles trapped in the lower atmosphere. A widespread burning of trees and vegetation in some parts of Indonesia and Malaysia by shifting cultivators as well as a period of long dry spell worsened the situation. Haze occurred for the second time in April 1983. Again it was an extended period of drought and the possible cause was attributed to the burning of an estimated area of 3.1 to 3.5 million hectares of forest in the region.

Monitoring and Surveillance

If pollution control measures are to be effective at minimum cost they must be based on a sound and thorough knowledge of the local environment. Considerable emphasis has therefore been placed on environmental monitoring which is one of the responsibilities of the Environment Department.

Air Quality Monitoring

The Environment Department continued to monitor the ambient air quality through a network of 180 monitoring stations throughout the country which included 165 dust deposit gauges (DPG), 8 high volume samplers (HVS), 1 set of eight port samplers (EPS), 1 set of three gas samplers (TGS). The parameters measured were dust-fallout, total suspended particulates, sulphur dioxide and total acidity.

In addition there were 5 automatic monitoring stations to monitor sulphur dioxide, carbon monoxide, oxides of nitrogen and ozone. The primary purpose of the network is to determine the degree of air pollution and to provide information to check the effectiveness of regulatory action.

In April 1984 a WHO consultant was assigned to the Environment Department for a period of one month to review the air quality monitoring programme in Malaysia. During this process it was discovered that several agencies in Malaysia were carrying out air quality monitoring with varying objectives. It was therefore decided to form an Inter-Agency Task Force on Air Quality Monitoring with the following objectives:-

(i) To co-ordinate future air quality monitoring programmes including the identification of priority parameters and methods of measurement;

(ii) To compile all available air quality monitoring data from various agencies involved;

(iii) To determine standard methodology in the interpretation of data so as to obtain more meaningful results with respect to the state of the environment; and

(iv) To exchange experiences to enhance the quality of monitoring techniques.

The Task Force comprises 16 Agencies as follows with the Environment Department undertaking the Chairmanship and providing the secretarial service:-

(i) Department of Environment (DOE)

(ii) Department of Meteorological Services (MMS)

(iii) Department of Chemistry (DOC)

(iv) PETRONAS

(v) National Electricity Board (LLN)

(vi) National University of Malaysia (UKM)

(vii) University of Agriculture Malaysia (UPM)

(viii) University of Malaya (UM)

(ix) University of Technology Malaysia (UTM)

(x) MARA Institute of Technology (ITM)

(xi) Telecommunication Department (TEL)

(xii) Factories and Machinery Department (FMD)

(xiii) Occupational and Industrial Health Unit, Ministry of Health (MOH)

(xiv) Environmental Protection Society of Malaysia (EPSM)

(xv) Malaysian Medical Association (MMA)

(xvi) WHO/Centre for Environmental Planning and Applied Studies (PEPAS)

The Task Force would work towards the formation of an efficient Air Quality Monitoring Network through:-

* Co-ordinating future air quality monitoring programmes to avoid duplication of efforts and manpower;

* Identifying priority parameters;

* Standardising objectives of monitoring techniques of sampling and measurement;

* Compiling all available data on air quality in the country;

* Developing uniform methodology for data evaluation and interpretation so as to obtain more meaningful results with respect to the state of the environment;

* Identifying and interpreting any pollution episodes in the country.

The Task Force went into action on 25 October 1984 and as the first task had drafted a Plan of Action and identified the following areas for indepth consideration:-

(i) To determine and prioritise the objectives of air quality monitoring;

(ii) To recommend parameters that are required to be monitored for a meaningful assessment of the status of the environment with respect to air quality;

(iii) To develop criteria for the siting and monitoring stations;

(iv) To standardise sampling and analytical techniques, and methods of measurements to facilitate the exchange of data;

(v) To identify air quality control regions;

(vi) To develop air quality indices and models for environmental planning;

(vii) To develop air quality standards; and

(viii) To review and develop emission standards.

Water Quality Monitoring

By the end of 1984, the Environment Department operated 366 Water Quality Monitoring Stations in 49 Water Quality Control Regions in Peninsular Malaysia, 27 in Sabah and 21 in Sarawak. Up to 40 different parameters were analysed depending on the station and the need. For this purpose about 1400 samples were collected each year (1981–1984) from the monitoring stations and sent to the Chemistry Department for analysis. The analysis covered physical, chemical and biological parameters. In addition, monitoring of ground water mainly from boreholes and open wells were carried out regularly at 44 stations mainly in the North-East and North-West of Peninsular Malaysia.

Besides the Environment Department, other agencies involved in monitoring and surveillance included:-

* Drainage and Irrigation Department which maintained some 69 principal and secondary water quality monitoring stations in Peninsular Malaysia.

* Public Works Department and Ministry of Health carried out joint monitoring in relation to water supply and sanitation.

Coastal Water Quality Monitoring and Health Survey

Samples were taken from 108 priority stations throughout Peninsular Malaysia. On an average 400 marine and 30 estuarine samples were collected annually and analysed for physical, chemical and biological parameters. In addition 28 stations were surveyed to assess the extent of pollution of the recreational beaches by oil residues in the form of beach tar.

Domestic and Commercial Solid Waste Control

It has been estimated that the per capita waste generation rate in Malaysia is in the region of 0.5 kg/person/day. Surveys carried out in the major towns in Malaysia and some basic information on the quantity and characteristics of waste generated in these towns are presented in Tables 26. Solid waste collection and disposal has traditionally been the function of Local Authorities. On an average the cost to collect and dispose of 1 ton of solid waste is about M$50 out of which in some Local Authorities 80 percent of this cost goes towards collection. There are between 250 to 300 disposal sites in use by some 236 Local Authorities in Peninsular Malaysia.

The most popular and acceptable method of disposal is by controlled tipping at designated landfills. However only about 24 percent of the Local Authorities adopted this practice satisfactorily in 1984 compared to only 19.3 percent in 1977. About 76 percent of the Local Authorities in Peninsular Malaysia continued to carry on with their traditional practices of haphazard dumping and rampant burning in the open as shown in Table 27. However, the standard of various practices have improved slightly during the last 8 years. Moreover less number of Local Authorities resorted to open burning as a means to dispose of their collected wastes.

Most Local Authorities in Peninsular Malaysia are running out of waste disposal sites. A survey of municipal or local government waste disposal sites shows that nearly 50 percent of these sites are located too close to the nearest residence, within one-half kilometer away. Moreover, over 61 percent of these sites will be short-lived in 5 years time or less as reflected in Figure 16.

The seriousness of indiscriminate dumping of solid wastes into natural watercourses and littering in public is further aggravated by the growth of human settlements along river banks and coastlines that the occupiers continue to regard these natural amenities as backyards.

Investigation of Complaints and Special Studies

The Environment Department received complaints with respect to environmental pollution from the public, residents association, community leaders, non-governmental organisations etc. All complaints with respect to air, water and noise pollution were duly investigated by the regional offices of the Environment Department throughout the country and appropriate follow-up action was taken. Other complaints regarding commercial noise, solid waste management and public nuisance were channelled to local authorities for action.

Investigation of complaints features as an important activity of the Environment Department since it serves as a useful indicator on the state of the environment. It also provides feedback on the enforcement programme of the Department and the state of compliance with the various regulations under the environmental Quality Act 1974 by the industries.

Figure 17 shows the number of complaints received over the years 1981–1984. Figures 18a to 18d show the types of pollution complaints received in 1981–1984 State by State.

Air Pollution Complaints

Most of the complaints were in respect of air pollution which constituted about 80 percent of the complaints received for the years under review. The number of air pollution complaints (including noise) received during the years under review is as shown in Table 26.

Complaints on dust and particulates continued to feature prominently over the years. The major sources were sawmills, rice mills, transport industry (mostly earth carrying), construction works and rampant practice of open burning. Other major complaints were related to noise, odour and smoke. Table 27 gives the breakdown of the types and sources of air pollution complaints.

Water Pollution Complaints

During the years 1981–1984, 235 water pollution complaints were received by the Department. Palm oil mills and rubber factories continued to be the major sources of water pollution complaints as shown in Table 28. However the number of complaints against these sources had declined. Other sources of water pollution complaints were industrial effluents, siltation due to land clearance and mining activities, domestic sewage and piggery waste.

Special Studies

Seven special studies were conducted to identify the sources of pollution as well as for other purposes as follows:-

(1) Merbok River Basin Baseline Study

(2) Report On Water Quality of the Rompin River Basin

(3) Water Quality Planning Project Linggi River Basin

(4) Report on Study of the Impact of Effluent Discharge from Palm Oil on River Quality prior to and after the Operation of Waste Treatment Facilities

(5) Report on 1980 Water Quality Monitoring Programme for Trengganu Tengah

(6) Preliminary Report on Pollution of Bidor River (Perak River)

(7) Preliminary Report on Pollution of Benut River

Research and Development Activities

The Palm Oil Research Institute of Malaysia (PORIM) continued its research on palm oil mill effluent and palm oil refinery effluent treatment technology. The efforts were centred on the following areas:-

* Cost-effective treatment technology;
* Upgrading the treatment systems;
* Development of non-waste or low-waste technology;
* Waste utilisation and land disposal of palm oil mill effluent.

The Rubber Research Institute of Malaysia (RRIM) carried out similar work with rubber factory effluent with special emphasis on reduction of ammonia level and odour nuisance from rubber factory operations.

The Standards and Industrial Research Institute of Malaysia (SIRIM) concentrated its research efforts on other industrial effluents and utilisation of padi husk.

Besides several universities in the country were involved in various studies with respect to environmental management. The nature and extent of research activities ranges from research on the pollution of natural resources including air, water, land and energy to social impact studies including urban transport and noise pollution.

The National University of Malaysia had done considerable amount of research on urban environment with respect to atmospheric and noise pollution. The Engineering Faculty of University of Technology Malaysia had conducted research on the quality of potable water supply in relation to its treatment with local materials such as coconut husk, rice and charcoal etc. and also on the use of PVC pipe. Research on the management of wastewater in Malaysia was also conducted. The Institute of Advanced Studies of the University of Malaya had conducted studies on the development of water quality criteria for Malaysia. Other studies conducted on the environment and natural resource by the institute are as follows:-

- Studies on rubber and other commercial polymeric materials;
- Studies on agro-industry waste materials;
- Linggi River Basin Management;
- Kuala Lumpur Ecoville;
- Research on organotin compounds;
- Studies on genetics.

University of Science Malaysia had conducted various hydrobiological research on the beaches of west coast of Peninsular Malaysia and oil pollution studies in the seas around Sabah and Sarawak. Other studies conducted include residue of chlorinated hydrocarbons and PCB's in the environment. Research conducted by the Faculty of Science and Environmental Studies of the University of Agriculture Malaysia covers the following aspects:-

- Potable water supply including evaluation of sources, treatment and arsenic poisoning from drinking water;
- Studies on blood lead levels;
- Utilisation of agriculture waste including studies related to POME;
- Pesticides residue monitoring;
- River water pollution and water quality indices;
- Soil erosion and studies on the reclamation of saline-sodic soil;
- Noise pollution;
- Social impact studies; and
- Energy sources and use.

Development of Water Quality Criteria and Standards for Malaysia

The Environment Department under the Ministry of Science, Technology and Environment has commissioned the Institute of Advanced Studies of the University of Malaya to undertake a comprehensive study to assess and develop water quality criteria and standards, covering beneficial uses for domestic water supply, fisheries and aquaculture, livestock, recreation and agriculture throughout the country. The development of national water quality criteria and standards is envisaged to form the basis of the entire work of water quality planning and management. Altogether, about 72 parameters have been taken into consideration for the formulation and development of criteria and standards (Table 29) covering organic and inorganic substances, microbial and physical compounds, radioactivity and others.

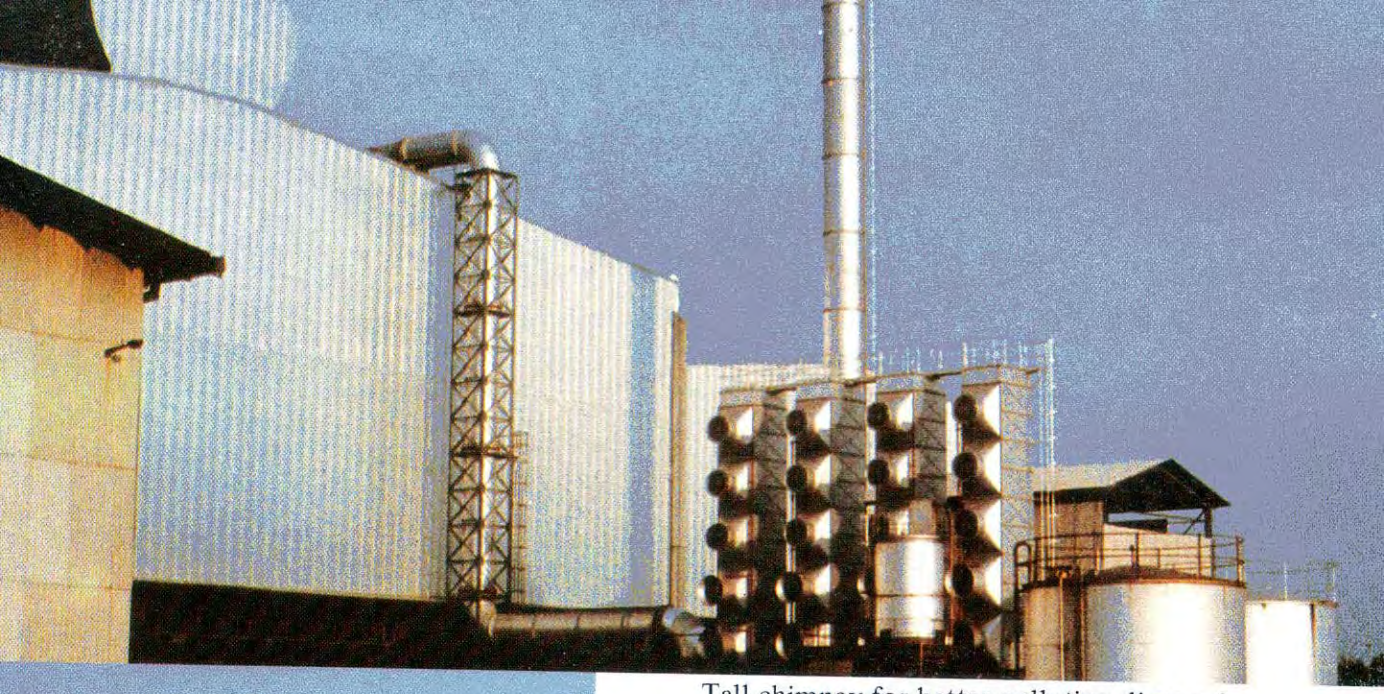
Signing of the project between the Environment Department and the University of Malaya was done on 7th December, 1984. The total cost of the consultancy services is about M$182,972 and it would take a year to complete the project. Two committees have been set up to monitor the progress of the project, namely a 'Steering Committee' which has the overall supervision on the project and a 'Technical Committee' which is responsible for the technical control of the project.

The present study undertaken by the University of Malaya is only for the first phase of the whole project study. The consultancy team is required to make a thorough search and review of existing scientific data and information pertaining to water quality in Malaysia and other countries. The second phase will be directed towards research into the areas where information is needed for the formulation of water quality criteria and standards.

Presiting Evaluation of New Industrial Sources

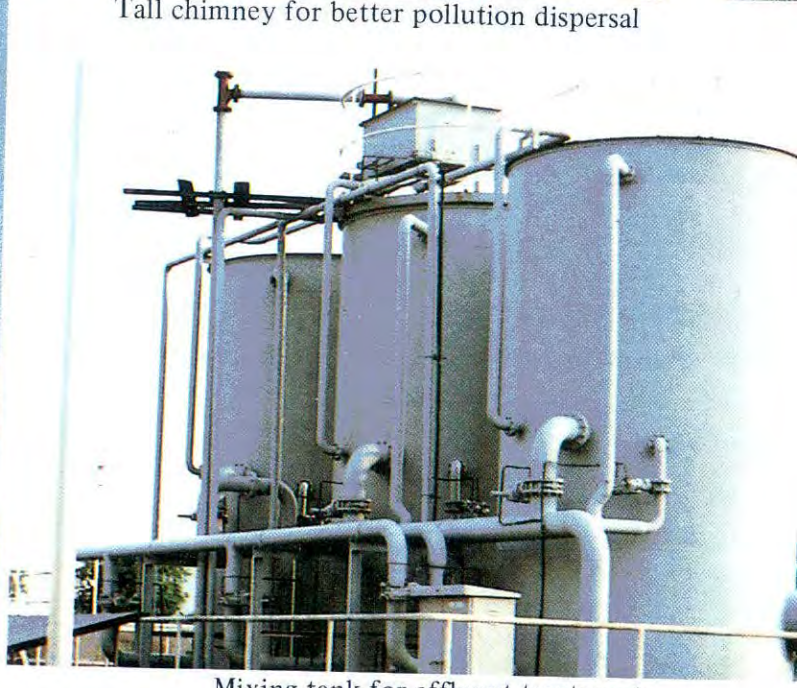
One of the successful strategies adopted by the Environment Department in pollution prevention is the implementation of the provisions under various control regulations stipulating that written permission should be obtained from the Director-General of Environment prior to establishing any new factories. This process enables the Environment Department to screen every project with a view to assessing the impact of these projects on the environment and formulate appropriate control measures in advance for inclusion in the final design and implementation of projects. Proper siting of the industry is a major consideration in this assessment in order to avoid indiscriminate land-use. This procedure would reduce and even eliminate the pressure of public outcry against environmental damage. It would make the direct control measures adopted through the various regulations more meaningful and less costly and also facilitate the smooth enforcement of the regulations. In addition it would save industry large sums of money through foresight and careful planning and help preserve the quality and productivity of the environment.

A total of 1793 applications were received and processed during the years 1981–1984 for the establishment of new factories which needed presiting evaluation. Table 30 shows the number of such applications for each of the above years.

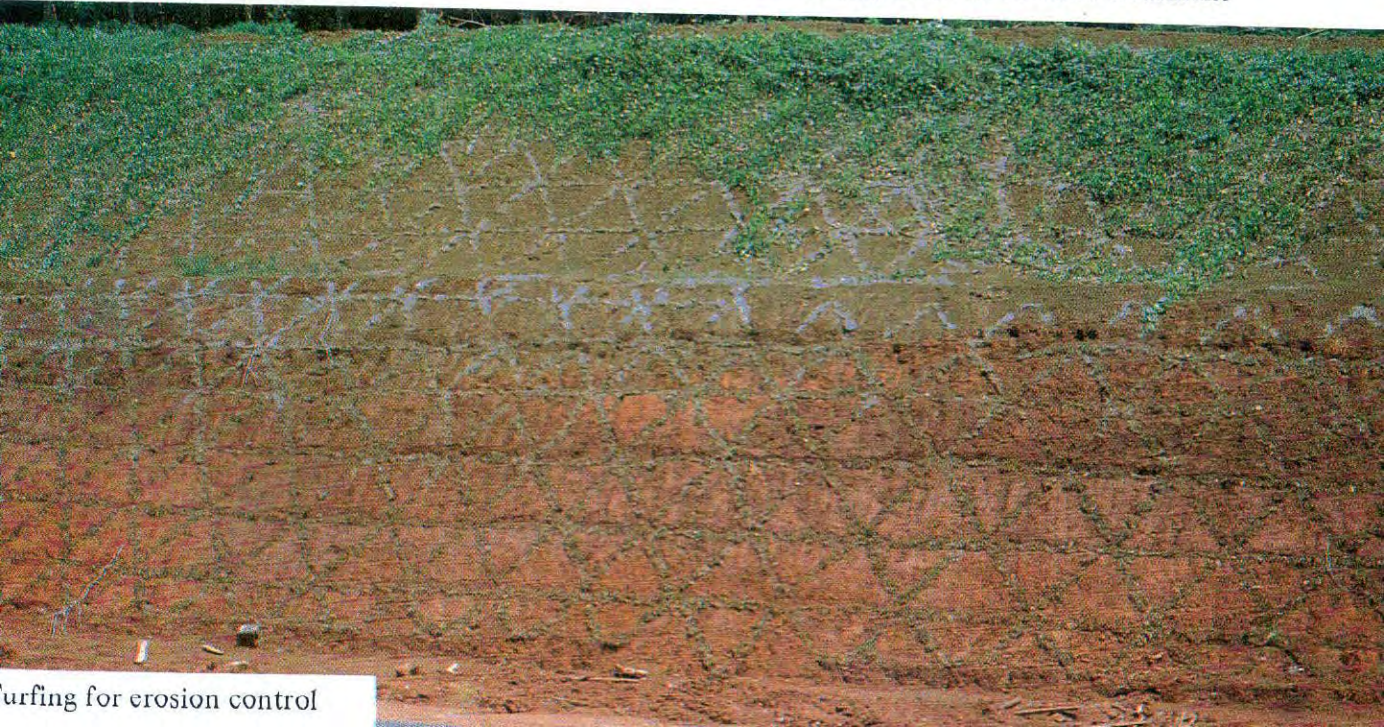


Tall chimney for better pollution dispersal

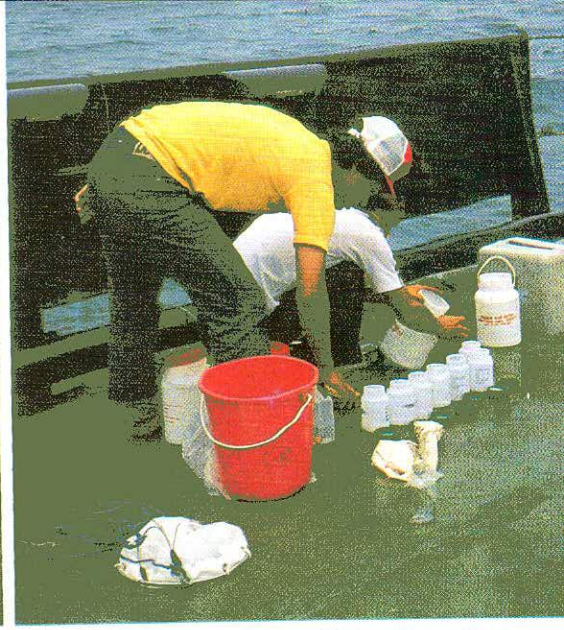
Incinerator for better waste disposal



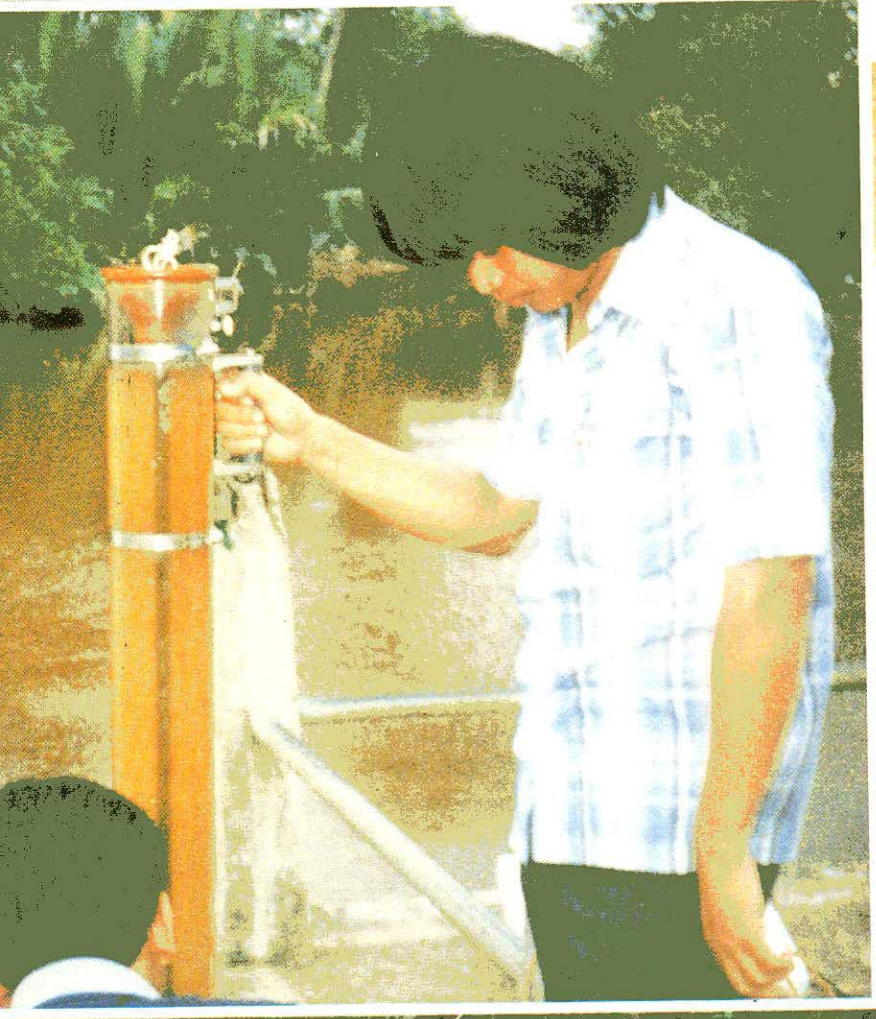
Mixing tank for effluent treatment



Turfing for erosion control



River Water Sampling



Kerbside smoke test conducted on motor vehicles

Motor Vehicle Noise Survey

Oil Spill Control Exercise

Improper handling, storage and dumping of hazardous chemicals and wastes

Indiscriminate dumping of solid waste

A properly managed sanitary land fill

CHAPTER IV

NATURAL RESOURCE MANAGEMENT

NATURAL RESOURCE MANAGEMENT

Introduction

The growth of the economy and the necessary maintenance of other socio-economic amenities that rely crucially on the continued exploitation of natural resources and the sustainable productivity of natural systems require the preservation and protection of the environment against not only pollution of the environment but also overexploitation of the resource systems. The high rate of economic development particularly in the recent decades has drawn heavily on Malaysia's resource base, both renewable and non-renewable, ranging from forestry, land, fossil fuels, minerals, to the most basic resource of all, water. The Government, sensitive to the implications of the deterioration or near depletion of these resources, will continue to bring about a more balanced exploitation of these resources to ensure that the present and future generations of Malaysia continue to have access to similar resources.

Nature Conservation

Terrestrial parks and reserves

The preservation of representative samples of Malaysia's natural forest and marine ecosystems with its constituent flora and fauna has continued to be accorded due importance. The natural forest habitats are indispensable as they play a truly significant role in the preservation of the watershed, in the maintenance of hydrological cycle while serving as a permanent resource of scientific, cultural and recreational value. As shown in Figure 19, over 65 percent of the total land area in Malaysia is still under forest cover. In total, 0.58 percent of the land area in Peninsular Malaysia as indicated in Table 31, 0.63 percent in Sarawak and 1.4 percent in Sabah have been set aside as National Parks and Wildlife Reserves under the Government's programme for conservation and preservation of flora and fauna.

The reserves in the Peninsula are managed by the Federal Department of Wildlife and National Parks.

In Sabah, the Ministry of Manpower and Environment manages a total of 245,108 hectares of National Parks, while another 141,203 hectares which have been constituted as wildlife reserves in the Permanent Forest Estate are being managed by the State Forestry Department.

In Sarawak, the national parks and wildlife reserves are being managed by the Forestry Department. With the constitution of Gunong Gading National Park in 1983, the total area of national parks and wildlife reserves in Sarawak now stands at 82,940 hectares. The other established National Parks include Bako, Gunung Mulu and Niah National Parks. Apart from these, there are three wildlife sanctuaries namely, the Samunsam Wildlife Sanctuary established to protect the Proboscis monkey and proposed sanctuaries for orang utan covering 185,000 hectares in the Gunong Lesong and the Lanjak Entimau areas.

Forestry

The forest resources in Malaysia have been systematically managed since the appointment of the first forest officer in 1901. Over the years, ecologically and environmentally sound forest conservation and management practices have been developed to ensure forest renewal and sustained yield. The earlier silvicultural systems were primarily concerned with improving the existing timber crop for future exploitation. Very few timber species were harvested and the trees were felled according to the requirements of good forest management, such as to remove overmature trees and trees that might compete with the favoured species.

Through the years the system of forest management in Malaysia has evolved from that

of lowland to the hills which calls for innovative approach. The practice of Malayan Uniform Systems (MUS) has given way to the Selective Management System (SMS) which allows for more flexible timber harvesting regimes which are consistent with the need to safeguard the environment and at the same time to take advantage of the demands for the timber market. The approach adopted under the SMS is one of conservative management of resources which is expected to have the following beneficial effects:-

(i) the dwindling forest resource is conserved;

(ii) the sustainability of the resource base is ensured;

(iii) re-investment is minimal;

(iv) the environmental quality is preserved;

(v) the excessive damage is reduced;

(vi) the excessive wastage is minimal; and

(vii) the overall utilization is optimal.

Control of soil erosion

Generally, logging activities, particularly the construction of logging roads, have been identified as a major source of soil erosion in the hill environment. This is particularly prevalent in granitic soils where the soil structure is easily eroded. Measures which have been taken to minimize the problems include strict specifications on road alignment and construction, close control of felling and skidding and imposition of a higher minimum felling girth where necessary.

The conservation of representative forest types

The conservation of representative forest types such as the establishment of Virgin Jungle Reserves (VJR), to serve as permanent nature reserves for general ecological and botanical studies have been actively pursued. The total area constituted as VJR's in Peninsular Malaysia alone is 17,157 hectares comprising of Mangrove, Heath, Peat Swamp, Lowland Dipterocarp, Hill Dipterocarp, Upper Hill Dipterocarp and Montane Forests which are distributed throughout the Peninsular Malaysia.

The National Forestry Act of 1984

Serious efforts are being put into ensuring the practice of forestry meets the demand of the economy as well as not neglecting the sound management of the forest ecosystem. Malaysia has passed a new Forestry Act which takes into consideration the statement of assurance with respect to the security of tenure of forest reserves under the Permanent Forest Estates. This has been made possible through the National Forestry Council which reflects that the government is giving a serious look at matters pertaining to resource conservation.

Improved treatment of natural forests

Under the Malayan Uniform System attention was originally focussed on the seedlings and saplings which were expected to form the bulk of the next crop. As such, silvicultural treatments were aimed at favouring these groups, often at the expense of bigger trees and advanced growth. This led to a much heavier poison-girdling of trees than was necessary, and in some cases, too drastic opening of the canopy. However, the recent emphasis had shifted in the seventies from the seedlings and saplings to advanced growth. This led to a more discriminating use of the poison-girdling technique and more conservational approach in silvicultural treatments. The shift in emphasis was due to the recognition of the sensitive environment of the Hill Dipterocarp Forest, the uneven nature of exploitation and the necessity to curb wastage that was incurred in poison-girdling standing trees and advance growth of good form.

Up to 1984, a total of 655,371 hectares of the inland forest had been silviculturally treated in terms of poison-girdling and climber cutting; while enrichment planting had been carried out over an area of 15,819 hectares. For the year 1985, it is envisaged that 90,600 hectares of inland forest will be silviculturally treated while enrichment planting will be carried out over 580 hectares of forested land.

Forest plantation

Forest plantations have become increasingly important although the emphasis is still on the regeneration of the natural forests. Since their establishment in 1973, a total of about 6,754 hectares has been planted in Peninsular Malaysia mainly with Pinus caribaea, P. merkusii and Araucaria species. A further 8,393 hectares will

be established in 1985. To avoid the possibility of a shortage of timber in the mid-nineties in Peninsular Malaysia, the Compensatory Plantation Project was launched in 1982 with the aim of growing and supplying general utility timber to meet the expected increase in the domestic market. The project plans to establish about 188,200 hectares of plantation based on a 15 year rotation, of fast growing species, such as Gmeline arborea, Acacia mangium, Eucalyptus camaldulensis and Paraserianthes falcataria, by the year 1995. To date about 890 hectares have been established.

In Sabah, the Sabah Forest Development Authority (SAFODA) has planned to establish about 100,000 hectares of plantation by 1998, while the Sabah Softwood Company will establish a total of 61,000 hectares of plantations by 1990 and the Sabah Forest Industries will convert about 60,000 hectares of its total forest area to plantation of fast growing species to meet the requirements of its integrated pulp and paper mills. SAFODA and the Sabah Softwood Company have successfully established about 16,581 hectares and 24,444 hectares of plantation respectively by the end of 1983. The main species being planted include E. deglupta, P. falcataria, G. arborea, P. caribaea and A. mangium.

Recreational and urban forestry

Rapid urbanization in Malaysia has had increasingly adverse impact, both physically and physchologically, on the population which is becoming increasingly aware of the degradation and pollution of the environment. As a consequence, there has been growing appreciation of the aesthetic value of trees and the pleasures of outdoor recreation. Urban forestry in terms of tree planting along highways and sidewalks have been carried out by the various local authorities and relevant agencies.

As early as 1967 the need for recreational forests was felt. The Forestry Department began developing such areas by providing basic facilities to visitors. In the Second and Third Malaysia Plans (1971–1980) a total of 25 areas had been successfully established. To date 64 recreational forest areas have been developed in Peninsular Malaysia alone. These areas which are of different sizes and serving different interests, are located in Forest Reserves throughout the country.

Projects are being implemented to conserve and introduce the positive values contributed by tropical forests to man's livelihood. Right in the heart of metropolitan Kuala Lumpur lies a piece of natural forest which did not gain any attention save for its monetary value were it to be developed for other infrastructure. Incidentally this 11 hectares of forest reserve is the oldest tropical forest in this part of the world.

Forestry Department is developing this forested land for the enjoyment of the public by developing recreational facilities such as walking trails with self-explanatory labels where necessary. These labels will help the general public in appreciating one of our natural and national heritage.

Apart from the forest walk, the old buildings just outside the reserve will be renovated to form exhibition centres for forest and forestry activities in the country. It is envisaged that this forest will be one of the primary focus of visitors to Kuala Lumpur.

Traditional fruit tree planting

Petai (Parkia speciosa), Durian (Durio zibethinus) and other fruits come from the forest during the main fruiting season annually. The Malaysian community enjoy these fruits inspite of the current price level. As the Forestry Department feels obligated to meet this demand by the community at a reasonably low cost, it has embarked on traditional fruit tree planting to supplement and to complement the dwindling supply. Fringes of the forests which are in the vicinity of existing villages are utilized for this programme.

Wildlife

Management of threatened and endangered species continued with efforts centred upon the Sumatran rhinoceros, the gaur, the elephant, deer and tuntung. A number of proposals for areas to be reserved specifically for these species have been made by the Department of Wildlife and National Parks to various State Governments. Kuala Gula, particularly, has been earmarked for nesting sea birds including rare species such as the Night Heron and Milky Stock.

Marine parks and reserves

While much efforts have been put to conserve representative areas of the terrestrial environ-

ment, little progress has been made to conserve overall areas that are equally unique, rich and diverse in the coastal and marine environment, namely, the estuaries, beaches, mangroves, the coral and island-reefs. As of December 1984, Malaysia has legislated three national parks that include marine habitats. The two with existing management are Pulau Gaya in Sabah and Bako National Park in Sarawak. Turtle Island in Sabah is also designated as a national park but its management status is not known. Also two beaches, namely, the Muka Head State Park in Penang and the Dungun Beach in Terengganu are protected by legislation.

A study has also been made of Pulau Redang and its environs with a view to setting-up the Peninsula's First Marine National Park. A number of studies has also been carried out within the Langkawi Group of Islands in the State of Kedah for the promotion of tourism.

Marine fisheries

Marine fisheries continues to be an important sector of the economy. Marine products still constitute a major source of animal protein, essential in the diet of the coastal populace and a significant proportion of the country's labour force is engaged in this sector. The value of the total marine fish landings at various ports in Peninsular Malaysia has increased by 7.3 percent, from $1,214,692,000 in 1981 to $1,303,091,000 in 1983, despite the decline by 6.2 percent in quantity of total landings from 649,315 to 609,056 tonnes in the same period. Thus, the estimated availability of fish per capita in 1983 has dropped to 50 kg. In Sabah the value of fish landed has also increased by 33.6 percent, from $126,000 in 1981 to $168,300 in 1983. Within the same period, the production increased by 20 percent from 40,000 to 48,000 tonnes.

The rapid decline of fish production in Peninsular Malaysia indicates that the fish resources of the Peninsula, particularly on the west coast, are threatened. According to one estimate the catch per unit effort reached its peak in 1967 at the rate of 90 tonnes per trawler per year. The present rate of production is a mere 20 tonnes per trawler per year. Landings of demersal resources are certainly in excess of the maximum sustainable yield.

Another indicator of resource depletion is the virtual disappearance of once abundant species as shown in Table 32. Molluses, particularly oysters (Crassostrea rivularise) no longer flourish in the rich estuaries of the Muar and Perak rivers. The oysters are believed to have been gradually wiped out by pollution. Shrumbu-Lemah or white fish (Lactarius lactarius) has also disappeared. Another depleted resource is Terubuk or Long-Tail Shad (Clupea macrusa), once known to occur seasonally in immense shoals of the Straits of Malacca. The disappearance of the herring species Hilsa macrusa from the Straits has also been attributed to the effect of pollution leading to the deterioration of spawning grounds.

Aquaculture

The production limits to marine fisheries and the increasing efforts per unit catch have made aquaculture more attractive in economic terms to complement the traditional supply of animal protein by 2 percent. In 1983, about 12,900 metric tonnes were produced in Peninsular Malaysia but 93 percent of which, however, were reared in freshwater pond and cages, and the rest in the brackish and marine environment.

The number of ponds constructed in 1983, exceeded by 35 percent over that of 1980. The total area involved also increased by 54 percent. The number of ponds was 16,413 units with a total area of about 2,783 hectares.

Aquaculture activity by cage culture had also been doubled since 1980, both in terms of number and area. The total number of cages was 5182 units and area involved, 43,960 square metres. About 60 percent of the cages were deployed in the brackish water environment.

As reflected in Table 33, aquaculture production, in terms of both area and value, either in ponds or in cages, had improved. But the cage culture was the one that should be further promoted. It required much less area per unit production compared to that of culture in ponds, as shown in Figure 20. Furthermore, it did not have to displace large areas of mangrove that need to be protected and preserved in order to sustain both types of culture.

Water

Water is the most basic resource of all. It supports many beneficial uses including drinking, fisheries, agricultural irrigation, industrial processing and navigation.

The demand for water throughout the country in 1981 was 550 million gallons per day (mgd), and 31 percent of which was for the State of Selangor and the Federal Territory of Kuala Lumpur. By 1990 the demand was expected to double, as shown in Table 34. Thus, the number of States with water deficit was expected to be reduced from six to two. The States of Johore and Kelantan would be short of water by 5.7 and 2.7 million gallons per day respectively.

The problem of water shortage was further aggravated by the occurrence of drought, lack of rainfall so great and long continued as to affect injuriously the plant and animal life of the place and to deplete water supplies for other purposes. In 1981 a minor drought occurred in Perlis affecting 7500 hectares of padi. Damage to crop was estimated to be 10 million ringgit. Terengganu also had the same experience, causing damage of 200,000 ringgit to padi crops. In the following year, Kelantan was the worst hit area where the damage suffered amounting to $4.7 million and affecting the livelihood of 101,200 people. Terengganu was again hit by drought in 1982 and suffered similar damage to crops amounting to $1.4 million.

In 1984, exceptionally high rainfall in Peninsular Malaysia, February through July resulted in a 34 percent increase in surface water runoffs. The rain caused extensive flooding in Johore, Malacca and Southern Perak. Minor flooding was experienced in February in Kuala Selangor and Negeri Sembilan. Penang experienced flash floods in April and Kuala Lumpur was affected by several minor flash floods through out the year.

In December 1984, the North East Monsoon returned to bring another series of flooding in the east coast of Peninsular Malaysia. Kelantan and Terengganu experienced significant flooding whereas Pahang and Johore sustained minor flooding.

The flood in Johore caused 7 deaths and over 24,000 people had to be evacuated. Damage to irrigation network was estimated to be $103,000. In terms of property damage, however, Kelantan suffered the most. The total damage amounted to $4,861,250, and 64 percent of which was sustained by regional development and statutory bodies such as KADA, MPKB and RISDA.

Energy

The surplus of water in certain areas could be harnessed for the generation of hydroelectric power. Indeed the supply of such power had almost doubled from 8,910 barrels per day of oil equivalent (bdoe) in 1981 to 17,400 bdoe in 1984. By 1984, hydroelectric power constituted 7.7 percent of the total energy supply in the country, compared to only less than 5 percent in 1981.

The country's energy dependence had shifted recently from traditional sources such as oil to other types of fuel, namely, natural gas and coal. The use of oil dropped by 2.2 percent to 186,680 bdoe in 1984. The utilization of gas for electric power generation had increased by sevenfold, from 2,000 bdoe in 1981 to 14,030 bdoe in 1984, while the use of coal quadrupled from 1,980 bdoe in 1981 to 8,070 bdoe in 1984 as shown in Table 35.

Timber – A fast depleting natural resource

CHAPTER V

ENVIRONMENTAL PLANNING

ENVIRONMENTAL PLANNING

Introduction

Many of the environmental problems in this country have arisen because of lack of environmental considerations during land use planning as well as the planning phase of development projects. There are many glaring examples in the past which have remained with us as reminders of what we should avoid in the future. The pollution problems experienced in the surrounding environs of factories such as Chemical Company of Malaysia in Shah Alam, Lee Rubber in Gombak, Cast Iron Products in Petaling Jaya and the Quarries in the Batu Caves area stand out as typical examples of project/development planning in which consideration of buffer zones was not taken into account. In this respect it is more often than not housing development that encroaches into the vicinity.

Similarly, physical plans for land use have also not taken into consideration the need to provide buffers between industrial and residential areas; waste treatment facilities for domestic sewage and industrial effluents; municipal refuse disposal facilities such as waste disposal sites and incineration plants; disposal facilities for toxic and hazardous wastes generated from industrial operations and the treatment of industrial waste water; silt trap facilities at strategic locations for containing soil eroded during activities such as logging and earthworks during housing, highway and road construction; mining and large scale agricultural development; special noise zones around airstrips and adequate green areas for parks and other recreational areas particularly in urban areas. In addition, the planning of urban areas has also not taken air and noise pollution impacts particularly those due to motor vehicles into account.

Many examples can attest to the aforesaid and these include the Subang Jaya which is right along the flight path of planes landing at the airstrip of the Subang International Airport; the various housing estates in and around the Batu Caves Industrial Estate, the Selayang Industrial Estate and the Bukit Raja Industrial Estate; the lack of sewerage treatment facilities and municipal refuse disposal and the absence of toxic and hazardous waste disposal facilities; the high suspended sediment load in the majority of our rivers as well as the air pollution and noise problems faced by town folks particularly those who stay in houses fronting main roads. Two main points stand out clearly in these examples:-

(a) General lack of awareness among decision makers and planners that there is a limit to what pollution control can achieve; and

(b) Failure to integrate environmental dimension into the physical planning exercise.

Fully aware of the mistakes of the past, the Environment Department has recommended an integrated approach to development planning. In the first place Federal and State agencies undertaking planning studies such as master plans, regional plans, structure plans, local plans have been requested to take environmental considerations into account. As a matter of fact, the Environment Department has also been involved in many of these studies by participating in the drafting of Terms of Reference (TOR) for these studies, by providing data on the status of environmental quality in the study area and by providing comments on the working papers and reports prepared in conjunction with the studies. Secondly, the Environment Department has directed potential investors of major industrial projects to carry out Environmental Impact Assessment (EIA) studies for their proposed projects. The EIA study should be carried out during the prefeasibility and or feasibility study stages of the project. In addition, the Environment Department also provides technical input to state and local authorities in the zoning and location of industrial estates, in the allocation of industrial lots to potential investors and in land

conversion applications from agricultural land use to industrial and residential land use.

To assist planning authorities and consultants in incorporating environmental dimension into land use planning and in conducting environmental impact assessment studies, many environmental planning guidelines have been drawn up which complement the various pollution control regulations formulated under the Environmental Quality Act 1974. Some of these guidelines include the Environmental Impact Assessment Handbook – Procedure and Guidelines. Other environmental planning guidelines include those for the siting and zoning of industries, the disposal of solid waste on land, the prevention of soil erosion and siltation as well as those related to toxic and hazardous wastes management. There are also other guidelines which are drawn up to assist the sound planning/management of certain industrial operations and these include General Guidelines for Air Pollution Control.

Environmental Impact Assessment (EIA) Procedure

As outlined in the Environmental Impact Assessment Handbook – Procedure and Guidelines, the EIA Procedure aims to assess the overall impact on the environment of development projects by the public and private sectors. The EIA Procedure provides for:-

(1) Preliminary Assessment of selected projects;

(2) Detailed Assessment of those projects for which significant residual environmental impacts have been predicted in the Preliminary Assessment;

(3) Review of Detailed Assessment Reports.

The Procedure is summarised in Table 36.

Because environmental impact assessment is conducted in response to a project proposal, the assessment procedure is project-centred. In this connection, the procedure is moulded around the normal project planning process which comprises:-

(1) Prefeasibility study of identified projects.

(2) Feasibility study of those projects appraised to require full feasibility study.

(3) Reappraisal of Project Feasibility Report.

It is clearly seen that the environmental impact assessment can be integrated into the somewhat generalised normal sequence of project planning as illustrated in Figure 21. Some minor modification may be necessary to suit particular project development programmes. This concept, known as the Integrated Planning Concept will facilitate the integration of environmental dimension into project planning.

It is to be noted that the environmental impact assessment procedure needs to be complemented by environmental monitoring activities throughout the implementation phase of the project. This is to ensure that measures identified in the environmental impact assessment studies in order to mitigate the potential adverse impacts of the project activities are incorporated in the design, construction, operation and maintenance (including abandonment) of the project.

Projects Subject to EIA

During the years 1981 to 1984, about 29 projects were subjected to informal environmental assessment (Table 37). Environmental impact assessment (EIA) of projects was not a legal requirement during the period but was imposed by the Environment Department through the normal procedure of project planning and approval.

Hydroelectric power projects, new industrial estates and projects related to petroleum and gas constituted the major bulk of projects which were subject to informal EIA. The number of hydroelectric power projects which involve the construction of large dams and the creation of large impoundments will continue to be important in the country in view of the Government's policy to exploit fully the vast hydropower potential available. This will be more so in the States of Sabah and Sarawak where the hydropower potential of rivers have yet to be fully exploited. The Bakun hydroelectric power project in Sarawak with a maximum installed capacity of 2400 MW will be the largest project of its kind in the country. Significant impacts on the environment are expected to be caused by the construction of the dam and the creation of

the impoundment. The adverse impacts include resettlement of large numbers of the population; changes to water quality caused by the impoundment of water submerging vegetation; ecological changes affecting aquatic life, wildlife and vegetation; as well as increased saline intrusion downstream. The project will however assist in meeting the country's demands of electric power in the future. Detailed assessment of the significant impacts of the project are to be carried out during the coming year.

The discovery of oil and gas off the coast of Terengganu, Sabah and Sarawak continue to play a role in attracting downstream activities related to petroleum and gas industries. Most of these projects are large and have potential to impact the environment. The ASEAN Bintulu Fertilizer plant in Sarawak for example produces 1000 metric tons of ammonia and 1500 metric tons of urea a day. Methane from natural gas fields is used as feedstock of the plant. The impacts include those that arise from the use of methane an inflammable substance, the storage and transportation of ammonia, the discharge of process and cooling water and the discharge of gaseous effluents. Proper location of the plant away from residential areas helped minimise the impact due to the plant.

With the continued emphasis on the industrialization programme, many more new industrial areas will be developed throughout the country. Recent trend has shown the awareness of State Governments on the importance of proper assessment of new proposed industrial sites to minimise adverse impacts. Although in general no formal impact studies have been carried out by the States for the industrial areas proposed, nevertheless assessment by the Environment Department of the proposed sites assisted the States in formulating proper guidelines for the development of the areas concerned.

Other major industries for which EIA studies were carried out included the pulp and paper mill in Sabah, hot-briquetted iron plant in Labuan and a cement plant and quarry in Perak. The pulp and paper mill project in Sabah is expected to be significant due to the discharge of waste water into the Brunei Bay which is rich in prawns and fish, the emission of gaseous effluents and dust, and the removal of large tracts of natural forest for timber and pulp and its conversion to softwood type forests. Detail assessment of these possible impacts is being carried out to minimise the problems mentioned.

Plans/Studies Subject to Environmental Assessment

Twenty plans/studies in which environmental assessment were carried out were referred to the Environment Department during the period 1981–1984 (Table 38). These plans/studies were for water resource management, regional land development, urban master and structure plan development, tourism development, sewerage development and related forestry conservation and development.

Sewerage master plans were made for the major towns of Melaka, Bintulu, Kuantan, Port Dickson and Kelang during the period. The Environment Department provided various inputs into the preparation of these plans. In addition for some of the studies Environment Department assisted in carrying out source inventory surveys of industries.

Urban master and structure plans were made for the urban centres of Melaka, Bangi/Kajang, Kelang, Kota Kinabalu, Ipoh, Kuala Terengganu, Pulau Pinang, Seremban and Johore Bahru during the period. The Environment Department besides providing various data input for the study also critically reviewed the environmental studies related to the preparation of the master and structure plans.

It is noted with satisfaction that increasingly environmental dimension is being given due consideration during the planning of development projects. However, although the level of environmental input given is far from satisfactory, it is envisaged that this will improve with greater experience by consultants and greater awareness by planning authorities.

Overall Performance

Environmental impact assessment process is still in its infancy in this country and as expected the level of local expertise available to undertake such studies remains insufficient. The lack of effort in promoting EIA among all sectors involved and the absence of training facilities in the country within existing training institutes has hindered progress during the period. With amendments to be made to the Environmental Quality Act, 1974 to make environmental assessment a mandatory requirement for selected projects, efforts will be made to overcome this.

Consciousness among many government agencies and the private sector on the need to incorporate environmental consideration into project planning, though improving, is at a low ebb. Acceptance of this need is often hampered by the notion that this would entail high cost and delay in project implementation. Mandatory requirement of environmental assessment of a project may instill greater awareness of such a need.

CHAPTER VI

ENVIRONMENTAL EDUCATION

ENVIRONMENTAL EDUCATION, TRAINING AND INFORMATION

Introduction

For any society grappling today with basic problems of population growth, economic viability, energy and industrialisation, education about the environment is of vital importance. If there are solutions to these problems, they will be found in the future by educating today's children.

While environmental quality is broadly defined as the interrelationship of man and his environment, it is important to understand the wealth of implications contained in this statement. The environment supplies man with his basic needs – air, water, food – without which there can be no life. Thus, man's existence has always been dependent upon his ability to adapt to his environment. Today, however, man is capable of effecting changes in his environment that may have far-reaching impact on his own future and the future of mankind. If this impact is to be constructive, man must act responsibly towards the environment. The purpose of environmental education is to give to man the intellectual, professional and technical tools with which to do so.

There is general agreement on the functions and goals of environmental education (EE), and on its multidisciplinary nature. Two trends have developed in the formal educational system. One approach is to consider the study of the environment as a new science, and the other approach is to include environmental aspects in existing courses. Both mean introducing a new subject into already crowded school programmes and a generally conservative style of education. There is a general consensus, however, that specially qualified teachers are needed in formal education systems to teach environmental studies, and that experienced teachers will require inservice training in order to supplement their courses with new material and teaching methods.

Even though children and young people most often gain an initial appreciation of the environment while attending the formal education system, the role of non-formal education in Malaysia is doubly important because it reaches the adults.

Non-formal education is aimed at developing the public's involvement in preventing pollution and enhancing and protecting the quality of the environment. It is being conducted in Malaysia via many channels – public organisations, special events, contests, exhibitions, seminars etc.

The priority task of the Environment Department ever since its inception in 1975 has been centred around the enforcement of the Environmental Quality Act, 1974 and its various regulations in line with its policy of curbing and containing pollution while acting resolutely to forestall emerging environmental problems.

The curative aspects of pollution control had therefore been the main concern until 1981. However in order to build the foundation for sound environmental management it is essential to develop a population that is aware of and is concerned about the environment and its associated problems and which has the knowledge, skill, attitude, motivation and commitment to solve current environmental problems and the prevention of new ones.

For this purpose, the Environmental Information and Education Unit and the Technical Training Unit were established in 1981 and 1982 respectively. The objectives of the Environmental Information and Education Unit are:-

(i) To disseminate environmental information as an input towards the decision-making process for the protection and improvement of the environment and the enhancement of the quality of life of the people; and

(ii) To increase awareness of the public

with regard to the state of the environment and environmental pollution and to inculcate the responsibility of controlling and preventing pollution through public education.

The Technical Training Unit was established with the objective of enhancing the technical capabilities of the staff of the Department through in-house training sessions and co-ordinating attendance of the staff in workshops, seminars and symposia.

Environmental Education

While it is true that the public has, over the years, generally become more aware of environmental problems, there is still a need for a concerted effort in bringing about greater public awareness so that increased civic responsibility will result in positive social action. It is therefore necessary to identify programmes which will ensure the improvement of humanity's potential to develop individual and social well-being in harmony with the environment.

Since environmental education is necessarily oriented towards community action there are many target groups for environmental education who are outside the formal school systems. Efforts to reach them have involved many different instruments, government institutions and agencies and a wide variety of non-governmental organizations including private and commercial enterprises.

During the years under review, the Environment Department published and distributed free the magazine SEKITAR to Government Departments and organizations, universities, secondary schools and public libraries. Other materials included booklets on 'Our Environment', 'Environmental Conservation' and pamphlets on 'Water and Air Pollution'. Apart from this, the Environment Department continued to distribute guidelines and other information documents to the target groups. In addition, to mark specific events such as the World Environment Day, relevant information, brochures and pamphlets are distributed to the public together with posters and special messages from the Minister charged with the responsibility for the environment. The themes for the World Environment Day during the years under review were as follows:-

1981 Rapid Development Without Pollution

1982 Towards a New Era in Environmenta Management

1983 Clean and Beautiful Environment is ou Responsibility

1984 Save Our Soils

Further, the Environment Department organised talks and panel discussions and co operated with a wide spectrum of organizations in addition to active participation in radio and television programmes focussed on environmental education. Seminar organised by the Environment Department and other environment-related agencies ranged from issues in education and legislation to highly technical and scientific ones relating to environmental technology and pollution control. During the years 1981 to 1984, seminars as listed in Appendix B were organised.

A Regional Conference on Environmental Education in ASEAN Universities and Its Transfer was held at the Universiti Pertanian Malaysia from 18–21 August, 1981. Several recommendations emerged out of the seminar for implementation by ASEAN member countries.

The Wildlife and National Parks Department as part of its responsibility for the management of national parks operates a Nature Study Centre at Kuala Atok at Taman Negara in addition to issuing its own educational materials. The Forestry Department and the Local Authorities along with relevant agencies organised activities such as Tree Planting and Cleanliness Campaigns which contributed towards environmental education.

A National Cleanliness Campaign was launched by the Hon. Prime Minister in October 1983 with the objective that cleanliness should become an integral part of the Malaysian way of life and help create a clean environment.

Under the formal environmental education programme, the Curriculum Development Centre of the Ministry of Education has introduced "Man and His Environment" as a subject in the new school curriculum. The subject is aimed at providing knowledge, perception and positive attitude towards environment in a holistic approach.

At the tertiary level, the University of Agriculture Malaysia (UPM) offers a Bachelor Degree in Environmental Science. The curriculum

content encompasses pollution control and management and environmental control technology. It also offers a course leading to Bachelor Degree in Fisheries in which oceanography and marine pollution form part of the curriculum. In the National University of Malaysia and the University of Malaya, environmental studies form an option for graduates in the Diploma of Education. Other universities also have some environmentally related courses integrated into their Bachelor of Science Degree programmes.

Training

As in the past years, the Department gave emphasis to extend training in environmental management to its personnel. The Department also took advantage of the training programmes sponsored by International Agencies, namely UNEP, UNDP, WHO, UNESCO and Foreign Governments under their technical co-operation programmes. Details of meetings, workshops, courses and seminars attended by members of the staff of the Environment Department are given in Appendix B. In addition several on-the-job training courses were held by the Department such as on stack sampling and air quality measurements.

Information

Availability of reliable, relevant and up-to-date information is crucial for proper decision making in environmental management. In this respect, the Environment Department through its monitoring, source survey and other related programmes have gathered considerable amount of data that are necessary for assessing the state of the environmental quality and for purpose of environmental planning. A WHO consultant was assigned to the Department for a period of one month (17th July – 14th August, 1981) to help develop an Environmental Information System. Among other things, the consultant identified the need for a clearing house mechanism in the management of environment-related data and computerisation. Preparations are underway for the purchase of a computer and the establishing of an information network.

The Information and Education Unit of the Environment Department, apart from having been entrusted with the task of collecting and collating environmental information for dissemination, also handles query-response service in environmental information. The Unit also functions as the National Focal Point (NFP) for the International Referral System for Sources of Environmental Information (INFOTERRA) and the National Correspondent for the International Register of Potentially Toxic Chemicals (IRPTC).

INFOTERRA

An advisory committee, established to review and revamp its information service met from 17th–20th October, 1983 in Athens. Malaysia was represented in the Committee by the Director-General of Environment. The Committee formulated the following priorities with a view to reforming the information service of INFOTERRA:-

(a) Identification of information needs on a regional and sub-regional basis and in particular those of the developing countries and to develop such regional and sub-regional network of environmental information as necessary, using effectively the existing services and structures or setting up new ones within available financial resource and meeting different local needs;

(b) Streamlining the publications programme through the publication of a regular newsletter focussing on the activities of UNEP which should include in particular, information on the results and implications of the activities of UNEP and on national experience in combating environmental problems and a section on environmental events;

(c) Identification of non-traditional forms of information;

(d) Intensifying the use by UNEP of information centres and services, particularly for the dissemination of environmental information in the various regions;

(e) Co-operation with non-governmental organizations;

(f) Establishment of the environmental information training fellowships in co-operation with other relevant United Nations training programmes and of a journalistic attachment programme.

The Environment Department as the National Focal Point (NFP) of INFOTERRA register-

ed the following agencies in the International Directory of Sources in 1981:-

(i) Department of Environment

(ii) Department of Wildlife and National Parks

(iii) Institute of Medical Research

(iv) Forest Research Institute

(v) Palm Oil Research Institute of Malaysia

In its query-response service via INFOTERRA, the Department handled 38 queries during 1981–1984. Ten of the queries received were from foreign countries which included India, Guyana, Brazil, Philippines and Ghana. In all cases the queries were referred to the relevant sources for response.

A National Seminar on INFOTERRA was organised by the Department from 16–17 February, 1983 in order to introduce the system to agencies related to the field of environmental information and also to encourage the use of the system nationally. The Malaysian NFP also attended an INFOTERRA Training Course in Nairobi, from 22–25 August, 1983.

International Register of Potentially Toxic Chemicals (IRPTC)

The Environment Department as the Malaysian National Correspondent for IRPTC has been maintaining close contact with agencies involved either directly or indirectly in the control of chemicals in this country. In its querry-response service the National Correspondent handled 18 queries on various chemicals, particularly pesticides.

In 1984, two Dutch Consultants appointed by the Programme Activity Centre of IRPTC assisted the Malaysian National Correspondent in establishing the National Register of Potentially Toxic Chemicals. The register aims at collecting information and data on chemicals used in this country. Information gathered includes details on production and trading processes, uses, toxicological data, waste management and data on environmental fate and pathways into the environment.

The information gathering is being assisted by a Committee on National Register of Potentially Toxic Chemicals. The Committee comprises representatives from the Ministry of Trade and Industry, Ministry of Health, Statistics Department, Customs and Excise Department, Chemistry Department, Pesticides Board, Malaysian Agricultural Research and Development Institute (MARDI), the Fishery Research Institute, Factories and Machinery Department, SIRIM and the universities.

The Malaysian National Correspondent attended the Second Meeting of Experts on Toxicological and Safety Data for Chemical Substances in Internation Trade held under the USSR-UNEP/IRPTC Project on "Control of Hazards Posed by Chemicals to Human Health and the Environment" in Moscow from 5–9 December, 1983.

The Malaysian National Correspondent attended a course in the Management of National Register of Potentially Toxic Chemicals organised by the Programme Activity Centre of IRPTC, Geneva from 29 October–15 November, 1984. In addition, the Bimonthly Bulletin of the IRPTC which provided very useful information on chemicals was distributed to the members of the Committee on National Register of Potentially Toxic Chemicals.

The Role of Non-Governmental Organizations (NGO's)

Non-governmental organizations (NGO's) commonly functioning as environmental groups to advocate popular support for environmental cause have an environmental education and training role embodied in their respective constitutions. Their public pronouncements and publicity are directed at effecting changes and shaping attitudes, and so, both directly and indirectly they become involved in environmental education. Of great importance is the role of NGO's in providing a mechanism for feedback on negative side-effects from programme implementation to the government and its regulatory agencies. In effect, they are holding a watching brief on behalf of the people on the use of natural resources, conservation, professional practices and other activities of the Government and private sector which adversely impinge on the environment.

Feedback from NGO's can take many forms. These include publications in the form of newsletters and magazines, exhibitions, talks, sympo-

sia, forums and conferences. In sum, the effectiveness of NGO's can be enhanced by broad-based public participation and generous and informed coverage by the mass media.

In Malaysia, the most active environmentally-related NGO's are:-

(i) Malayan Nature Society (MNS)

(ii) The Environmental Protection Society of Malaysia (EPSM)

(iii) Friends of the Earth Malaysia (SAM)

(iv) Environmental Management and Research Association of Malaysia (ENSEARCH)

(v) Federation of Consumers Association (FOMCA)

(vi) World Wildlife Fund Malaysia (WWF)

Co-operation with NGO's was greatly enhanced during the years under review through regular dialogue sessions and effective participation in environmental awareness programmes organised by the Government.

Malaysian Nature Society (MNS) one of the oldest non-governmental organisations in Malaysia was established in 1940. It has a long and proud tradition of providing a forum for nature study creating awareness amongst Malaysians in the value of nature. Since its formation, MNS has organised an extensive range of indoor and outdoor activities, such as nature trips, expeditions, seminars and exhibitions. It regularly publishes a journal entitled 'Malaysian Nature Journal' as a means of information dissemination.

ENSEARCH, which was inaugurated in February 1984 particularly to provide professional advice on solving environmental problems. In this respect, it has had several seminars, talks, workshops and regularly published its newsletter entitled 'Ensearch'.

EPSM was established in January 1974 and since its inception has contributed considerably towards inculcating environmental awareness among Malaysians. In this respect, it has had several projects and the highlights during the years under review are:-

(i) Environmental studies of Petaling Jaya, Taiping and Kelang

(ii) Environmental Decade Review Campaign

(iii) Tembeling (National Park) Campaign

(iv) Air and Noise Survey

(v) Environwalks in all the 13 State Capitals

(vi) Environmental Management Workshops

(vii) Press Releases on Several National Environmental Issues.

Friends of the Earth Malaysia (SAM) was formed in 1977. In addition to holding seminars, SAM has published several books, materials, posters and newsletters with a view to creating environmental awareness among the Malaysians. SAM is also the co-ordinator of the Asia-Pacific Peoples Environment Network.

Part of environmental awareness programme

CHAPTER VII

INTERNATIONAL AND REGIONAL AFFAIRS

INTERNATIONAL AND REGIONAL AFFAIRS

Introduction

Malaysian environmental activities at the international level are carried out primarily within the framework of international organisations. Foremost among these organisations is the United Nations Environment Programme (UNEP). Others are the affiliated United Nations Organisations. At the regional level Malaysia worked mostly in collaboration with the association of South-East Asian Nations (ASEAN) and within the framework of the UN Economic and Social Commission of Asia and the Pacific (ESCAP). At the bilateral level close rapport was maintained with Singapore and Indonesia with respect to environmental issues of the Straits of Malacca and with Singapore on exchange of information on environmental issues.

United Nations Environment Programme (UNEP)

UNEP with its Headquarters in Nairobi, Kenya is the International Organisation responsible for assisting countries in environmental management and was formed in 1972. One important function of UNEP is to ensure that comprehensive approaches are developed to deal with environmental problems. The Environment Department is the focal point of UNEP in Malaysia.

The UNEP Governing Council with its 58 Member States meets annually to provide policy guidance to the Executive Director in that he may be able to execute programmes for the forthcoming year smoothly and on the basis of determined priority. Malaysia served in the Council for three consequtive terms of 3 years each beginning from 1975 and has been again elected to serve for another term until 1986.

UNEP over the years has emerged as a significant and important institution to be reckoned with on the world environment scene imbued with a deep sense of commitment towards UN system-wide environmental concerns. In this respect the catalytic and co-ordinating role of UNEP and its continued commitment to giving leadership and sense of direction to environmental initiatives at national, regional and international levels is commendable. By way of joint programming with other UN organs, UNEP enjoys the confidence and receives the co-operation of all other UN organs with respect to activities concerning environmental issues.

In May 1982, 110 Governments of the world met in a session of a special character of the UNEP Governing Council at Nairobi to review the progress made in the past decade and to reaffirm their continued commitment to the environmental cause and to the mandate of UNEP with some indication of ways and means of further effective action. This reaffirmation was embodied in a document now known as the Nairobi Declaration which essentially gives a succinct and pragmatic account of the gamut of environmental issues to be addressed until the turn of this century. While noting some progress has been made since Stockholm, it also expresses serious concern about the present state of the environment world-wide, and recognises the urgent necessity of intensifying efforts at global, regional and national levels to protect and improve it. At the session of a special character at Nairobi there was a clear consensus that the absence of economic development is one cause of environmental degradation and conversely that development must be environmentally sound if it is to be sustainable development enforcing enduring benefit. The need for sustainable development was one of the major themes of the Nairobi Conference. The full text of the Nairobi Declaration is attached as Appendix D.

Through UNEP, though it faced occasional difficulties, frustrations and challenges the drive to improve the quality of the environment both in developing and developed countries alike has gathered momentum with substantial accomplishments to its credit over the past decade.

These include the following:-

(i) UNEP has made substantial progress in bringing about an increase in awareness of the nature and significance of the environmental basis of development. Formal education, technical training, mass media, non-governmental organisations and citizen groups have all played a role in this process;

(ii) Public involvement in environmental debate and action increased in the developing countries, just as movements favouring environmentally sustainable lifestyles acquired wider support in the developed countries. Support, both at scientific and grassroot levels for action to arrest environmental degradation grew in the developing countries, in the face of some increasingly apparent negative ramifications of industrialisation, urbanisation, population growth and significant changes in forests, rangelands and farmlands;

(iii) Institutional machineries at national and regional levels for consultation on environmental issues and problems have been established or strengthened, in many developing countries. There is now found effective design and implementation of environmental action through interdepartmental co-ordination and, often joint planning and management. Legislation and regulations on environmental matters have increased notably. Efforts have been made to improve the methodological guidance available for analysing the significance of environmental matters in relation to development, with a view to identifying optimal policies, programmes and projects. Environmental impact assessment and social cost-benefit analysis have been two areas in which the improvement, adaptation and application of methodological guidance have made some headway. Integrated physical, socio-economic and environmental accounting for use in macro-economic policy and planning are two other fields where effort to provide guidance suitable to the needs of developing countries is being intensified. The major need not yet properly met in this area is that of environmental training of personnel involved in decision-making on policies, plans, programmes and projects; and

(iv) Some environmental problems can be dealt with effectively only through international action and co-operation. Acid rains, siltation, salinisation resulting from large scale irrigation, deforestation, desertification, degradation of coastal areas and pollution of the regional seas are some examples. Since the Decade began several Governments have taken notable initiatives for mutual consultation and exchange of information of shared environmental problems and challenges. This process has opened up new awareness of international co-operation for environmental action and sustainable development. UNEP played its catalytic role to help bring into existence such environmental co-operative programmes at various regional and sub-regional levels.

In addition there are several other areas where UNEP can be said to have made useful contributions which have helped developing countries considerably in the management of their environment. Foremost amongst UNEP activities that have been most beneficial are:-

(i) The successful Regional Seas Programme for the protection of the marine environment and the coastal areas;

(ii) Incorporation of environmental consideration into development policies, programmes and projects by multilateral development funding agencies;

(iii) Development of global plan for the wise utilisation of tropical forests;

(iv) Development of environmental information systems, namely, INFOTERRA and IRPTC (International Register of Potentially Toxic Chemicals) for effective decision making;

(v) Environmental assessment through the Global Monitoring Systems (GEMS);

(vi) Development of environmental impact assessment guidelines for providing decision makers policy guidelines and

insights for achieving better economic and social progress through rational use of resources and sustained productivity from the environment;

(vii) Launching of the World Conservation Strategy; and

(viii) Technical assistance through Regional Advisory Services.

Apart from these, Malaysia has had direct benefit by way of contribution from UNEP in the form of equipment, technical assistance and sponsorship of attendance at technical meetings, study tours, training and fellowships. Several seminars have been co-sponsored by UNEP in Malaysia and abroad. Technical assistance has also been provided by UNEP by way of consultancy and publication of technical overviews and guidelines.

Since the Session of the Special Character in commemoration of the Tenth Anniversary of UNEP in May 1982, dominant theme of UNEP has been the consideration of the role of the environment in the wider context of economic and social development. The deep and common concern of international community revolved on the question of the harmonisation of goals and policies for economic development with those of environmental protection and improvement particularly in the developing countries. This problem has been attributed to the lack of awareness of the benefits of environmental measures among the decision-makers and planners and the lack of systems of environmental accounting that will be meaningful to decision-makers. UNEP, therefore, has outlined the following strategies for integrating environment into the broad spheres of decision-making:-

(i) A new approach to public information through a more effective information programme which alerts the public to the dangers and hazards of environmental mismanagement;

(ii) Close co-operation with non-governmental organisations in public awareness programmes;

(iii) Interparliamentary Conference on the Environment in co-operation with Interparliamentary Union at the invitation of the Kenyan Parliament in Nairobi in November 1984 with a view to broadening international understanding of the contribution environment can make to the dialogue on economic and social issues;

(iv) A new dialogue with industrialists and legislators through the World Industry Conference on Environmental Management in November 1984, financed by the industry itself. The objectives are to show ways in which industrial production can be sustained and increased and progressive improvement of the environment achieved in parallel, and also to show the many ways in which world industry can contribute more effectively to sound environmental management as a means of meeting the serious environmental problems facing mankind, especially in the developing countries;

(v) To review the environmental component of the International Development Strategy for the Third United Nations Development Decade to appraise the extent of success in giving effect to the environmental directives of the strategy in the development process with a view to achieving the environmental goals and objectives, since its implementation in 1980;

(vi) The preparation of the environmental perspective for the year 2000 for the purpose of updating of knowledge as regards possible future environmental issues so that nations can be in a state of preparedness to handle them;

(vii) Dialogue between and among developed and developing countries to intensify efforts at international co-operation, strengthen international institutions in order to close the gap between the growing recognition of economic and ecological interdependence and the present modest collective capacity to respond to the new problems and to the new apportunities they bring with them, as well as to close the gap between what is presently known and what Governments need to know individually and collectively for informed and timely decision-making; and

(viii) The clearing house mechanism to meet

the serious environmental needs of the developing countries through a process of technical assistance and project funding by developed countries.

World Health Organisation (WHO)/Centre for the Promotion of Environmental Planning and Applied Studies (PEPAS)

The WHO through PEPAS situated at Serdang, Selangor, Malaysia within the campus of the Universiti Pertanian Malaysia has over the years rendered considerable assistance to the Environment Department by way of consultancy service, jointly sponsoring seminars by providing resource persons and conducting workshops in specific areas as water quality management, solid waste management etc. Details of these activities are contained in Appendix B.

Association of South-East Asian Nations (ASEAN)

ASEAN, in all modesty, can be numbered among the success stories in regional co-operation in the field of environmental management and protection. In the spirit of ASEAN, member countries of the region share the feeling that there are common and similar environmental issues which would benefit from active technical co-operation among themselves, availing at the same time of the technical collaboration of international and bilateral agencies.

In order to ensure sustainable development, countries of the region have taken due cognizance of environmental issues. Government mechanisms have been established at the ministerial level in all ASEAN member countries to co-ordinate and supervise environmental activities.

As early as 1977, the United Nations Environment Programme (UNEP) provided the impetus for the establishment of an ASEAN Sub-Regional Environment Programme (ASEP) as the collective answer to the environmental concerns of the ASEAN member countries. UNEP also helped to formulate the sub-regional environment programme, and to identify collaborative activities among the five-countries concerned.

An Experts Group on Environment, consisting of representatives from the ASEAN countries, has been established under the ASEAN Committee on Science and Technology as a forum for dealing with the environmental aspects of the region. Since its first meeting in 1978, the ASEAN Experts Group on the Environment has met seven times to ensure that collaborative activities answer the needs of ASEAN and support the national environment programme of individual member countries. In each ASEAN country, there is now a Ministry in charge of the environment.

In May 1981, ASEAN Ministers in charge of the Environment met in Manila for the first time and adopted the Manila Declaration of the Environment and committed themselves to the protection of the ASEAN environment. This has meant not only the safeguarding of the environment and natural resources, but also the need to make them available for sustained economic development.

The Manila Meeting, the first Ministerial Meeting on the ASEAN Environment, endorsed the first phase of ASEP and its eight goals which included the following:

(i) Implementation of the Action Plan for the development and protection of the marine environment and the coastal areas of the ASEAN Seas;

(ii) Preparation of tested Environmental Impact Assessment (EIA) guidelines for specific developmental activities, based on case studies in ASEAN countries, such as for water resources development projects, and actual employment of these guidelines in the integration of the environmental dimension in development planning and project evaluation;

(iii) Implementation of a regional instrument in regulating international trade in endangered species of flora and fauna;

(iv) Development and promotion of a regional network of selected protected areas of significance for the conservation of nature, including proper management of these reserves to ensure the conservation of wild flora and fauna of the region;

(v) Fully established regional capability in pollution control technology, particularly for those industries which are of

significance to the ASEAN region such as agro-industry and mining industry;

(vi) Establishment of adequate urban air and water quality monitoring systems in major urban areas of the region to serve as a significant measure in alleviating urban environmental pollution;

(vii) Development of a network of institutes offering co-ordinated programmes on environmental training and education, including research on environmental subjects; and

(viii) Establishment of an information dissemination network among ASEAN Governments, non-governmental organisations and the public at large in order to increase the awareness and broaden the knowledge base of the ASEAN people on environment.

The past seven years have reconfirmed the exemplary network of co-operation among ASEAN countries on environment. During this period, action plans have been formulated for the priority areas of Marine Environment, Nature Conservation and Environmental Education, whereas extensive programmes have been established under the priority areas of Environmental Management including Environmental Impact Assessment, Industry and Environment, and Environmental Information and Data.

The first phase of this co-operative environment programme has been successfully completed and the stage is now set for intensified sub-regional co-operation in the environmental field.

ASEAN has now embarked on its second phase of the Environment Programme – ASEP II – which is designed to be action-oriented with emphasis on solving immediate needs of the region. The ultimate objective of ASEP II is to strengthen regional collaboration in environmental management aimed at regional self-reliance.

An Action Plan for the Protection of the Marine Environment and Coastal Areas of the East Asian Region has already been drafted with support and assistance from the United Nations Environment Programme (UNEP) which has already been adopted by ASEAN Member Countries and is in the process of being implemented.

The recent membership of Brunei Darussalam into the ASEAN fold will enhance ASEAN co-operation and collaboration.

The ASEAN Ministers on the Environment met for the second time on 29–30 November, 1984 to reiterate their commitment to the protection of the ASEAN environment and the safeguarding of its natural resources in order to make them available for sustained economic development. The Malaysian Delegation was led by the Honourable Minister for Science, Technology and the Environment assisted by the Director-Generals of the Department of Environment and Department of Wildlife and National Parks and a staff of the Malaysian Embassy in Thailand.

The most notable achievements in the meeting were:

(i) Adoption of the Bangkok Declaration on the ASEAN Environment and the ASEAN Environment Programme for the period 1983–1987;

(ii) Adoption of the ASEAN Agreement on 'Conservation of Nature and Natural Resources';

(iii) Adoption of the 'ASEAN Declaration on Heritage Parks and Reserves';

(iv) Adoption of the Resolution on 'Policy Guidelines for Implementation'.

The Bangkok Declaration reiterates the need to strengthen and enhance the regional co-operation in the field of environmental protection to meet the increasing and challenging environmental problems of the ASEAN region in the decade ahead. In this respect it has redefined its Development Strategy to include an integrated approach entailing advance or forward planning in the environmentally related activities with a view to incorporating environmental dimension in development planning right at the base level in order to achieve sustained development and long-term conservation of environmental assets and at the same time improving the quality of life for all.

In order to achieve the above objectives several policy guidelines have been enunciated for application throughout the ASEAN region. The most important among these are:

Environmental Planning

(i) Foster the development of macro economic-cum-environmental development plans which can be accommodated by the environmental carrying capacity of the region;

(ii) Continue and strengthen the use of the Environmental Impact Assessment (EIA) process and extended Cost-Benefit Analysis for minimizing the adverse effects and for ensuring proper consideration of environmental values in all projects and programmes under government that are likely to produce significant environmental impact and its gradual extension to the private sector including industry;

(iii) Develop a system of procedures for conducting EIAs and for their review which can be practically utilized within the ASEAN region;

(iv) Continue and increase efforts for establishing environemntal units in the planning divisions of major project implementing agencies to ensure that environmental consciousness permeates government departments so that development policy and planning in all sectors reflect systematic consideration of the environment;

(v) Establish techniques for quantifying the impact of development projects on environment both favourable and unfavourable;

(vi) Evolve criteria for augmentation of renewable resources and economical use of non-renewable resources;

(vii) Prepare an optimal land use pattern and zoning plan;

(viii) Develop new and practicable approaches for preserving forests, wildlife and other ecological systems in the face of continuing population pressure.

Environmental Technology

(ix) Develop practicable methods for the management of pollution discharges so that economic development of coastal resources may proceed in coexistence with preservation of the quality of coastal beaches and resorts and the marine environment;

(x) Adopt practicable methods for ensuring reasonable technology and more effective re-use and recycling of wastes in production;

(xi) Wherever practicable adopt low waste and non-waste technology and more effective re-use and recycling of wastes in production;

(xii) Develop a Toxic and Hazardous Waste Control Programme and stimulate efforts by government agencies and industry to develop suitable systems for control;

(xiii) Increase efforts to provide water-borne sewerage systems with central sewage treatment facilities at least for the major towns;

Environmental Awareness

(xiv) Continue efforts to enhance public awareness in respect of the importance of environmental protection and support governmental actions in this regard;

Environmental Training

(xv) Provide environmental training of personnel involved in decision-making on projects, programmes, policies and plans with emphasis on cause and effect relationship that exists between an individual's environment and his health;

(xvi) Introduce stronger general environmental theme into school and university syllabi;

(xvii) Provide technical training for staff engaged directly in the work of environmental protection agencies and in environmental programmes of other agencies;

Environmental Information

(xviii) Develop a comprehensive environmental information system to facilitate decision-making;

(xix) Initiate or strengthen efforts for estab-

lishment of suitable national data bank/ storage and retreival systems;

(xx) Intensify efforts for establishing monitoring programmes for continuing surveillance of sensitive environmental resources;

(xxi) Promote increased use of remote sensing as a means of establishing environmental data bases;

Environmental Co-operation

(xxii) Encourage and promote co-operation between Governments, Non-Governmental Organisations, Universities, Business Communities within ASEAN in the field of environmental management;

(xxiii) Establish co-operation with developed and other developing countries and international agencies for transfer of technology and share experiences in the management of the environment;

Legal and Institutional Arrangements

(xxiv) Develop appropriate legislation to support the proper management and development of the environment; and

(xxv) Implement the revised ASEAN Environment Programme (ASEP II).

The ASEAN Agreement on the Conservation of Nature and Natural Resources aims at supporting scientific and technical programmes of relevance to the conservation of species and ecosystems and of ecological processes of the region.

The ASEAN Declaration on Heritage Parks and Reserves provides for regional co-operation in conservation and management of a number of national parks in the ASEAN Member Countries. This is essential as environmental concerns transcend national boundaries and although individual countries are primarily responsible for their respective heritage sites these heritage sites require urgent regional conservation and management action as well as a regional mechanism complementary to and supportive of national efforts to implement conservation. The proposed sites are shown in Figure 23.

The Resolution emphasises that the task of environmental management is so vast and complex that in order to accomplish it, it must be shared. The environment cuts across all sectors. Environmental problems are all encompassing and transcend national boundaries. There is therefore a need for the re-orientation of the work of the Experts Group on Environment for more effective results through the implementation of definite policy guidelines on environment. In this respect the Experts Group should:-

(i) implement projects which are of common concern to all ASEAN countries and are fundable;

(ii) forge an ASEAN common stand on environmental matters, in order to present a common view and determination in dealing with other regions, countries and international organisations;

(iii) ensure wider involvement of non-governmental organisations, the business communities, universities, professional associations, in environmental endeavours;

(iv) develop programme strategies for identifiable milestones, periodic reviews and performance targets.

The Resolution also emphasises that:-

(i) in the ASEAN set-up, a mechanism be developed through which environmental dimension can be integrated into the activities of the ASEAN functional committees; and

(ii) the urgency for formally adopting policy guidelines on environment be brought to the attention of Heads of Governments.

The achievements of the Second ASEAN Ministerial Meeting held in Bangkok from 29–30 November, 1984, namely, the Bangkok Declaration ASEAN Agreement on Conservation of Nature and Natural Resources, ASEAN Declaration on Heritage Parks and Reserves and the Resolution on Policy Guidelines for Implementation, have given a filip and a new direction to the ASEAN Environmental Programme.

The new ASEAN Development Strategy in the Bangkok Declaration incorporating environ-

mental dimension into development planning right at the base level, both at the national level as well as at the level of the ASEAN Functional Committees will help adopt a preventive approach in environmental management. This in turn will lead to the achievement of sustained development and long-term conservation of environmental assets and at the same time improving the quality of life for all. In short the most needed economic development can proceed hand in hand with environmental protection.

The enunciation of policy guidelines in environmental management for the first time by the Ministers in charge of the environment at this Meeting is a step in the right direction and this would certainly make the ASEAN Environment Programme more meaningful and effective.

Economic and Social Commission for Asia and the Pacific (ESCAP)

Since its founding 35 years ago, the ESCAP has served as United Nations regional arm to help member countries overcome their economic and social problems. There are 44 countries in the region which are either independent full members or associate members. Over fifty six percent of the world population live in the region.

The Commission is the main organ and highest legislative forum of ESCAP with participation at the ministerial level. Under the Commission, nine legislative committees meet periodically to discuss and make recommendations on common concerns. The nine committees cover the following specific fields:-

* Agriculture;
* Development Planning;
* Industry, Technology, Human Settlements and the Environment;
* Natural Resources;
* Population;
* Social Development;
* Statistics;
* Trade; and
* Shipping, Transport and Communication.

An Environmental Co-ordination Unit (ECU) has been established within ESCAP to ensure that environmental factors are fully taken into account in projects undertaken by ESCAP. Besides, ESCAP, through the ECU has identified four priority areas for concentration. These are:-

(i) The promotion of environmental awareness;

(ii) Strengthening of the institutional and legal framework for environmental protection at the country level;

(iii) Environmental management of land ecosystems;

(iv) Protection of the marine environment.

The historic United Nations Conference on the Human Environment held at Stockholm in 1972, launched a global environment movement, which was followed in the ESCAP region by an Asian Plan of Action for the Human Environment in 1973. Since these propitious beginnings, there have been significant development in the field of environmental management in the ESCAP region. Foremost amongst these are:-

(i) Preparation of the State of the Environment Report for the Asia and the Pacific region;

(ii) Holding of a Workshop for Broadcasters on Environment and Development in Kuala Lumpur, Malaysia from 12–24 April, 1982.

(iii) Preparation of Industrial Pollution Control Guidelines in respect of the following industries:-

* Fish Processing Industry
* Tapioca Industry
* Sugar Industry
* Fertilizer Industry
* Brewery and Distillery
* Palm Oil Industry
* Electroplating Industry
* Tanning Industry

(iv) Holding of the Regional Technical Workshop on the Protection of the Marine Environment and Related Ecosystems from 20–28 February, 1984 at the Asian Institute of Technology, Bangkok;

The Tripartite Technical Experts Group on the Safety of Navigation in the Straits of Malacca and Singapore (TTEG)

The TTEG comprises technical experts from the three coastal states of Indonesia, Malaysia and Singapore. This group since its inception has taken painstaking and dedicated efforts to ensure safety of navigation in the Straits of Malacca. From the point of view of pollution control, the major achievements have been:-

(i) Implementation of the Traffic Separation Scheme since 1st May, 1981 which has considerably reduced the number of accidents and hence the occurrence of oil spills; and

(ii) Establishment of the Revolving Fund on 11th February, 1981 to combat oil spills from ships and tankers using the Straits of Malacca and Singapore. Japan contributed 400 million yen to the Fund.

ASEAN Experts Group on Marine Pollution

Besides the ASEAN Experts Group on Environment, regional co-operation specifically in combating marine pollution from ships is also achieved through the ASEAN Experts Group on Marine Pollution. The following areas have been indentified for co-operation:-

(i) Co-ordination of and co-operation in marine environment policies in important international forums with the object of safeguarding and advancing the rights and interests of coastal nations in the control of marine pollution in the region;

(ii) Exchange of information and data on marine environment matters; and

(iii) Implementation of an ASEAN Contingency Plan for the mitigation and control of oil spill. This Plan recommends that each member country should design and implement its own National Contingency Plan and information on the capabilities of each member country in combating oil spill be exchanged. Assistance from member countries be sought in case the control of any oil spill transcends the national capability.

The foremost achievement of this group was the drafting of an Action Plan for the establishment of a Pollution Equipment Centre to protect the seaway between Lombok/Makassar Straits and Sulawesi Sea at the meeting of the officials from IMO, UNEP and representatives from Indonesia, Malaysia and Philippines in January, 1980.

As a result of this meeting a centre was established in Davao, Philippines. Equipment such as skimmers, booms, dispersant spraying equipment, radio sets, chemical dispersants etc. have been purchased through funds made available by UNDP.

An On-Scene Co-ordinators Workshop was held on 3–5 April, 1984 in Manila to develop an operating plan for the Centre and a financial management system to make the Centre financially self-sufficient in the event the equipment in this Centre was used in an actual oil spill.

A Hands-On Training Course was held at Davao Centre from 29th January to 4th February, 1985. It was attended by 28 trainees (10 from Philippines, 10 from Malaysia and 8 from Indonesia). The objective of this training was to train key government personnel to familiarise themselves with the use of pollution equipment available at the Centre.

Three consultative meetings were proposed to be held in each member country to finalise the Oil Spill Response Plan. The first consultative meeting was held in Manila on 5th February, 1985. The second and the third meetings will be held in Malaysia and Indonesia respectively as a follow-up.

Bilateral Co-operation

At the bilateral level, Malaysia and Singapore continued its annual Ministerial level intergovernmental meetings, with considerable benefit. There was enhanced information exchange on a number of environmental topics of mutual interest.