

MALAYSIA

**ENVIRONMENTAL QUALITY
REPORT
1985-1986**

Department of Environment
Ministry of Science, Technology and the Environment

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MALAYSIA
ENVIRONMENTAL QUALITY REPORT
1985—1986

FOREWORD

Established in March 1975, the Department of Environment under the Ministry of Science, Technology and the Environment is charged with the responsibility of administering the Environmental Quality Act, 1974 and the Amendment of 1985, for the prevention, abatement, control of pollution and enhancement of the environment.

This combined 'Environmental Quality Report' for 1985 and 1986 is published in fulfilment of the responsibility of the Director General of Environmental Quality under Section 3 (1) (i) of the Act. The basic format used in the previous report for the period 1981—1984 has been primarily maintained for consistency and continuity. This approach will enable the statistical data of the report to be updated and enhanced for each subsequent year to provide a quantitative overview, particularly with respect to the state of environmental quality.

While this report is essentially a report by the Department of Environment on environmental quality, it is needless to say that the environment domain obviously extends well beyond the role and responsibility of the Department of Environ-

ment. Therefore apart from reporting on the state of the environment, pollution abatement and control as well as environmental quality monitoring and surveillance, the report also highlights the integration of environment dimension into the development process and the importance of environmental education, training and information as well as environmental research and development. International and regional and bilateral cooperation in various fields of environmental management is also described. Finally the Department of Environment would like to record its appreciation to all governmental and non-governmental organisations for their support of the department's programmes and their contribution towards the enhancement of environmental quality.



Acting Director General of Environmental Quality
Malaysia

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CHAPTER I
**ENVIRONMENTAL
POLICIES AND
STRATEGIES**

ENVIRONMENTAL POLICIES AND STRATEGIES

Introduction

The year 1985 signalled an important milestone in the history of the Department of Environment as it signified a decade of environmental management in Malaysia and the end of the Fourth Malaysia Plan (1981—1985). Malaysia today is a modern progressive country. Industrial development has progressed to such an extent as to elevate Malaysia into a position of envy among advanced countries and to be on top of a host of developing countries in the world. Economic growth and industrialisation will continue to be the key development priority of Malaysia.

The rapid development of the national economy from the early sixties, while providing Malaysia with the material conditions for an acceptable standard of living, has also brought to the fore many environmental problems and considerable impact on its resource potential. Improved standards of living have been accompanied by high levels of personal consumer goods and services which resulted in the generation and accumulation of industrial wastes damaging our environment with respect to land, air and water. In short, as development proceeded apace, potential damage and disruption to the human environment not only began to emerge but to gain in significance from year to year.

To its credit, the Government showed sensitivity to the environment following the realisation that development must be seen more than quantitative growth, indeed as encompassing all those activities through which individuals and societies seek to meet human needs and to upgrade the quality of life. Far from being incompatible and mutually exclusive, environmental quality and development are interlinked when viewed in their proper perspective. Development cannot confer lasting benefits unless environmental considerations of man and related ecosystems become central to development planning and decision-making.

During the past decade, a priority task in the efforts of the Government to achieve a balance between development and the environment was to deal with environmental problems that had accumulated over the years through restorative measures backed by systematic enforcement of the various Regulations under the Environmental Quality Act while developing strategies to forestall future problems. The sustained environmental improvement efforts to date have made significant inroads into the problems identified at the start of the decade. The major polluting industries, particularly the rubber and palm oil industries, have met the pollution control requirements. Consciousness of environmental consequences and appreciation of their bearing on social and economic well-being have grown significantly. Formal and non-formal education, technical training, mass media, governmental and non-governmental organisations, universities, citizen groups and private sectors have all played a role in this process of building environmental awareness. There has also been some progress in terms of greater access to information on environmental problems and prospects, administrative and legislative means of organising and implementing action, methodological guidance in assessment and analysis of environmental changes and measures, as well as training and technical co-operation to deal with environmental matters. Regional co-operation to deal with shared environmental problems has increased. Environmental aspects have begun to be seen in clearer perspective in various sectors of development e.g. food and agriculture, health, industry and human settlements.

Public involvement in environmental debate and action has increased. Support, both at scientific and grassroot levels, for action to arrest environmental degradation had grown in the face of some increasingly apparent negative ramifications of industrialisation, urbanisation, population growth and significant changes in forests, rangelands and farmlands.

The preservation of representative samples

of Malaysia's natural forest ecosystem with its constituent flora and fauna has continued to be accorded due importance. Such natural forest habitats are indispensable as they play a truly significant role in the preservation of watershed; in the maintenance of hydrological cycle while serving as a permanent resource of scientific, cultural and recreational value. In total 5.8 per cent of the land area in Peninsular Malaysia, 0.63 per cent in Sarawak and 1.4 per cent in Sabah have been set aside as National Parks and Wildlife Reserves under the Government's programme for conservation of flora and fauna.

National Environmental Objectives

Malaysia is forging ahead with economic development for self-reliance and to raise the standard of living of the people to a satisfactory level. At the same time it has to be acutely conscious that its resources are limited, fragile, and require comprehensive protection. The Government has therefore endeavoured to bring about a more balanced exploitation of these resources. It has also placed emphasis on development with conservation to ensure that the benefits gained through development are not negated by environmental damage so that present and future generations will have access to similar resources. In order to achieve this, the Government has reiterated that the overall objective of environmental management in Malaysia will take due account of the following factors:-

- Maintaining a clean and healthy environment;
- Maintaining the quality of the environment relative to the needs of the growth population;
- Minimising the impact of the growing population and human activities relating to mineral exploration, deforestation, agriculture, urbanisation, tourism, and the development of other resources on the environment;
- Balancing the goals for socio-economic development and the need to bring the benefits of development in a wide spectrum of the population against

the maintenance of sound environmental conditions;

- Placing more emphasis on prevention through conservation rather than on curative measure, inter alia, by preserving the country's unique and diverse cultural and natural heritage;
- Incorporating an environmental dimension in project planning and implementation, inter alia, by determining the implications of the proposed projects and the costs of the required environmental mitigating measures through the conduct of Environmental Impact Assessment studies; and
- Promoting greater co-operation and increased co-ordination among relevant federal and state authorities as well as among the ASEAN Governments.

In order to inculcate a greater understanding of the close relationship between development and the environment it has become necessary that the environmental policy reflects the Government's recognition of its responsibility and strong commitment to manage all the resources of the nation in a manner which, with due concern for the welfare of future generations, maximises the quality of life for all Malaysia. To this end, the Government has responded positively by including a chapter on 'Environment' in the Fifth Malaysia Plan (1986—1990) Document incorporating a policy statement on the basis of factors mentioned above. Such a policy statement is broader in scope than the underlying policies of any laws and legislation in environmental quality, which in essence would chiefly be concerned with the control of various pollutants, and would extend to other environmental tangibles and intangibles covering such diverse subjects as soil and water conservation, flood control, wildlife, national parks, cultural aspects, aesthetic values, health, recreation and tourism, education and town and country planning.

The Government has proposed that, during the Fifth Malaysia Plan, environmental programmes will be developed to meet the environmental

objectives in most sectors of the economy. Priority will be accorded to conservation strategies and efforts that strengthen the existing regulatory machinery, particularly at the State and Local Government levels through the development of uniform rules as well as through joint and well co-ordinated enforcement. At the Federal and State levels, greater co-ordination between policy-formulating and programme-implementing agencies will be fostered. Efforts will also be directed at promoting greater involvement of the public, citizen groups and the private sector in environmental awareness campaigns, education and training. In this regard, action has already been initiated to formulate new concepts and improved techniques as well as appropriate approaches for the management of the environment.

Integrated Development and Planning and New Strategies in Environmental Management.

Underlying the importance of striking a balance between development and the environment is the need to place more emphasis on preventive approach to environmental management rather than on curative measures which are costly, time consuming and sometimes impracticable in the economic sense. Furthermore, Malaysia's major concern is with optimal resource use, maintenance and enhancement. Therefore the most effective and suitable environmental management strategy is the integrated development approach which entails the incorporation of environmental dimension into the development planning process right at the base level through the enlargement of the existing machinery for planning to take account of environmental factors in the planning process and to enhance the traditional methodology and approach of project evaluation adopted by development planners and decision-maker that are based purely on economic considerations.

With the Government poised to play a leading role under the Fifth Malaysia Plan in fostering the growth of the manufacturing sector with emphasis on the development of agro-based and other resource-based industries as well as the heavy industries, the potential to pose additional challenges for environmental management is very real. The scope is both vast and complex as industrial activities are currently being carried out

both at Federal and State levels by a number of development agencies. 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 their action — and sometimes even inaction — is it — or can contribute to pollution. Matters such as land, water, agriculture, forestry, mining, soil erosion control, solid waste disposal, drainage and irrigation which are fundamentally important in environmental management fall within the purview of the State and the Concurrent Lists in the Federal Constitution. This implies having to take into account division of responsibilities and administrative jurisdictions 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 purposes, avoiding both duplication of efforts and resources being spread too thinly to be effective. In this respect, the 38 environment related pieces of legislation in force in Malaysia containing suitable provisions for dealing with the environmental problems of development will also be resorted to with the help of appropriate guidelines developed from time to time by the Department of Environment.

The challenging decade of the 1980's has commenced with a somewhat long agenda of environmental concerns which include the following:-

- The various water resources studies to date point to a scenario where the availability of sufficient water of appropriate quality could become a critical factor constraining future growth. Given the inexorable pressures for intensified urbanisation and accelerated industrial development, adequate measures to protect and manage our water resources have become a compelling need of our time;
- Coastal areas and estuaries which are most productive of the marine environment and the most at risk from sewage, agricultural chemicals, industrial discharges and contamination

by heavy metals are threatened by sewage and industrial effluent discharges, sediment discharge from logging, road construction, mining and housing development, construction of ports, commercial development (dredging, and jetties), and oil spills from off-shore drilling, tanker accidents and normal tanker operations;

- Increasing generation of toxic and hazardous wastes and the need to act so that indiscriminate dumping does not occur;
- Increased emissions of oxides of sulphur and nitrogen produced by the combustion of fossil fuel (coal, which is increasingly regarded as the most likely substitute for oil, often has high sulphur content) which can lead to acid rain and photo-chemical smog;
- Depletion of the ozone layer and accompanied threat of increased ultra-violet radiation at the earth's surface;
- Increased concentration of carbon dioxide and the possibility of unpredictable changes in climate due to the "greenhouse effect";
- Increase in fallout of trace metals, potentially toxic in small amounts to humans and other organisms due to industrial activities and the large number of organic micropollutants being transported over long distances and deposited along with acid rain, toxic metals and other pollutants; and
- Increase in noise hazards in the working environment as well as noise nuisance in the urban environment due to motor traffic and in residential dwellings next to industries.

Effective solutions to these problems call for an integrated approach entailing advance or forward planning in the environment-related activities in terms of the long-term conservation of environmental assets. Towards this end, it is im-

portant to ensure that environmental consciousness pervades decision-makers and planners both in the public and private sectors so that imperatives of environmental protection are integrated into the development projects and the need for costly and time-consuming remedial measures obviated.

The challenges ahead are indeed formidable and it is important that anticipatory and preventive approach in environmental management should be strengthened and implemented at all levels. This requires inter-disciplinary action on a broad front and the closest rapport among all actors on the environmental scene. In this respect the Department of Environment has begun to implement its new strategy on environmental management as follows:-

- (i) Several amendments have been made to the Environmental Quality Act which, among others would require project initiators to carry out an environmental impact assessment (EIA) study for certain types of development activities in the public and private sectors and efforts will be made to prescribe such development activities so that the EIA requirement can be implemented;
- (ii) Involvement of State Governments, other Government agencies, universities, research institutions, industry, and citizen groups in joint-action and programmes relating to environmental protection;
- (iii) Plans are already afoot to develop environmental management capabilities at State level through the establishment of environmental committees so that during the Fifth Malaysia Plan period, there will be a definite commitment of State Governments towards an integrated development approach with environmental management becoming an integral part of economic development;
- (iv) Holding of dialogue sessions with various sectors such as the transport

and industry sectors to solicit co-operation, understanding and agreement with regard to strategies, regulations and concerted action in environmental management;

- (v) Continued efforts at enhancing environmental awareness and literacy through non-formal education and environmental awareness campaigns;
- (vi) Improved institutional arrangements through re-organization of the functions and staff deployment in the Department of Environment;
- (vii) Formulation of the following Regulations for implementation shortly:
 - (a) Environmental Quality (Scheduled Wastes) Regulations aimed at controlling the disposal of toxic and hazardous wastes;
 - (b) Environmental Quality (Control of Emissions from Diesel Engines) Regulations aimed at controlling smoke emissions from diesel powered motor vehicles;
 - (c) Environmental Quality (Marine Pollution Control) Regulations aimed at controlling all direct discharges from land-based sources into the marine environment; and
 - (d) Environmental Quality (Motor Vehicle Noise Control) Regulations.
- (viii) Enlargement of the existing machinery for planning to incorporate environmental dimension in an integrated way in development planning right at the base level. In this respect, institutional arrangements for integrating environmental considerations in development, decision-making and action will provide for multi-sectoral and inter-departmental consultation, co-ordination and joint planning;
- (ix) Establishment of techniques for quantifying the impacts (both positive and negative) of development projects on environment;
- (x) Establishment of environmental accounting for use in macro-economic policy and planning;
- (xi) Environmental training of personnel involved in decision-making on projects, programmes, policies and plans with emphasis on cause and effect relationship which exists between an individual's environment and his health;
- (xii) Introduction of a stronger, general environmental themes into school and university syllabi;
- (xiii) Technical training for staff engaged directly in the work of the Department of Environment and in the environmental programmes of other agencies;
- (xiv) Preparation of an optimal land use pattern and zoning plan for Peninsular Malaysia and Sabah and Sarawak;
- (xv) Development of a comprehensive environmental information system to facilitate decision-making;
- (xvi) Shifting from the conventional pollution control approach of treatment and disposal to a more rational approach of waste utilization leading to the creation of more valuable resources from wastes as well as the development of low-waste and non-waste technologies;
- (xvii) Encouraging the participation of the private sector in waste management; and
- (xviii) Promoting greater Government-Industry co-operation in environmental management.

Conclusion

The first decade of environmental management in Malaysia essentially adopted the first and second echelon environmental management strategies constituting a restorative action through the enforcement of the various Regulations under the Environmental Quality Act of 1974 on a priority basis as well as the provision of environmental guidelines for planning and development agencies including State Governments to assist them in taking into account environmental protection measures in the planning and implementation of their projects.

The Department of Environment has already

moved into the third echelon environmental management strategy commencing with the second decade of environmental management with efforts focused on integrated development planning approach 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 planning. A significant development has been the forging of closer rapport with the State Governments for effective coordination and willing co-operation in environmental management and thus 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.



The First Meeting of the 4th Environmental Quality Council.

CHAPTER 2
**ADMINISTRATION
AND FINANCE**

ADMINISTRATION AND FINANCE

Environmental Quality Council

The Environmental Quality Council established under Section 4 of the Environmental Quality Act, 1974 was inaugurated on 12 April 1977. In 1985 and 1986 the Council continued to function under the chairmanship of Yang Berbahagia Tan Sri Datuk Hamzah Sendut generally to advise the Minister in-charge of the environment on matters pertaining to the Act, and also on any relevant matters referred to it by the Minister. In addition, the Council contributed significantly to galvanise the public sector, industry and the scientific community to exercise their best endeavours to minimise environmental degradation.

The Environmental Quality (Amendment) Act 1985 provides for the Council membership to be extended from 7 to 16 members so as to have a more complete representation from environment-related sectors. Two non-governmental organisations representing the public are now included in the Council. Other new members include representatives from the Ministry of Agriculture, Ministry of Transport, the oil palm industry, the rubber industry and two members representing the States of Sabah and Sarawak (there was only one member for Sabah and Sarawak before the amendment to the Act). The new members together with the existing members formed the Fourth Environmental Quality Council which was launched by the Honourable Minister of Science, Technology and the Environment on 2 October, 1986.

During the period under review, the Environmental Quality Council had six meetings. Table 1 provides a list of matters discussed by the Council.

Department of Environment

Organisation Structure (1975—1984)

The Organisational set-up of the Department in 1975—1984 as shown in Figure 1 reflects the priority accorded to the first echelon environmen-

tal management with efforts made towards moving into the second and third echelon environmental management. The Department is headed by the Director-General who is appointed by virtue of Section 3 (1) of the Environmental Quality Act, 1974. The Department (known as Division of Environment until September 1983) was structured into 3 functional divisions namely Air Pollution Control, the Water Pollution Control, and Administration. Later in 1981, three additional units were formed reflecting the Department's move towards preventive pollution control. The new units were the Resource Management Monitoring Unit, the Environmental Impact Assessment Unit and the Education and Information Unit.

Reorganised Structure (1985—1986)

In 1985, a reorganisation exercise was undertaken by the Department of Environment to streamline its functions and activities. The objectives of the reorganisation were to enhance the efficiency and performance of the Department and to enable the Department to perform all the tasks provided for under the Environmental Quality Act, 1974. The proposal for the reorganisation was originally agreed in principle by the Public Services Department in March 1983 and was supported by the Ministry of Science, Technology and the Environment and the Manpower Planning Unit (MAMPU) of the Prime Minister's Department.

The re-organised structure as reflected in Figure 2 was implemented in 1985 with the redeployment of existing staff within the Department Division are to ensure that environmental sions namely Planning and Development, Operations and Administration.

The objectives of the Planning and Development Division are to ensure that environmental dimension is considered in all stages of development planning including project planning, to document pollution control technologies, to increase public awareness and positive attitude towards the environment, to promote regional and international co-operation in the field of environ-

ment and also to formulate and review environmental guidelines and regulations. The Division consists of three sections namely Planning, Development and Programme Formulation. Activities of the section include:-

- environmental impact assessment
- environmental input to development planning
- pre-siting evaluation of industrial projects
- environmental pollution control technology
- environmental education
- regional and international affairs
- environmental criteria and standards
- formulation of environmental regulations and guidelines.

The objectives of the Operations Division are to control and prevent pollution through its enforcement and monitoring programmes. The Division has two main sections namely Enforcement and Monitoring. Activities of the sections include:

- environmental monitoring
- data management
- instruments and services
- information dissemination
- technical training
- source inventory
- licensing
- enforcement and prosecution
- marine pollution control

Finance

Operating Expenditure

The Department's total operating expenditure for 1985 and 1986 was M\$7,336,204 and

M\$8,269,458 respectively showing a slight increase compared to M\$5,370,864 in 1984. About 52 per cent of the operating expenditure for the years under review was for manpower and related emolument expenditures while 45 per cent was for services and supplies. The department's operating expenditure for 1980—1986 is as reflected in Figure 3.

Development Expenditure

The Department's development expenditure was \$1,173,339 in 1984 and in 1985 was \$480,196. There was no expenditure for development in 1986, the first year of the Fifth Malaysia Plan. The development expenditure reflects the Department's development programmes including the purchase of monitoring equipment, micro-computers, general office equipment and facilities. The Department's development expenditure is reflected in Figure 3.

Revenue

Revenue collected in 1985 and 1986 amounted to \$539,459.00 and \$659,362.00 respectively. Effluent-related fees accounted for about 70 per cent of the total revenue collected for both years whilst about 12 per cent were from compounds collected under the Environmental Quality (Clean Air) Regulations 1978. Other sources of revenue include licensing fees, processing fees for written approval, fines and other forms of penalty and payment.

CHAPTER 3
**STATE OF
THE
ENVIRONMENT**

STATE OF THE ENVIRONMENT

Introduction

The State of the Malaysian environment continued to be monitored closely during 1985 and 1986. This two-year period was particularly significant as it encompassed the concluding year for the First Decade (1975—1984) of concerted environmental management in Malaysia and the year of commencement of the next decade. The many concluding events to the First Decade had drawn considerable public attention and heightened public awareness of the environment, especially during the period. As a result, parallel action was inevitable on the part of environment-related Government agencies in stepping-up environmental monitoring and surveillance activities. This information-gathering process enabled the state of the environment to be more clearly defined.

The present chapter describes the state of the Malaysian environment with respect to air quality, the quality of Malaysian rivers and coastal and marine waters, the status of environmentally sensitive areas, noise, extent of sewerage development, waste disposal from animal-husbandry, disposal of municipal solid waste and toxic and hazardous waste, and land-related issues.

Air

In 1985 and 1986, only total suspended particulates, particulate lead and dust-fallout measurements were carried out throughout Malaysia, among other things to determine the state of air quality.

Suspended Particulates (SPM)

The monitoring of suspended particulate matter in the urban environment is important from a public health point of view due to the fact that particles of less than 10 microns in diameter can enter the human lungs and cause chronic respiratory disorders with prolonged periods of exposure. However, due to lack of appropriate accessory equipment to be used with the High Volume Sampler, the Department of Environment

has had to content with the measurement of suspended particulates of a size ranging up to 100 microns in diameter.

Results of total suspended particulate measurements are summarised in Table 2, while Figure 4 shows the results according to geographical location. Based on a comparative analysis with the adoption of 75 micrograms per cubic meter (annual mean of 24-hour measurements) as an interim standard for acceptable air quality for mixed urban-industrial areas, air quality in most urban locations can be deemed as unsatisfactory. The interim standard was exceeded in the following urban centres listed in order of decreasing magnitudes as indicated by the respective annual mean concentration of suspended particulates:

Urban Centre of	Annual Mean Concentration Of Total Suspended Particulates, ug/Nm ³	Per cent Of Individual Observations Exceeding Interim Standard
1. Shah Alam	91 (1986)	27
2. Bintulu	95 (1985)	33
3. Pasir Gudang	105 (1986)	57
4. Butterworth- Prai	117 (1986)	58
5. Georgetown	118 (1985)	61
6. Kuala Terengganu	86 (1986)	61
7. Melaka Tengah	122 (1986)	72
8. Klang	118 (1985)	86
9. Kuala Lumpur- Petaling Jaya	182 (1985)	95
10. Inanam (Sabah)	171 (1986)	97

Note: ug in ug/Nm³ represents microgram

Only three urban centres were found to have satisfactory air quality with respect to suspended particulates, namely Kemaman (50 ug/Nm³ in 1985), Bintulu (30 ug/Nm³ in 1986) and Kuantan (73 ug/Nm³ in 1985). However, it must be noted that the particulate measurements were for particle size of up to 100 microns diameter and therefore includes particulates that do not directly pose a health concern.

Lead (Pb)

The lead-content of petrol was reduced from 0.84 g/l to 0.40 g/l by 31st December 1986; the level is to be further reduced to 0.15 g/l by 31st December 1990. In order to enable the determination of the impact of lead reduction in petrol on atmospheric lead levels, the Department continued to monitor for ambient lead. This was done by analysing the lead-content of samples of atmospheric particulate matter obtained in the course of total suspended particulate measurements. Ambient lead measurements were carried out at street level in appropriately selected locations in Georgetown, Butterworth, Kuala Lumpur — Petaling Jaya, Shah Alam and Melaka.

The results of analysis of ambient lead levels are shown in Table 3 and graphically according to geographical location in Figure 5. Results of lead measurements for the above 5 urban centres are summarized in order of decreasing magnitude as follows:-

Urban Center	Annual Mean Ambient Lead Concentration ug/Nm ³	Per cent of Individual Observations Exceeding Interim Standard of 2.0 ug/Nm ³
1. Kuala Lumpur-Petaling Jaya	2.3 (1985)	67.2
	1.3 (1986)	34.0
2. Georgetown	1.0 (1985)	6.5
	0.5 (1986)	0
3. Shah Alam	0.9 (1986)	10.5
4. Melaka	0.4 (1985)	4.3
	0.3 (1986)	3.7

Note: ug/Nm³ represents microgram

From the above it is evident that based on, the adoption of an interim standard of 2.0 ug/m³, only the annual mean lead level for Kuala Lumpur—Petaling Jaya exceeded the Standard and this was in 1985. In Kuala Lumpur—Petaling Jaya and Georgetown ambient lead appears to have declined in 1986; however the statistical significance of the above was not tested.

Dust Fallout

Although dust-fallout is not a pollution

parameter of public health significance, it was nevertheless monitored in selected urban locations throughout the country for purposes of obtaining baseline information as dust is a nuisance indicator. Graphical representations of the results according to urban location and state are shown in Figure 6 through Figure 17. In 1985, 51 out of a total of 74 aggregated areas for dust fallout monitoring were found to have exceeded the Department of Environment recommended upper nuisance limit of 130 mg/m²/day. In 1986, 53 of the above 74 aggregated areas exceeded the acceptable dust fallout level. The results indicate that dust nuisance is indeed an environmental issue in specific urban locations subject to the influence of dust generating sources.

River Water

In order to determine the general condition of water quality in Malaysian rivers across the country, a total of 35 major river systems were selected for study; 21 in Peninsular Malaysia, 6 in Sabah and 8 in Sarawak. The following general parameter limits for acceptable water quality were adopted in order to enable a comparative analysis to be performed:

Parameter	Maximum Acceptable Limit, mg/l
Biochemical Oxygen Demand (BOD; 5 day, 20 °C)	5.0
Ammoniacal-Nitrogen	1.0
Suspended Solids	50.0

The BOD parameter was selected as an indicator of organic pollution due to industrial and domestic sources; the Ammoniacal-Nitrogen parameter as an indicator of river contamination by animal wastes and human sewage; and suspended solids as an indicator of river pollution due to sediment, principally from soil erosion and mining activities.

Detailed results of the analysis of water quality in the the 35 river systems are summarised in Tables 4, 5, 6 and 7.

Note:

35 major river systems were selected based on their relative importance in terms of potential pollution by major sources distributed in major river basins.

Analysis of the BOD parameter indicated that in 26 of the 35 rivers (74 per cent) water quality was within the recommended criteria for more than 95 per cent of the time. In the case of Ammoniacal-Nitrogen, 25 rivers (70 per cent) were within the standard for more than 95 per cent of the time.

However, in the rivers that exceeded the standard, the level of Ammoniacal-Nitrogen was significantly high and indicative of river contamination most likely by human or animal wastes or both. River pollution by suspended sediment was of greater concern as none of the 35 rivers could meet the standard of 50 mg/l for 95 per cent of the time or better.

The overall situation appeared improved in 1986. The BOD parameter indicated that 31 rivers or 86 per cent satisfactorily met the standard for more than 95 per cent of the time; 25 rivers or 70 per cent for Ammoniacal-Nitrogen, while at least one river had acceptable quality with respect to suspended solids.

With respect to river quality as affected by toxic heavy metals, eight (8) rivers known to be receiving industrial or other sources of discharges containing heavy metals were selected for study; namely Sungai Merbok, Sungai Perai, Sungai Juru, Sungai Perak, Sungai Kelang, Sungai Langat, Sungai Muar and Sungai Batu Pahat. Water quality was analysed with respect to lead (Pb), mercury (Hg), cadmium (Cd), copper (Cu), zinc (Zn) and arsenic (As). A comparative analysis based on pertinent standards for fishery indicated that all rivers except the Sungai Muar had less than satisfactory water quality with respect to lead; Sungai Merbok, Sungai Perak and Sungai Juru had significant levels of mercury; cadmium was significantly present in the Sungai Merbok, Sungai Perai, Sungai Juru and Sungai Batu Pahat; while copper was significantly present in Sungai Merbok, Sungai Kelang, Sungai Muar and Sungai Batu Pahat. However, zinc and arsenic were not detected in significant levels in rivers monitored, namely Sungai Perak and Sungai Kelang. Detailed results for heavy metal analysis are shown in Table 8.

Coastal and Marine Waters

The state of water quality of Malaysia's inshore marine waters continued to be worthy of concern as evidenced by the results of monitoring during 1985 and 1986. While more than 20 water quality parameters have been routinely monitored, three (3) key pollution parameters of fishery and public health significance and seven (7) heavy metal parameters of importance with respect to fishery, were selected for assessing the state of inshore marine water quality.

A diagrammatic representation of the state of water quality for the coastal waters of each State is shown in Figure 18 with respect to faecal coliform contamination; Figure 19 with respect to suspended solids; Figures 20 and 21 with respect to oil and grease; and Figures 22 through 27 with respect to contamination by heavy metals. A detailed tabulation of the results of the water quality analysis can be found in Table 19.

Faecal contamination of coastal waters, attributable to wastes of human and animal origin, is indeed serious off shore of several States. The States with the most polluted coastal waters in terms of degree of contamination (Most Probable Number of Faecal Coliforms per 100 ml of water sample), listed in descending order were Malacca, Kedah, Pulau Pinang, Selangor, Negeri Sembilan, Johor and Perlis. However, in terms of duration of pollution as determined by the percentage of total observations that exceeded an interim acceptable standard of 100 Most Probable Number (MPN) of faecal coliforms per 100 ml of water sample for protection of public health; the order was Perlis (73 per cent), Malacca (72 per cent), Pulau Pinang (71 per cent), Johor (65 per cent), Selangor (55 per cent), Negeri Sembilan (54 per cent) and Kedah (41 per cent). The east-coast States of Peninsular Malaysia and the States of Sabah and Sarawak registered fairly moderate water quality with respect to faecal contamination.

In relation to suspended solids, a parameter of particular significance with respect to pollution by suspended sediment originating from soil erosion in areas of active land development, the geographical distribution pattern of pollution was different. Based on an interim water quality standard of 50 mg/l for fishery, a comparative

analysis indicated that the States with the worst conditions of coastal water quality as listed in descending order of severity were Sabah, Perlis, Perak, Kedah, Terengganu, Kelantan and Pulau Pinang.

The parameter on oil and grease was used to determine the extent of pollution of Malaysia's coastal waters by oils and fats of mineral and vegetable origin. Using this indicator parameter, the States with poor coastal water quality in descending order were Sabah, Pahang, Perak, Terengganu and Kelantan.

Heavy metal contamination of Malaysia's coastal waters was assessed with respect to seven (7) pertinent metal constituents; namely arsenic, cadmium, chromium, copper, mercury, lead and nickel. A comparative analysis was performed based on a set of interim water quality standards for fishery. Pollution by arsenic was insignificant; cadmium was most significantly present in the coastal waters of Kedah, Sabah, Pulau Pinang, Perak and Pahang. Chromium was moderately significant in Pahang, Perak and Terengganu. Copper levels were highly significant in the coastal waters of Perlis, Pulau Pinang, Sabah, Perak, Pahang and Kelantan. Mercury levels were significant in Perlis, Kedah, Sabah, Pulau Pinang and Perak. Lead levels were most significant in the coastal waters of Perlis, Pulau Pinang, Kedah, Sabah, Perak and Pahang. Nickel levels were extremely significant in Perlis, Pulau Pinang, Kedah, Sabah, Perak and Pahang. The results were consistent with respect to the States facing heavy metal contamination of coastal waters.

The situation for Perlis, Kedah, Pulau Pinang and Perak is not surprising in view of the concentration of the electronic industries and metal plating works especially in Pulau Pinang and Kedah. The situation in Sabah may be attributable to the discharge of mining wastewaters from the Mamut Copper Mines. The high metal contamination of the coastal waters of the east coast States of Peninsular Malaysia are indeed surprising and need to be investigated further.

Environmentally Sensitive Areas

The mid-eighties has seen greater awareness of the continuing assaults on the environment and the threat to environmentally sensitive areas

brought on by intensive resource development and other activities. The primary concern has been the extent of ecological disturbances and possible irreversible damage to certain segments or elements of the natural environment. Among the most affected are the richly endowed coastal zones of Malaysia and the flora and fauna of the terrestrial ecosystems.

Forested Areas

Malaysia is fortunate to have extensive areas of valuable natural tropical rain forests, particularly in Sabah and Sarawak. Malaysian forests are known to be among the most species-rich in the world and the complex nature of the tropical rain forest ecosystem suggests the need for careful forest management practice, including adequate measures for conservation and preservation. In spite of rapid conversion of forest land to agriculture and other uses, the country still has a substantial hectarage of forested lands as evident in Table 20.

The forests of Malaysia have been variously classified according to their ecological and physical distribution, but for purposes of management have been broadly classified into dipterocarp, freshwater swamp and mangrove forests. Table 21 is an estimate of the distribution and extent of major forest types by region.

A total of 13.8 million hectares of forest land has been earmarked as Permanent Forest Estate (PFE) to be managed under sustained yield. Approximately 9.1 million hectares of the proposed Permanent Forest Estates have been identified as productive while the remaining 4.7 million hectares as protective forest. Such protective forests include all forest land designated as national parks, wildlife reserves and watershed areas. The extent of the proposed Permanent Forest Estates in Malaysia is as shown in Table 22.

Of the several measures taken to protect and preserve the species of endangered wildlife, the most significant are efforts directed at expanding the system of parks and reserves. Within Peninsular Malaysia approximately five per cent of the total land area is within the system of National Parks and Reserves. The largest areas are Taman Negara, the Krau Game Reserve and the area proposed as the Endau-Rompin National Park. In

Sabah and Sarawak, the percentage of land area set aside for parks and reserves is much less.

From the species point of view the above reserve areas are considered adequate except for four main species; the Sumatran rhinoceros, the elephant, the gaur and the tiger. The elephant and tiger are sufficiently adaptable for survival outside of parks and reserves and thus maintain genetically viable populations. The gaur has a very restricted habitat living close to and within the riparian zones of rivers that are relatively undisturbed. This species, with an estimated count of about 400, requires further protection and conservation measures for its continued survival. Of serious concern is the fate of the Sumatran Rhinoceros as there is insufficient area to maintain a genetically satisfactory population for this species in Malaysia. The largest known population is found in the Endau-Rompin area bordering Johore and Pahang.

Coastal Zone Resources

The coastal zone is the broad band of shore land and the adjoining ocean space. Functionally it is a broad interface between land and water where production, consumption and exchange processes occur at high rates of intensity. Ecologically it is an area of dynamic biochemical activity and may extend beyond the visible beach delta areas and include the continental shelf. In Malaysia, this zone includes practically all major settlement and industrial areas along the coastline and the 332,600 sq km of seas on the continental shelf declared as Malaysia's Exclusive Economic Zone (EEZ). Due to easy access since historical times, the coastal zones in Malaysia have been subjected to considerable development stress and resource exploitation with the net result that many parts of the coastal zones can now be considered as environmentally sensitive.

Sensitive Fishery Resources

Of the living marine resources, fishes, molluscs, prawns and shrimps have been exploited extensively for consumption and export. The marine fishery resources exploited have been predominantly confined to the coastal waters within 60 km of the coastlines of Peninsular Malaysia, Sabah and Sarawak. The declaration of the EEZ has thus included a vast area of coastal waters within Malaysia's jurisdiction for further exploita-

tion of resources. Given that the fishery resources within territorial waters are finite and that the limit of exploitation should be based on the maximum sustainable yield, increased fishing pressure has to be closely monitored to prevent over-exploitation of fishery resources. It is currently felt that the fishing industry in the east coast of Peninsular Malaysia is already operating at the maximum sustainable yield level with respect to demersal fishery and future expansion would thus upset productivity.

Mangroves

Mangrove forests are an important coastal resource in Malaysia amounting to nearly 650,000 ha, 110,000 ha in Peninsular Malaysia, 366,000 ha in Sabah and 174,000 ha in Sarawak. These mangrove forests have traditionally been exploited on a multiple use basis for their forest and fishery resources. Increasing evidence has shown that mangroves are important to estuarine and coastal fisheries both as breeding and nursery ground and as a habitat and food sources.

The mangrove ecosystem in Malaysia is increasingly being affected by human activities. In the last 20 years, 20 per cent of the mangroves of Peninsular Malaysia have been reclaimed largely for port and airport facilities, industrial estates and aquaculture. In Sabah and Sarawak, 20 per cent of the mangrove forest areas have been licensed for the production of woodchips which involves clear-felling of mangroves.

Estuaries

Estuaries constitute a coastal resource whose importance in terms of their productivity has only been realised recently. In Malaysia several commercially important fish species are caught in estuaries, such as sea perch, threadfins, coral cods, snappers, mullet, croakers, rabbit fishes, eel, catfish, herrings, gizzard shad and whiting. Giant freshwater prawn and the mud crab are commercially exploited in the estuaries of the Kemaman, Chukai, Kerteh, Paka and Dungun Rivers in Terengganu.

Destruction of forest, reduction in inflow of freshwater, excessive sedimentation, or pollution of the estuarine system by toxic substances have impaired the productivity of the estuarine

ecosystem. The estuaries are also subjected to damage by events that occur not only within them but also at great distances from them. The greatest threat may be attributed to the chronic degradation of the estuarine environment through cumulative effects of pollution and gradual alteration of the adjacent wetlands.

Coral Reef

Coral reefs are a coastal resource mainly recognised for being a tourist attraction. Malaysian coral reefs are known to be among the richest in the world in terms of coral diversity with genera population. They are important to the fishery industry. In some districts of Peninsular Malaysia, which house some of the richest coral reef areas, the reef fish landings during certain periods of the year are reported to exceed 30 per cent of the total catch.

Coral reefs are regarded as important breeding and nursery grounds for many marine organisms which include fish, lobster, cephalopods and a variety of molluscs. The coral reefs of Pulau Kapas in Terengganu are an important breeding ground for cuttlefish. In addition, aesthetic beauty of the reef fauna and flora contributes to the attraction of the local and associated beaches as recreational areas. The islands of Pulau Kapas, Pulau Tioman, Pulau Perhentian and Pulau Redang of the East Coast of Peninsular Malaysia and the several coral reef areas of Sabah are recognised for their tourist potential.

Although the coral reefs have served as an important coastal resource, intentionally or otherwise, several human-related activities have inflicted serious damage to the coral reef areas. Logging, agricultural activities, development of tourist resorts, ports and coastal towns have been known to have an indirect impact on coral reef areas due to land clearance activities leading to soil erosion and coral reef damage.

The illegal use of explosives to catch fish is reported as another major cause of damage to the coral reef of the country. Shell and coral collectors have also inflicted damage to coral reefs due to excessive removal resulting in imbalance of the coral ecosystem. Minor damage has been attributed to recreational activities such as scuba diving, snorkelling and boating.

Beaches

Beaches are generally an important coastal resource in Malaysia for tourism. However, certain beaches on the Terengganu coast are specifically important as they constitute one of the few breeding sites for sea turtles in the world. The harvesting of turtle eggs has become an important commercial activity on the beaches between Chukai and Dungun. Four different species of sea turtles are known to nest in Malaysia, namely the Leatherback or Giant Leathery turtle, the Green turtle, the Pacific Ridley turtle and the Hawkbill turtle. The Leatherback is the most well known and the major nesting ground for this turtle in the world is the 19 km stretch of beach at Rantau Abang in Terengganu.

The nesting female turtle is reported to be an extremely sensitive animal and disturbances caused by visitors have generated concern that the turtle nesting grounds may be prematurely abandoned and may affect the future nesting pattern of the Leatherback turtles.

The beaches in Malaysia, although not environmentally threatened, are facing problems both natural and man-made. In recent years, coastal erosion has resulted in damage and loss of recreational beaches. Of the 4840 km of coastline in Malaysia about 1300 km (27 per cent) is presently subjected to erosion which can be classified under the following 3 categories based on the severity of the consequences of erosion:

- (i) 140 km of critical erosion areas where facilities and property are in immediate danger;
- (ii) 240 km of significant erosion areas where facilities and property will be endangered within 5—10 years;
- (iii) 900 km of acceptable erosion areas which are generally under developed and contain no facilities and property.

The control of the consequence of coastal erosion has now become an important economic and social need. Action is currently being initiated towards containing the problem in the critical erosion areas, as well as appropriate planning with respect to future coastal facilities to minimise or obviate the need for expensive protection works.

The pollution of recreational coastal waters, particularly by sewage continues to be a problem of concern in several areas including the northern beaches of Pulau Pinang, and the beaches of Melaka, Johor and Port Dickson. Pollution of the coastal waters by oil slicks has been localised mainly affecting Port Dickson and the southern coasts of Johor. No major oil spill incident was recorded in 1985 or 1986.

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 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.

In 1985, a community noise survey which covered various land use areas such as commercial, school, residential, hospital, bus/taxi stations was conducted in various towns in Peninsular Malaysia. The survey revealed that Penang and the Federal Territory of Kuala Lumpur were most noisy in terms of community noise. Ten per cent of the samples taken in Penang and the Federal Territory registered a noise level exceeding 76.0 dBA and 74.5 dBA respectively. However, these levels far exceeded desirable noise criteria recommended by WHO for urban community which is 55 dBA.

The 1985 survey also revealed that schools, hospitals and residential areas were being exposed to high noise levels. Ten per cent of the samples taken for school registered a noise level exceeding 69.5 dBA. Similarly, ten per cent of the samples taken for hospitals and residential areas registered noise levels between 61.5 dBA in residential area and 72.5 dBA at a road interchange.

Sewerage Systems and Urban Sanitation

The improper disposal of domestic sewage continued to be a major source of pollution of both, surface and coastal waters in the country. The public health threat posed by sewage contamination of surface waters was evident from the

recurring incidence of water-borne diseases, which included Cholera, Typhoid and Hepatitis. Reports of the Ministry of Health indicated that water-borne communicable diseases were still widespread throughout Malaysia and uncontrolled discharge of untreated and partially treated sewage and nightsoil was attributed as the main cause.

Sewerage and sanitation facilities, however lacked behind other sectors such as water supply. As a result of the lower priority given to the sewerage sector only 5 towns have central sewerage systems. These towns are Georgetown, Butterworth and Bukit Mertajam in Pulau Pinang, Shah Alam in Selangor and Kuala Lumpur.

Table 23 shows estimates of the population served by the various types of sanitation facilities for 1985, and includes the actual census-based data for 1970 and 1980 for comparison. The situation in 1986 was not expected to defer significantly from that estimated for 1985.

Animal Waste

The standing pig population (spp) in Peninsular Malaysia is estimated to increase from 1.74 million in 1985 to 2.09 million in 1990. Estimates of pig population for Sabah and Sarawak indicate a total spp exceeding 400,000 for 1985.

It is envisaged that about 300 large farms will continue to generate more than half of the total waste load produced. The annual discharge of faeces from about 1.8 million spp in 1986 is about 5.4 million kg based on 2 kg of faeces per pig and annual extraction rate of 1.5. This contains about 337,500 kg of BOD and 1,512,000 kg of suspended solids (TSS). The BOD and TSS loads are equivalent to that of about 6.75 million and 14.85 million human population respectively. It is therefore, a national imperative for the Government to adopt some positive measures to control the discharge of pig wastes.

A field visit by a consultant commissioned by the Government in January 1985 to several farms in Malaysia revealed that the farmers were actively venturing into different schemes of waste management. Ponding was particularly popular among farmers. Continuous desludging of ponds

was noted, usually on an annual basis as the ponds become filled up according to the schedule, but sometimes more frequently if the ponds are filled up prematurely. However, no proper monitoring had been conducted to assess the performance of the treatment works. Many were found to have managed the wastes satisfactorily, though there were also farms which had not adopted proper treatment measures.

The study initiated in 1985 had enabled the Task Force on Piggery Waste Management to draft useful guidelines on the control of waste discharge. Practical design criteria were developed and guidelines formulated to assist farmers in constructing new treatment works and upgrading existing treatment facilities, and to ensure proper operation and maintenance of the treatment works. However, in many pig rearing areas such interim measures could not be instituted for the control of pollution due to severe land constraints and limited scale of pig farms. Relocation and enhanced farming techniques, including scale-up of farm sizes and/or the introduction of centralised water treatment appeared to be necessary.

With this in mind, the Animal Waste Management and Pollution Control Project under the co-sponsorship of the Department of Veterinary Services and the United Nations Development Programme (UNDP) was initiated in Selangor in 1985. The primary objective was to formulate a comprehensive plan to establish two to three (2—3) economically viable pig farms with the integration of production and pollution control systems.

Under the UNDP project, an intensive survey of pig-farms in the Federal Territory and the State of Selangor was commenced in August 1985 and completed in January 1986, involving 650 farms in Selangor and 38 farms in the Federal Territory. Further studies in 1986 were directed towards improving farm management practices and integrated waste management. It is hoped that this comprehensive study in Selangor will result in a pig industry management strategy which can be used as a guide by other pig-rearing States in Malaysia.

Domestic and Commercial Solid Waste

The urban centres in Malaysia are growing

rapidly as evidenced by the increase of urban population from 2.8 million in 1970 to 4.7 million in 1980. This number probably stood at 5.8 million in 1985 and 6.1 million in 1986.

The rapid urbanisation has resulted in the generation of large quantities of municipal solid waste which has to be adequately collected, treated and disposed of so as not to pose a threat to public health and the environment.

It has been estimated that about 3500 tonnes to 5800 tonnes of municipal waste is generated per day in 1985 and 3700 tonnes to 6100 tonnes per day in 1986 from urban centres in Malaysia. These estimates are made based on an urban population growth rate of 4.7 per cent per year and a waste generation capacity of 0.6—1 kg/person per day.

In Malaysia, municipal waste are currently being collected and disposed of by various local authorities. Commercial and industrial waste are however collected and transported by private contractors and disposed of at municipal disposal grounds. No attempt has been made to quantify these waste systematically so far. In the rural areas, domestic waste generated by residents are usually disposed of by individual house owners. Burying or burning waste at their own compound is a common practice.

By and large, the majority of the local authorities in Peninsular Malaysia continued to carry on with their traditional practice of dumping and open burning at the disposal sites. Controlled tipping is only practised by about 25 per cent of the local authorities. Among them, the Kuala Lumpur City Hall practises sanitary landfill using covering material and compaction. One local authority in the East Coast of Peninsular Malaysia has resorted to the use of a municipal incinerator to dispose of its municipal waste.

Toxic and Hazardous Waste

A survey conducted in 1985 showed that approximately 220,000 m³/year of toxic and hazardous wastes were generated in Peninsular Malaysia. About 44 per cent of the wastes were produced by metal finishing industries; 16 per cent by asbestos industries; ranging each between 3 to 4 per cent were from packaging and printing in-

dustries, metalworks/foundries, film processing and oil refineries, while motor assembly plants, paint industries, electronic/semiconductor plants, electrical appliances manufacturing plants, chemical plants and pharmaceutical products manufacturing industries each produced wastes ranging between 1 per cent to 2 per cent. Other types of industries generated less than 1 per cent of the total wastes per year. Figure 28 shows the distribution of wastes by industry.

The largest volume of toxic and hazardous waste generated in 1985 was acid wastes i.e. about 37 per cent of the total volume generated. Such wastes may sometimes contain toxic heavy metals. The other categories of wastes generated in fairly large quantities were asbestos dust sludges and alkaline wastes respectively constituting about 16 per cent and 11 per cent of the total wastes produced. Mineral oil and hydrocarbon wastes, water-based paint sludges, photographic wastes, sludges containing heavy metals and water-based paint wastes each account for 4 to 6 per cent of the wastes. Other wastes were produced in much lesser quantities. Figure 29 shows the distribution of wastes by waste type.

Eight states located on the West Coast of Peninsular Malaysia in which industrial activities are concentrated were selected to be the study area covered in the 1985 survey. The survey revealed that the state of Selangor generated the largest volume of toxic and hazardous waste i.e. approximately 47.2 per cent of the total wastes surveyed in 1985. Federal Territory ranked second, generating about 17.5 per cent, Johor was third producing 8.3 per cent, fourth was Negeri Sembilan and Penang each producing 7.7 per cent, sixth was Perak with 4.5 per cent, Kedah ranked seventh generating about 4.1 per cent and Melaka generating the least volume of waste constituting only 3.1 per cent of the total wastes produced. Figure 30 illustrates the generation of toxic and hazardous waste per year according to the eight states.

Presently there are no suitable facilities for the treatment and disposal of toxic and hazardous wastes. However, most of the major and medium-sized industries have installed within their own premises wastewater treatment plants that are capable of treating their wastewater to the acceptable limits of discharge stipulated under the

Environmental Quality (Sewage and Industrial Effluent) Regulations 1979. Air emission control plants were also installed to remove toxic pollutants from the flue gas streams discharged through the vents of these individual industries in order to comply with the emission discharge standards of the Environmental Quality (Clean Air) Regulations 1978. The toxic residues resulting from these pre-treatment facilities were being accumulated and stored within the premises of the industry pending arrangement for final disposal thus causing problems in terms of storage capacity. Existing domestic landfill sites are inadequate and environmentally unsuitable to receive such toxic residues.

Other liquid wastes such as spent solvent, large volumes of which generated by the electronic/semiconductor industries were accumulated and stored. A small percentage of these wastes were recovered by a few small off-site recycling facilities.

The small scale industries on the other hand such as printing shops, metal plating/repair shops, photographic processing shops etc., were faced with problems such as having limited or no space to install treatment facilities on their own premises or that the volume of waste generated is not economical to be treated individually. As a result waste were being discharged into public drains, streams, rivers etc. either untreated or only partially treated.

Land Use

Economic and other human activities, whether in effect carried out in harmony with the environment or not, are reflected in the pattern of land use. About 52 per cent of the land in Peninsular Malaysia has been developed for agriculture, mining, urbanisation and other infrastructural development purposes, including some areas that were once rich in natural resources and diverse in their characteristic in flora and fauna. However about 6.3 million hectares or 48 per cent of the land area in Peninsular Malaysia is still under forest cover, although only about 10 per cent of the protected forest area maybe considered to be rich and having diverse tropical ecotypes and of scientific significance or interest.

To regulate surface run off, 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 should be maintained under forest cover. To date only 47 per cent of the river basins have 50 per cent or more of their respective catchment areas under forest cover. The pattern is worse off in the West Coast than in the East Coast of Peninsular Malaysia. Seventy nine per cent of the river basins in the West Coast are left with such little cover compared to 29 per cent in the East Coast. 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.

Notable in the landscape is the widespread occurrence of both underutilised and unused land that are no longer under production, productive and 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 aliena-

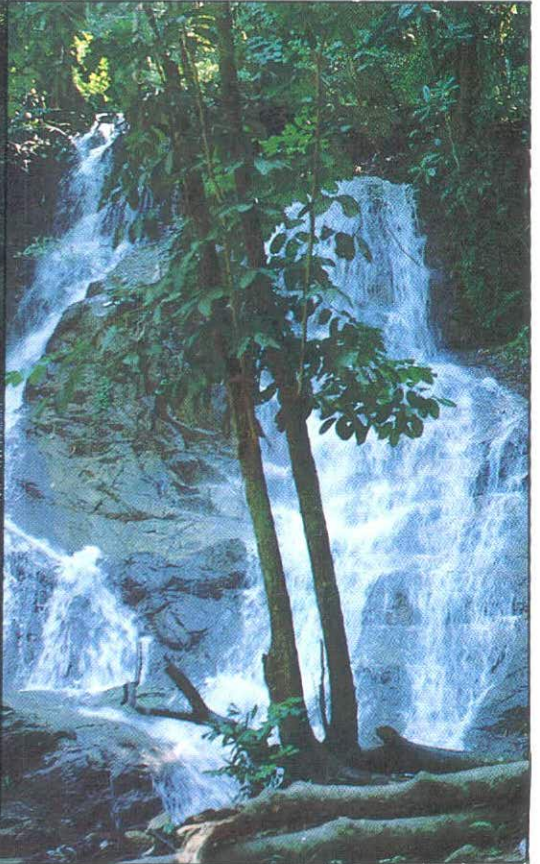
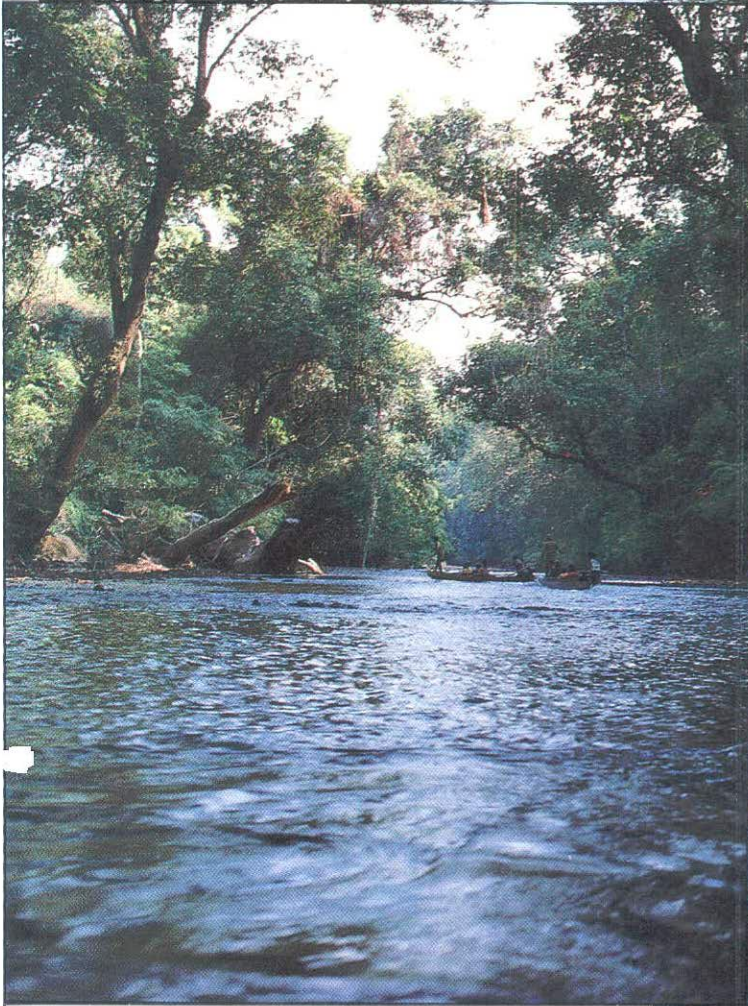
tion of forest lands for the development of new land for agricultural purposes.

Conclusion

Thirty years of independence have brought about tremendous economic development in the country that has improved the quality of life of the people but has also contributed to the deterioration of the environment. This deterioration has to be monitored and corrective measures have to be taken in order to ensure that our natural resource which sustain our development will not be jeopardised. The Malaysian government has taken corrective measures through pollution control and environmental planning programmes to protect its environment. While the situation is under control and in some areas improving, much more efforts are needed not only by the Department of Environment but also by other Government Agencies, Universities, the scientific community, professionals, politicians and members of the general public to work together towards improving the quality of our environment for sustainable development.

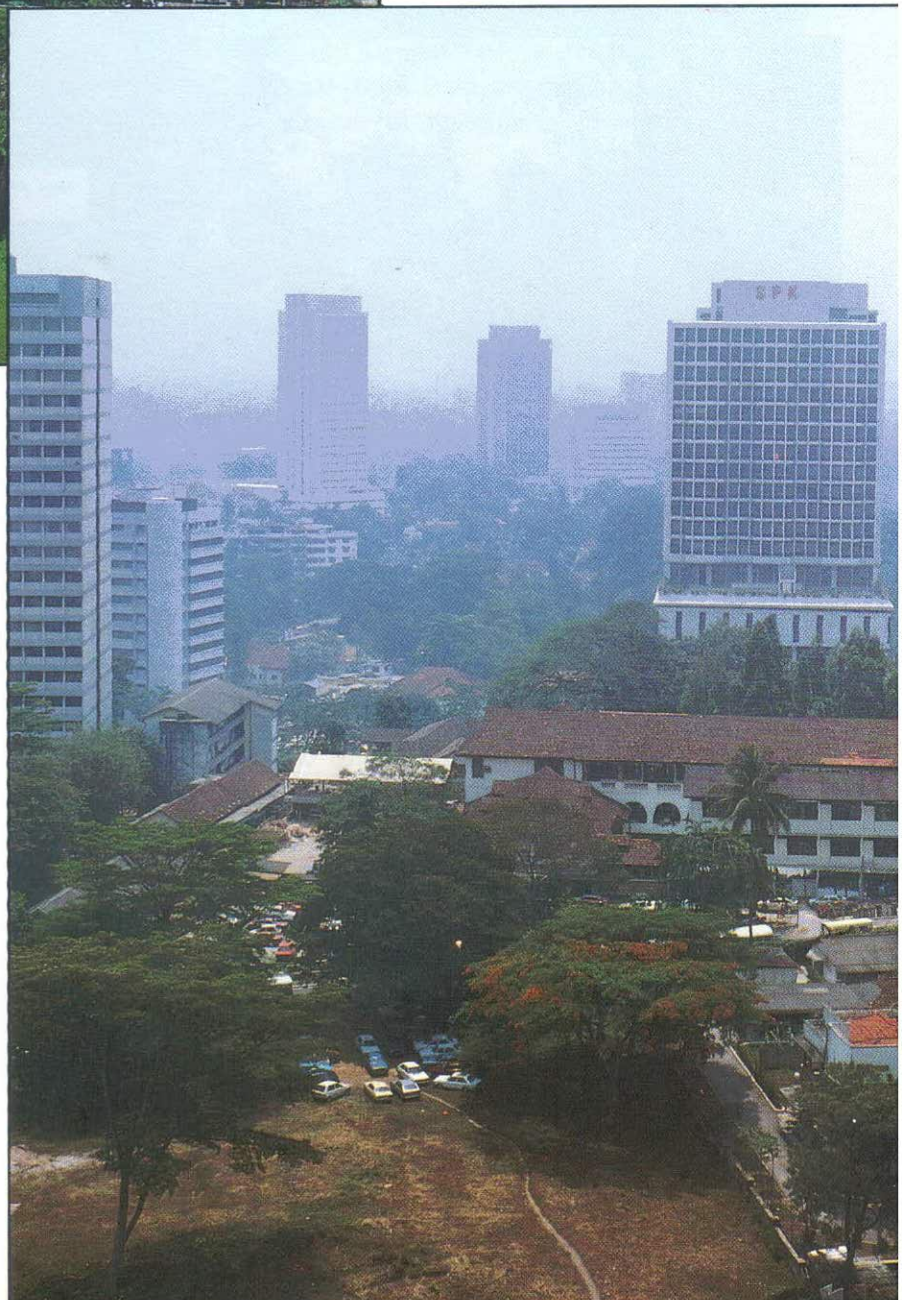


Our Tropical Rainforest: A Heritage to Preserve.





Kuala Lumpur: On A Clear Day.



Kuala Lumpur: On A Hazy Day.

CHAPTER 4
**POLLUTION
ABATEMENT AND
CONTROL**

POLLUTION ABATEMENT AND CONTROL

Legislation and Control

The Environmental Quality Act, 1974 and the Regulations made under it remain to be the main instruments in the abatement and control of pollution especially from industrial sources. The proposed amendment to the Act, initiated in 1982 was finally approved and gazetted for enforcement on 9 January, 1986. Amongst some of the important provisions of the Environmental Quality (Amendment) Act 1985 are:

- 1) The Environmental Quality Council has been enlarged to accommodate representation from the Ministry of Agriculture, Ministry of Transport, the oil palm and rubber industries, non-governmental organisations (NGOs) having concern for the environment and an additional representation from Sabah and Sarawak. The Council now has 16 members instead of the former nine (Section 3).
- 2) Period for renewal of licences has been brought forward to be not more than four months and not earlier than three months from the expiry date of the licence (Section 6).
- 3) The maximum penalty for non-compliance of licensing conditions has been doubled from \$5,000 to \$10,000 (Sections 7, 8).
- 4) Total prohibition of discharge of oil or oil mixture into Malaysian waters has been amended to allow for conditional discharge (Section 10).
- 5) Provision to prescribe activities that have potential environmental impact and requiring approval of assessment report before implementation of such activities. (Section 13)
- 6) Last but not least more specific provision allowing the Director General to

regulate the operation of vehicles, including the power to stop, inspect, test and detain any vehicle violating environmental protection provisions. (Section 17).

On 1 July 1985, the Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985 came into force. The Regulations require that the lead content in petrol used for motor vehicle be brought down from 0.84 g/litre to 0.4 g/litre effective 1 July 1985 and to be further reduced to 0.15 g/litre by 1 January 1990.

Effort towards amending the various regulations enforced since 1977 has been initiated. The review on Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 is on-going.

Consultation on the draft Environmental Quality (Control of Emission from Diesel Engines) Regulations began in July 1985. Detailed consultations with relevant government agencies and the transport industries including the Japan Automobile Manufacturers Association were completed and the draft is ready for consultation with the Environmental Quality Council.

As at 31 December 1986, the following legislations are being enforced by the Department of Environment:

- (i) The Environmental Quality Act, 1974 and the Environmental Quality (Amendment) Act 1985.
- (ii) The Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977.
- (iii) The Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977.
- (iv) The Environmental Quality (Licensing) Regulations 1977.
- (v) The Environmental Quality (Prescribed

Premises) (Raw Natural Rubber) Order 1978.

- (vi) The Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978.
- (vii) The Environmental Quality (Clean Air) Regulations 1978.
- (viii) The Environmental Quality (Compounding of Offences) Regulations 1978.
- (ix) The Environmental Quality (Sewage and Industrial Effluents) Regulations 1979.
- (x) The Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985.
- (xi) Motor Vehicle (Control of Smoke and Gas Emissions) Rules 1977 made under the Road Traffic Ordinance 1958.

Air Pollution Control

In 1985 and 1986, air pollution control activities were continued with the following objectives, viz:

- to preserve the nation's air quality and protect its air resources.
- to contribute to the nation's committed objectives of protecting and enhancing the quality of its environment especially with respect to public safety, health and welfare through a balanced and pragmatic approach in pollution control and conservation.
- to prevent, abate and minimise air pollution impact, having regard to the nation's short term and long term objectives in the elimination of poverty, provision of housing and education, health protection and energy conservation.

In the course of implementing these control activities, the Department of Environment continued to emphasize the preventive approach sup-

plemented with curative measures. Combinations of best practicable means, (e.g. for control of odour and various gases), prohibitive standards (e.g. for open burning), visible emission standard (e.g. smoke darkness) and numerical standards (e.g. for noxious gases and particulates), air quality control zone concept (e.g. Batu Caves area) buffer zone concept and pollutant dispersion (e.g. chimney height stipulation) continued to be the main effective control mechanisms.

Stationary Sources

In 1985 and 1986, the control of air pollution from stationary sources had shifted more visibly from curative to preventive measures. This was largely effected through the utilization of the 'prior approval' clauses in the Environmental Quality (Clean Air) Regulations 1978 for the erection of pollution sources. Detailed screenings were carried out to ensure that the new sources incorporate control measures, including the use of best practicable means, in order to comply with the prohibitive, visible emission and numerical standards specified.

In this time of economic recession and reduced industrial activities, the combined approach of air quality management and best practicable technology approach had further exhibited its advantages and flexibility, e.g. sulphur dioxide monitoring showed that its level in all major industrial and residential areas remained under control. Therefore the cost-effective dispersion through tall chimney approach would continue to be adopted for fuel burning equipment instead of the more expensive desulphurization process until local research and studies show otherwise.

Air pollution control measures adopted by major works such as power stations, cement works, acid plants and chemical works, fertilizer plants, lime works, refineries, metallurgical works, lead recovery plants etc continued to be effective and adequate, except during short periods of plant upset.

The Sultan Ismail Power Station in Johor Bahru was a subject of smoke, dust, and acid smut emission complaints. Rectifying measures by NEB was unfortunately interrupted by the scheduled closure of the plant. The NEB has been alerted to the possibility of similar upset in other

similar plants. The partial coming-on-stream of the triple-fired (coal/oil/gas) 2400 MW station in Port Klang is being monitored.

The new cement works of APMC at Kanthan, Perak Hanjong Cement Works and Kedah Cement had all come on stream with adequate control equipment and approved chimney heights. Improved control facilities at Cement Industries (CIMA) at Kangar and Malaya Industries and Mining Corporation (MINCO) at Kuala Lumpur had also been carried out. Coal conversion at Tasek Works in Perak had also been implemented with appropriate dust control.

The secondary dust collection systems installed at Amalgamated Steel Mill (ASM) and Perwaja Steel Plant were found to be controlling fume discharges satisfactorily. However, fugitive emissions continued to be visible and lack of adequate buffer zones at ASM had resulted in residents being affected by residual pollutants.

The Chemical Company of Malaysia acid/fertilizer works at Shah Alam had completed the installation of a new neutraliser to improve on ammonia control. Monitoring results showed satisfactory ambient level of ammonia at selected surrounding areas.

Smaller works such as rice mills, sawmills and small quarries continued to present problems. There had not been any breakthrough in satisfactory waste disposal or viable waste recycling technology in the first two industries. Open burning by small rice millers during peak harvest seasons had to be tolerated on compassionate grounds. Open burning at the bigger mills of the National Padi and Rice Board (LPN) still occurred occasionally. LPN had also set up two pilot waste heat power generation plants using padi husk as fuel at Teluk Kechai and Jerlun. Suggestion by the Department of Environment urging the industry to convert diesel burner/dryer to using rice husk as fuel received little support from the rice millers.

The wood-based industries, especially those sited in urban areas still persisted in bringing whole logs all the way from the felling area for processing and were facing increasing difficulties in disposing their wastes, especially barks, as there was neither demand nor disposal area to receive

the wastes generated. Those who could afford to incinerate still persisted in building wood incinerators without proper feeding/regulating mechanisms. In Sarawak, for example, 'teepee' type of incinerators of metal construction which do not meet DOE requirements, continued to be illegally constructed without prior consultation with DOE. In the quarries, wet suppression system was the preferred method of dust control. However, many had been constructed without proper investigation as to the availability of water.

Open burning at refuse dump sites remained the single largest pollutant-generator of dust in any particular area. Local authorities, as the responsible agencies for the management of such sites have been alerted to control such practices. While those in outlying areas affected only a handful of residents, others are located in heavily built-up areas where chances of their receiving toxic and hazardous wastes are greatest because of their proximity to industrial and commercial sources, e.g. the Jinjang waste disposal site in the Federal Territory of Kuala Lumpur, where thousands of people are already facing relatively higher levels of air pollutants generally present in urban air.

The attempt to save disposal cost had influenced many industrial premises and commercial complexes to propose incinerating their own wastes instead of carting them to refuse disposal grounds. As a result, no less than 45 premises had made enquiries or applications for the installation of packaged incinerators to burn refuse of which seven premises had installed such incinerators without seeking prior approval. The Department had advised that the mushrooming of such incinerators in built-up (and already polluted) areas such as Kuala Lumpur and Petaling Jaya was undesirable. Besides the potential to increase further the thermal load which gives rise to 'heat island', such packaged incinerators were known to be difficult to operate efficiently and would also consume combustible materials that are essential for the successful establishment of a municipal incinerator. On the other hand, there had been no application for setting up incinerators for the disposal of pathological waste, a practice encouraged for health protection purpose.

Mobile Sources

Control of smoke emission and hydro-

carbon emission from motor vehicles under the Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977 took new initiatives in 1985. An extensive co-operative programme rolled off with a dialogue between the Honorable Minister of Science, Technology and the Environment Y.B. Datuk Amar Stephen K.T. Yong and operators from the transport industry. The Minister urged the industry to understand the air pollution problems caused by motor vehicles and the need to regularly attend to their vehicles in order to minimise the problems. This was followed up by various dialogues at state level by the Honorable Parliamentary Secretary of the Ministry Y.B. Tuan Law Hieng Ding. An Eleven Point Action Plan was formulated. A National Task Force was set up to ensure continuous flow of information between the enforcement agencies such as DOE, Police and the Road Transport Department and the industry.

Free smoke test services were offered by the Department to enable early detection of excessive dark smoke to enable rectifying works to be carried out. These tests were continued in 1986.

Review of the previous enforcement work was completed and based on the information gathered, draft regulations to control emission from diesel vehicles based on ECE Regulations 24 and 49, extensive inspection and maintenance programme (IMP) and greater use of LPG as fuel in selected cities were proposed. Consultation with industries and manufacturers of vehicles were carried out. In addition, seven units of Hartridge Smoke Meter were acquired to reinforce regional capability. The police, despite their own heavy commitment continued to give their support in carrying out joint enforcement programmes on diesel smoke emission.

In 1985 and 1986, enforcement campaigns to control black smoke emission from diesel vehicles were carried out in all states except Sabah and Sarawak where only educational campaigns were done. Table 24 shows the data on enforcement programs carried out in 1985 and 1986 according to states while Table 25 shows the overall achievement of the Department's enforcement programmes over those years.

Water Pollution Control

In 1985 and 1986, efforts on water pollution

control focused on improving the Department's enforcement programmes and tightening compliance with effluent discharge standards. With the help of baseline data, such as ambient water quality, total pollution loads etc., prioritizing of needs for factory inspection became more systematic and organised and allocation of funds for the more needy areas was justified. On the whole while compliance with effluent discharge standards had become a norm than an exception, there were cases of deviation by polluting sources, such as rubber and palm oil mills, and review was carried out and rectification introduced.

Palm Oil Industries

Mills processing crude palm oil that were licensed under the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977 numbered 229 in 1985 and increased to 236 in 1986. During this period one mill had applied for transfer of licence and six (6) applied for variation of licensing conditions to change from water course discharge of treated effluents to land application, five (5) had applied to increase effluent quantity as a result of increase in plant processing capacity.

To expedite processing of licence and issuance of schedule of compliance, departmental processing and notification procedures were reviewed and streamlined, and application forms were made available to all regional offices. In 1986, all prescribed mills were also advised against lateness and delay in submitting applications and returns. However, despite the requirement to submit all applications by March of each year, 24 mills were late and 2 mills submitted applications only after their licences expired. Penalties under Sections 13 (3) and 13 (4) of \$10/day and \$10,000 were imposed accordingly.

The technologies for treatment of palm oil effluent were basically the same as before: 82 per cent doing biological ponding, 9 per cent doing biological ponding with digester, 6 per cent ponding with decanters, 1 per cent with other systems such as flocculation tanks and three (3) mills were without any form of treatment system due to shortage of land or unique location.

While the compliance of effluent discharge standards was generally met with, stipulated

operating conditions and procedure had not been adhered to by some mills. As a result, a completely new licensing format as well as new operating conditions were introduced to strengthen enforcement. Steps were also being taken to limit the quantity of effluent discharge for mills unable to improve on the quality of effluent discharge. Generally, performance record of the palm oil industry in meeting effluent discharge standards was satisfactory for 1985 and 1986.

Rubber Industries

In 1986, 218 licences were issued under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978, compared to 224 issued in 1985. These made up of 180 for Standard Malaysian Rubber (SMR) and conventional grade factories, 18 for latex concentrate and 18 for premises processing both products. In the same year, there were three applications for transfer of licence.

To promote speedy processing of licences, in 1985, the industry was issued letters and procedural guidelines and advised to send in information and applications early. In 1986, uniform procedures were adopted and strictly enforced. Licensing conditions were reformulated to provide clearer and more definite terms and operation guidelines to the industries. As a result, correspondence encumbrances encountered previously had been removed. It is however anticipated that computation of fees, recovery, and preparation of compliance schedule would continue to be done manually until the department is computerised.

On treatment technology, biological ponding was favoured by 88 per cent of the factories, followed by 3 per cent on land disposal. By the end of 1986, nine mills belong to MARDEC which were still in the process of acquiring suitable land for its treatment system.

Generally, except for some chronic cases where availability of land still presented some problems, the industry as a whole had performed satisfactorily with regard to the Environmental Quality Act.

Manufacturing Industries

The various manufacturing industries con-

tinued to be regulated under the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. In 1985 and 1986, regular enforcement actions by the regional offices had resulted in increased compliance of the various premises. While the larger and newer premises having sufficient financial resources and land spaces found little problems in complying, the older or smaller industries however, still faced serious problems in meeting the specified standards. Amongst these were premises engaged in food and beverages production, palm oil refineries, textiles factories, chemical concerns, paper recycling mills, metal finishing works and rubber product factories.

Food and Beverages Production

Industries in this category include marine product preparation, canneries, beer and beverages factories.

The main parameters that breached the specified standards were BOD and oil and grease. Thirty one factories had claimed lack of space and financial capability as reasons for not treating their wastes.

Palm Oil Refineries

In 1985, this industry had lagged very far behind in terms of waste treatment when compared to the crude palm oil millers. The problem of a Denmark-based consultant/supplier's inability to meet its obligations still remain unresolved. PORIM had carried out a feasibility study to assist the industry in treatment technologies for the various processes currently employed in refining. It concluded its study in June 1986 and all the relevant premises had been given notice/advice by the Department to implement the recommendations according to schedule determined.

Textile Factories

The textile industry in general faced space problems in putting up treatment system. For some premises, heavy investment and lack of appropriate technology were also cited as reasons for non-compliance. In addition, economic downturn and slacking world demand in 1985 and 1986 were claimed by some as basis of BOD, oil and grease and COD non-treatment. By the end

of 1986, only about 30 per cent of the factories had installed treatment systems.

Chemical Concerns

While the bigger premises such as the Chemical Company of Malaysia and Malayan Acid Works have treatment systems, the smaller ones especially those involved in occasional formulation and make-shift premises were unable to do much. These operators disclosed little of their nature of operations owing to fear or ignorance. The survey carried out in 1986 in preparation for scheduled wastes control would throw more light on this category of industry when completed.

Paper Recycling Mills

Large land areas required by conventional treatment for the voluminous effluent continued to be a problem for some older mills. High COD readings were also regularly registered for those having treatment system.

Metal Finishing Works

Sampling works carried out on many of these premises indicated presence of heavy metals and toxic chemicals such as cyanide. Many of the premises are very small operations located in shop-lots or areas having only space for production purposes. While the quantity of effluents may be comparatively small, the nature of discharge and the condition of the receiving bodies were of concern. The limitation of water use and elementary treatment could only serve as temporary measures while awaiting centralised treatment or relocation of plants.

Rubber Product Factories

These are premises involved in using rubber/latex as raw materials for products such as mattresses, gloves and condoms. Enforcement sampling on some existing premises showed excessive levels of zinc, oil and grease, and COD. Upgrading of treatment system was initiated in 1986. With increased activities in this field as a result of increasing world demands, it is foreseen that more factories would be established. For those involved in using latex concentrate as raw material, the meeting of a more stringent standard than those of factories preparing/manufacturing latex may continue to be a concern.

Sewerage

In 1985 and 1986 the total load of BOD generated from human wastes in terms of sewage and sullage discharge still remained at 750 tonnes per day. Enforcement actions were carried out at selected known sources of substantial discharges such as holiday resorts, hotels and housing estates. However, the control of human wastes depended upon the progress in the provision of water-borne sewerage systems. Other than Georgetown, Kota Kinabalu, Shah Alam and Kuala Lumpur, progress in other areas was slow. The plant at Prai is under construction.

Animal Husbandry

In 1985 and 1986, wastes from animal husbandry continued to contribute significant loads to pollutant level in surface waters. Animal wastes from small farms were largely discharged into water-courses untreated. Recognising the lack of appropriate technology in the handling, treatment and disposal or recovery of such wastes, the Department of Veterinary Services, in collaboration with other government agencies and UNEP, had initiated a number of projects to address these problems. A study initiated in 1985 had enabled the Task Force on Piggery Waste Management to draft guidelines and practical design criteria to assist farmers in upgrading existing treatment facilities and construction of new ones. However, it was recognized that such piecemeal and interim approach would not be efficient in tackling the problem. DOE had advised that only new larger farms capable of installing effluent treatment system and located in selected non-sensitive areas were to be permitted.

The Department of Veterinary Services had introduced uniform law in an effort to harmonize the various state enactments. In addition, with assistance from UNDP, the Department had carried out a comprehensive study with a view to recommend a management strategy to the various state governments. (see also page 21 on Animal Waste)

Mining Industry

In 1985, discharges from mines continued to be controlled by the Department of Mines largely through the enforcement of the various State Mining Enactments and Rules in the spirit

agreed upon when the Environmental Quality (Sewage and Industrial Effluents) Regulations were promulgated in 1979. While the level of control of discharges from tin mines in the past was not adequate to bring about the expected improvement in the quality of water affected by tin mines, the Department of Mines had taken further steps to control the discharge and run-offs.

It also regulated the siting of settling ponds, point of discharge, method of treatment and the channelling of effluents. The revised standard of suspended solids content at 200 grains per gallon for new leases and 400 grains per gallon for existing mines were also enforced.

The detection of high cyanide by DOE in some rivers downstream of some goldmines in Bau, Sarawak had caused concern. The Department of Mines carried out an assessment and assured all concerned that there was no cause for alarm. The situation is being closely monitored by the Department.

Control of Soil Erosion

In the years under review, the control of run-offs from newly developed land for agriculture, logging, housing, industry, roads, highways and other infrastructural development was undertaken by various control agencies on an ad-hoc basis and had brought about little improvement in the silt and suspended solids levels in the rivers in Peninsular Malaysia as well as in Sabah and Sarawak. The guidelines prepared by the Department on the Prevention and Control of Soil Erosion and Siltation had yet to receive wide acceptance by development agencies and control authorities. In a recent proposal by the Ministry of Housing and Local Government to review the Local Government Act and its various by-laws, opportunity was taken by the Department to recommend the incorporation of salient features of the Guidelines and stricter provisions to control soil erosion from infrastructural development works.

Noise Pollution Control

The control of noise was effected through available existing provisions under the Environmental Quality Act, 1974 and the Environmental Quality (Clean Air) Regulations 1978 and through co-operation with local authorities

in controlling the zoning of industries. While mobile sources were under scrutiny by the national Committee on Noise Control, the abatement of noise was largely carried out by siting and zoning of new potential sources away from the recipients, followed by ensuring that practical control measures were incorporated in the installation of equipment before approval was given e.g. generators to have acoustic silencers and boilers to have blowdown wells. The indiscriminate siting of concrete batching plant had created noise pollution problems especially in major urban centres such as Kuala Lumpur and Johor Bahru. Close co-operation between the Department of Environment and the city councils in ensuring proper siting had contributed towards arresting the situation. For numerous other sources, the control was effected through actual assessment of the situation, practical control measures and the issue of noise abatement notices.

Marine Pollution Control

In 1985, as a result of the agreement reached between the Marine Department and the Department of Environment, the control of pollutants getting into the marine environment was made more specific in the legislation.

In the amendment to the Environmental Quality Act, 1974 that came into force on 9 January 1986, the control of wastes from land based sources to the marine environment was made more specific while provisions on the control of vessel sources would be included in the amendment to the Merchant Shipping Ordinance, 1952 enforced by the Marine Department.

Oil Spill Incidents

In 1985, six cases of sighting of oil were reported all within the Johore Port area. In 1986, the number of sightings increased to 25 cases, nine of which were in various ports, eight in the Straits of Malacca, seven in the South China Sea and the remaining case in the Sarawak River. A cleaning cost of M\$19,849.53 was recovered in 1985. Table 26 shows the occurrences and expenditures incurred and Table 27 shows the source of spill. There was no case involving legal action/prosecution.

There were two major oil spill incidents in

1986; on 18 February, 1986 a major sighting was reported near Pulau Tenggol and Pulau Redang in Terengganu. This incident highlighted the need for a contingency plan for the South China Sea as considerable difficulties were encountered in the deployment of equipment and co-ordination of combating effort. The other incident involved the collision of Bright Duke with Pantas near Batu Pahat, Johore on 9 July, 1986. The accident resulted in a fire, loss of lives and oil spill. In the course of rescuing life and combating the oil spill, deficiencies in the Search and Rescue and Oil Spill Response Procedures were identified.

Oil Spill Response Planning

In the years under review, two sub-committees were established to examine the findings of the Malacca Exercise 1984. The first committee was on response and clean-up and the second dealt with communications. The recommendations of the two sub-committees were accepted by the National Oil Spill Response Committee and were reflected in the draft Fifth Malaysia Plan proposal. Owing to the prevailing economic situation and the high cost involved, only plans with regards to replacement of booms, construction of storage facilities and establishment of the Communication Centre were to proceed.

For the establishment of the South China Sea Oil Spill Contingency Plan, preparatory works began in mid-1986 with the establishment of five working groups at the regional level; Johore East, Pahang, Terengganu, Sabah and Sarawak. These sub-plans, scheduled to be completed in early 1988 would integrate into the South China Sea Oil Spill Response Plan, which in turn would combine with the existing Straits of Malacca Oil Spill Contingency Plan to form the National Contingency Plan. Meanwhile, collection of data on environmentally sensitive areas for identification and establishing the priority of the protection of coastal resources was in progress. In view of the need to further maximise utilisation of existing resources, preparatory work to modify existing equipment and identify facilities available elsewhere had also been initiated. The preparation of an approved list of dispersants has yet to be accomplished as the research and the development project on the toxicity testing of dispersant under the COBSEA Programme is still on-going and is envisaged to be completed by the end of 1987. For this pur-

pose the Department continued to assist in collecting and sending dispersant samples, to the various participating laboratories in Penang, Philippines, and Thailand.

Contravention Licences

Section 22(1) and Section 25(1) of the Act provide for contravention of acceptable conditions specified in the Environmental Quality (Clean Air) Regulations 1978 and the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 respectively.

Twenty-six (26) and 37 applications for contravention licence were received and processed under Section 22(1) in 1985 and 1986 respectively, as compared to 24 issued in 1984. The breakdown according to types of industries and type of contravention are as shown in Tables 28 and 29.

Licences were granted to small wood-based industries facing genuine problems in disposing of wood wastes that are left behind after various other efforts were made. Licences were also given to enable repair and construction of incinerators or construction of facilities to reduce smoke emission. Suggestions and advice were also offered to applicants on recycling and reutilising of wood wastes in order to conserve the country's resources. Wood-based industries in Sarawak were also warned not to perpetuate the construction of steel type teepee burners which had been found to be unsuitable.

In 1985, the granting of contravention licences under the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 underwent stricter scrutiny to prevent cases of possible abuse and to require submission of specific data to justify the application. All applications were to be accompanied by operations and discharge data and evidence of previous effort made in meeting compliance; in addition effluent related fees were charged in accordance to the provisions of the Regulations.

There were 41 applications in 1985, and 99 in 1986, compared to 83 cases in 1984. This increase was however due to the fact that multiple applications were received in the same year as a result of the granting of licences for shorter

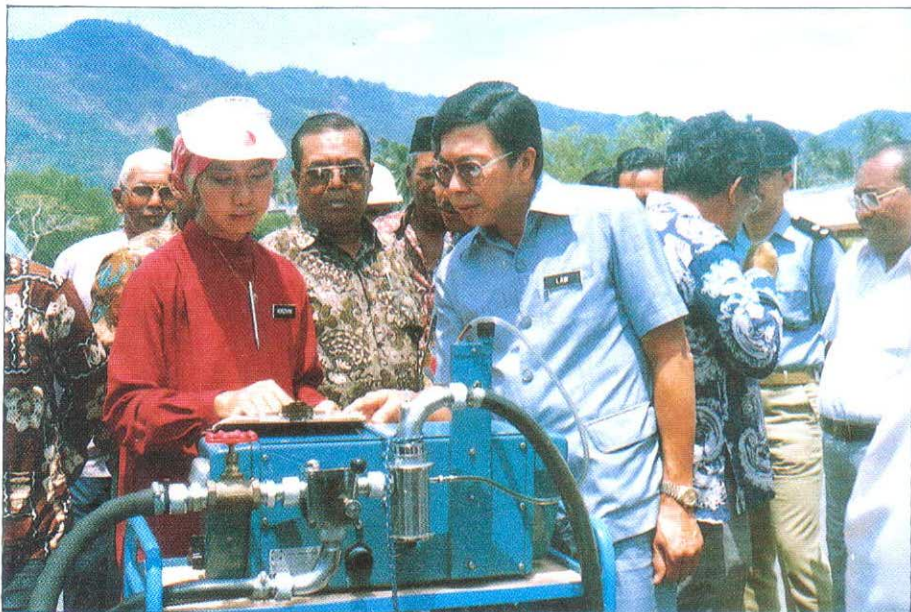
duration as to ensure speedier compliance and to enable better monitoring and more frequent review of doubtful cases.

The breakdown of the number of applications for contraventions according to the types of industries and justifications are as shown in Table 30 and 31.

Enforcement

Any violation of the Environmental Quality

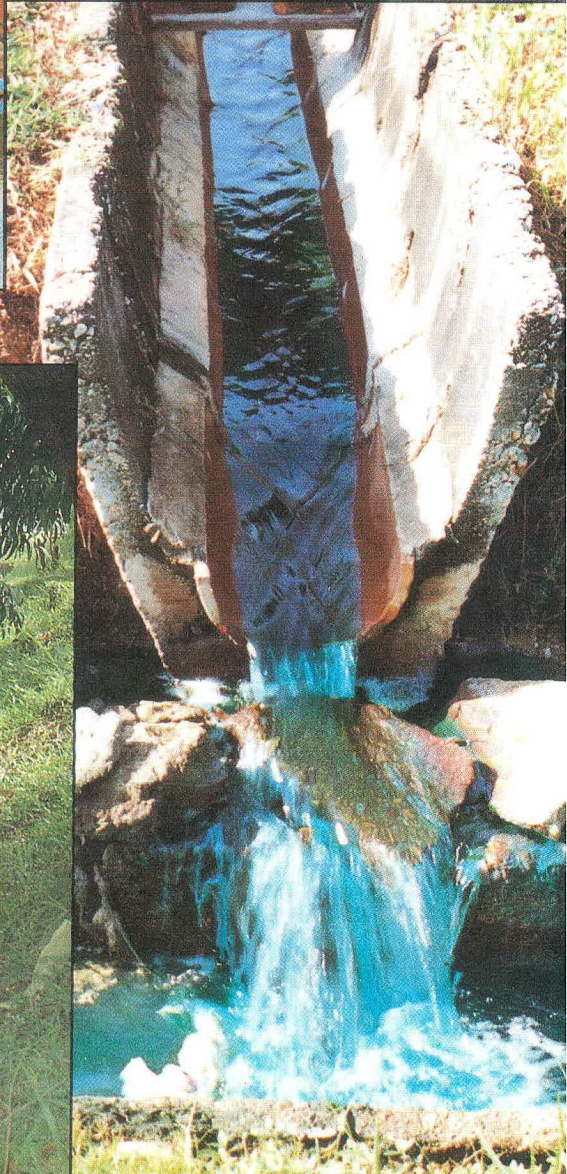
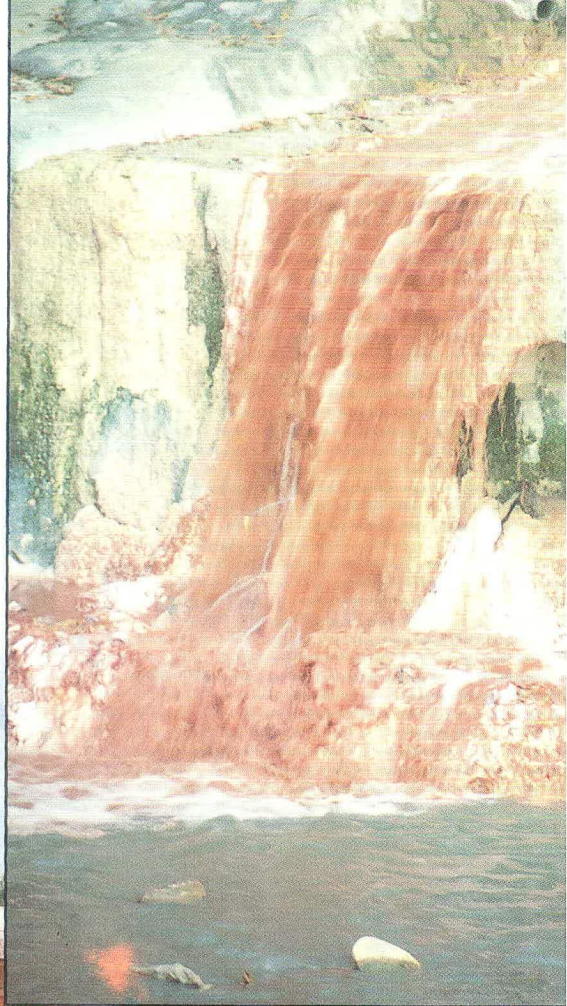
Act could result in the violators being charged in court and fined accordingly. Such violations were normally viewed seriously and warning, directives, compound and formal prosecution in courts were actions taken by the Department in 1985 and 1986 according to the seriousness of the offence. Offers of compound were available only under the Environmental Quality (Clean Air) Regulations, 1978. Tables 32, 33, 34, 35, 36, and 37 show the summary of enforcement actions, compound offered and prosecution details respectively.



Launching of Free Testing Service for Black Smoke Emission from Diesel Vehicles by Y.B. Law Hieng Ding, Parliamentary Secretary, Ministry of Science, Technology and the Environment.



Sampling of Gasoline for Testing of Lead Content.



Sources of pollution which require stricter enforcement and surveillance.



CHAPTER 5
**ENVIRONMENTAL
QUALITY
MONITORING AND
SURVEILLANCE**

ENVIRONMENTAL QUALITY MONITORING AND SURVEILLANCE

Environmental Quality Monitoring

Air Quality

Commencing in 1985, the National Air Quality Monitoring and Surveillance Programme progressed as a result of input from the Inter-Agency Task Force on Air Quality Monitoring Programmes, which was established at the end of 1984. This Task Force Group's (TFG) objectives were as follows:-

- (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 facilitate the exchange of experience to improve the quality of monitoring techniques.

The TFG reached consensus on the following priority list of air quality parameters to be monitored:

- (i) Total Suspended Particulates (TSP)
- (ii) Carbon Monoxide (CO)
- (iii) Ozone (O₃)
- (iv) Oxides of Nitrogen (NO_x)
- (v) Non-methane Hydrocarbons (HO)

(vi) Sulphur Dioxide (SO₂)

(vii) Lead (Pb)

In addition, it was deemed useful to conduct measurements of settleable particulates or dust fallout, particularly in residential areas close to major dust-emitting sources, in order to assess the extent of any dust nuisance conditions and how they can be resolved.

Due to various technical problems, budget constraints and difficulties in the timely procurements of spare-parts for the various automatic monitoring equipment and instrumentation, the Department was unable to establish and operate permanent automatic stations for monitoring Carbon Monoxide, Ozone, Sulphur Dioxide, Oxides of Nitrogen and Hydrocarbons. A further problem faced by the Department was the severe lack of experienced staff for equipment maintenance and operation.

Thus, in 1985 and 1986, air quality monitoring was successfully carried out only with respect to dust fallout, total suspended particulates and atmospheric lead. Table 38 shows the distribution by state of monitoring stations for dust fallout using dust deposition gauges (DDG) and total suspended particulates and atmospheric lead using high-volume samplers (HVS).

River Water Quality

Water quality monitoring and surveillance programme established since 1978, was intensified in 1985. The National Water Quality Monitoring Programme was reviewed with respect to the network of monitoring sites, frequency of water sampling and selection of water quality parameters.

A total of approximately 600 water quality monitoring sites were located in the river systems

throughout the country which fall within 95 water quality control regions. In-situ water quality measurements included turbidity, dissolved oxygen, salinity, temperature, pH and electrical conductivity, while laboratory analysis was performed on as many as 30 other chemical and biological parameters when deemed relevant. These also included the bacteriological indicator parameters, pesticides and detergents. An estimated 3,600 samples were taken annually during 1985 and 1986, generating over 70,000 water quality data each year.

Since 1985, the Department has had the benefit of micro-computers for data processing. Thus the task of data storage and processing of the back-log of water quality data accumulated since commencement of the water quality monitoring programme in 1970, began only in 1985.

Coastal Water Quality

Malaysia has a significant length of coastline amounting to a total of approximately 6,400 km. With the declaration of Malaysia's Exclusive Economic Zone in 1984, an additional marine area of more than 414,000 sq km became the assumed responsibility of the country for consideration of preservation and protection of marine living resources. However, due to limited manpower and other resources, control water quality monitoring was confined only to inshore coastal areas in 1985 and 1986.

Coastal water quality was monitored at approximately 150 locations selected with respect to fishery or recreational importance. More than 600 marine water samples were collected in 1985 and 1986, for chemical and bacteriological analysis.

Ground Water Quality

Due to lack of staff and budget constraints the ground water quality monitoring programme was given low priority in 1985 and 1986. However, the Department continued to liaise with the Geological Survey Department to obtain information on existing ground water sources and new areas of ground water resource development in order to enable planning for future monitoring programmes.

Noise

The monitoring of noise levels in specific localities was carried out with the following objectives:-

- (i) To establish representative noise level in the different environments including typical urban, industrial, residential and commercial areas and areas of mixed development;
- (ii) To identify areas of human exposure to noise levels exceeding recommended safe limits and to establish remedial or corrective measures;
- (iii) To establish trends in noise levels in persistent areas; and
- (iv) To obtain relevant noise data for planning purposes.

Specific programmes on noise measurement included monitoring of traffic noise, industrial noise, construction noise, community noise and aircraft noise for purposes of data input needed in the development of urban structure plans. Ad hoc noise measurements were also carried out in problematic areas following public complaints.

Investigation of Public Complaints

The Department of Environment received a total of 388 complaints with respect to environmental pollution in 1985 and 364 complaints in 1986. The number of complaints recorded in 1985 was the highest over the past eight years (Refer Figure 31). Complaints were received directly from the public by letters; telephone calls; personal visits; or through the Public Complaints Bureau, elected representatives, citizen and pressure groups, local authorities and district and village development and security committees. All complaints received were investigated and appropriate follow-up actions were taken.

Analysis of the complaints received showed that the West Coast States of Peninsular Malaysia had the most number of complaints compared to the states of Sabah and Sarawak. Detailed breakdown of complaints received state by state

is as shown in Figures 32 and 33 for 1985 and 1986 respectively. As in previous years air pollution complaints accounted for a major portion of the pollution complaints received by the Department. Seventy three per cent (73 per cent) of the total complaints received in 1985 and eighty-four per cent (84 per cent) in 1986, were related to air pollution including noise. Complaints on dust and particulates were still the highest, and accounted for 37 per cent of complaints in 1985 and 35 per cent in 1986. Other air pollution complaints received were due to noise, smoke, odour and gaseous emission (Refer Table 39).

Sawmills and wood-based industries were responsible for 15 per cent of the total air pollution complaints received in 1985 and 18 per cent in 1986. Chemical industries, rice mills, quarries, engineering workshops, feedmills, and fishmeal factories constituted the other significant sources of air pollution complaints as shown in Table 40.

Analysis of water pollution complaints received by the Department showed that rubber factories were no longer the main source of water pollution complaints, unlike in previous years. The complaints from rubber factories decreased from 10 per cent in 1984 to 4 per cent in 1985 while increasing slightly to 6 per cent in 1986. Palm oil mills continued to be a source of water pollution complaints and contributed to only 15 per cent of water pollution complaints received in 1985 and 20 per cent in 1986. Other industrial effluents collectively contributed to 29 per cent of the total water pollution complaints received in 1985 and 20 per cent in 1986. Other contributing sources of water pollution complaints included piggery waste, mining, domestic sewage, and solid waste. (Refer Figures 34 and 35).

With regard to the distribution of water pollution complaints by state, Selangor and Wilayah Persekutuan received the most, followed by Perak, Kedah and Johor.

Special Studies

Acid Rain

Studies conducted in 1983/84 by the Department of Environment, Chemistry Department and the Meteorological Department indicated that acid

rain was not a problem in the Klang Valley. From a total of 1860 samples, only 6 per cent recorded a pH below 4.6. In 1985/86, the situation continued to be monitored with a station maintained at the Forest Research Institute, Kepong, Selangor and results further showed that the problem of acid rain did not arise in the Klang Valley.

Haze

The occurrence of dense haze throughout the country in August and September 1982 and April 1983 due to thermal inversion and large scale burning of trees and vegetation in some parts of Indonesia and Malaysia did not recur in 1985 and 1986. Only occasional localised short spells of haze were observed during periods of dry season. While the situation continued to be monitored, no special studies or investigations were carried out.

Depletion of the Ozone Layer: Chlorofluorocarbons

A Task Force on the Control of Chlorofluorocarbons (CFC) was formed in 1985 to study the implications of the implementation of the nine strategies for the protection of the ozone layer proposed in the Economics Workshop on Chlorofluorocarbons (CFC) held in Rome, May 26—30, 1986. A 'Questionnaire Survey' was conducted on 21 industries expected to be handling or using CFC's in the country. Results of the survey indicated that industries did not favour proposed restrictions on the use and production of CFC or the imposition of emission fees survey also indicated support for an assessment and review of the depletion of the ozone layer for purposes of controlling pollution from CFC. The survey also estimated that the annual consumption of CFD was less than 0.16 kg per capita.

Polychlorinated Biphenyls (PCBs)

A preliminary study was conducted in October, 1985 to detect the presence of PCB in cockles, sea water and sediments in coastal areas of Penang in response to a memorandum received from a consumer association stating that high levels of PCB had been detected in certain marine products from that area. The report of a committee formed by the Department indicated that PCB was not detected in sea water and sedi-

ment samples whilst in cockles PCB level were generally very low i.e. below 6 ppb.

Such PCB levels are considered very low compared with the maximum permissible level of PCB in fish/shellfish specified in the U.S.F.D.A. Regulations, (1979) and Canadian Food & Drugs Regulations (1979) i.e. 2000 ppb.

It was also found that the PCB concentrations in existing transformers and capacitors used by a few selected industries (8) in the Klang Valley and one (1) electricity sub-station in Prai were low (below 6 ppm). Detailed studies will be carried out to other potential sources of PCB in the country such as hospitals and electricity sub-stations.

Impact of Cloud Seeding on Water Quality

The cloud seeding programme carried out by the Meteorological Department is to alleviate the water supply situation in drought areas of the country, mainly Kedah, Perlis, and Northern Perak. As the cloud seeding operations use chemicals such as sodium chloride, urea and ammonium chloride, it is imperative that the water quality might be affected in the operational region.

Five reservoirs were chosen for the study. They were Pedu (Kedah), Muda (Kedah), Temenggor (Perak), Klang Gates (Selangor) and

Langat. Cloud seeding was carried out in Pedu, Muda and Temenggor, whilst Klang Gates and Langat were used as controls.

Detergent

A study on the use of alkyl benzene sulphonate (ABS) was conducted by the Engineering and Environmental Consultant of Kuala Lumpur, SEATEC International of Thailand in collaboration with the Department of Environment. The study conducted in April 1984 to January 1985 was to assess the environmental effects of ABS detergents in Malaysia, to determine whether such use had resulted in any significant adverse effects, or would be expected to result in adverse effects in the near future due to continuing use of ABS.

The study which was preliminary in nature indicated that the use of anionic detergents in Peninsular Malaysia appeared not to have resulted in any significant impairment of the beneficial use of rivers studied. However, problems such as foaming have been observed in sewage treatment plants but has not reached significant levels in rivers. Additional studies however are necessary to examine the matter further and to provide additional information for an assessment of the situation, an understanding of which would assist in the formulation of policies and strategies related to the use of detergents in Malaysia.

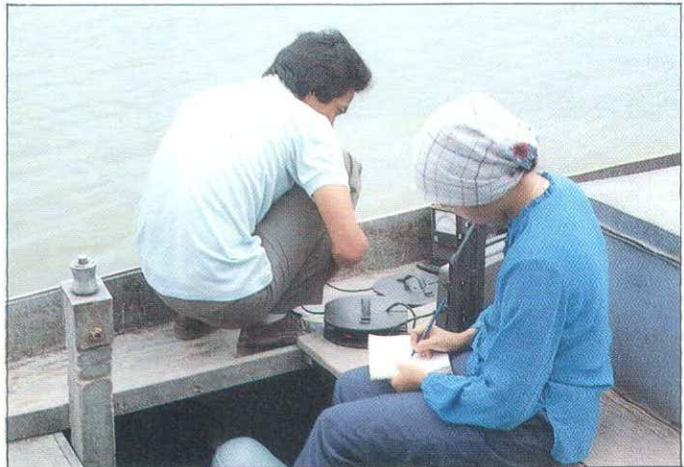
Monitoring of the Environment



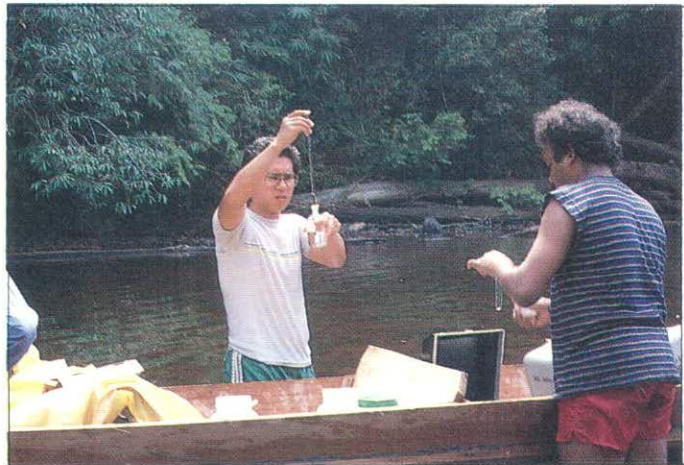
Noise Measurement.



*Air Sampling for
Suspended Particulate Matters.*



*Sampling
Coastal waters.*



*Sampling
Inland waters.*

Major source of public complaints.



*Open Burning
of Wood Waste.*



*Indiscriminate
Dumping of
Domestic Waste
along Riverbanks*



Open Quarrying

CHAPTER 6
**ENVIRONMENTAL
PLANNING AND
DEVELOPMENT**

ENVIRONMENTAL PLANNING AND DEVELOPMENT

Introduction

Man's extensive use of the natural resource system often impacts the environment causing it to change. The environment attempts to counter this in order to maintain a balance. The ecosystem, which comprises the environment and the human community within, has the important characteristic of resilience which is a measure of an ecosystem's ability to absorb environmental stress without changing to a recognizably different ecological state. However, this resilience to accommodate change and recover after stress is not unlimited. There are threshold levels of perturbations and alterations which, if exceeded, result in delayed rather than rapid recovery. In certain cases the ecosystem may be stressed beyond its limits for which it may not return to its original state.

Many of the environmental problems that occur in the country are the result of the lack of environmental considerations in the exploitation, development and management of resources resulting in the ecosystem extending beyond the limits of its resilience. Exploitation of natural resources such as forest for timber; land for agriculture, housing, industry and minerals; and water for water supply, irrigation and electricity generation are important in relation to the types of environmental problems faced by the country.

Some major conflicts which have resulted from the lack of environmental concerns in the exploitation and development of resources include disruption of agricultural and fishery activities due to copper mining in Mamut, Sabah; disruption of operations of the Dusun Tua Water Treatment Plant, Selangor due to high silt load as a result of logging operations and problems of dust affecting housing around the limestone quarrying operations at Batu Caves, Selangor. The knowledge gained from these experiences clearly indicate the need for environmental considerations to be given due attention during the planning and implementation of projects.

In order to achieve the objectives of a well-

managed environment with the aims of maximising the use of resources, effective environmental management is essential. Environmental management refers to the attempt at assessing the limits of an ecosystem so as to maintain it within its "resilient zone" to maximise the returns from the natural resource system and to minimise the adverse impacts in order to ensure long-term sustained productivity of the resource base.

The strategy being adopted by the Department of Environment to achieve this is through:

- the application of *environmental impact assessment* procedure in planning.
- the development of specific *environmental guidelines* to assist development agencies in project implementation; and
- *land use planning* with environmental considerations.

This strategy is being adopted to complement the existing programme of pollution control through the enforcement of the Environmental Quality Act, 1974 and regulations made under it as well as other legislations relevant to pollution control for example the Road Transport Ordinance, 1958; Mining Enactment, 1929; Local Government Act, 1976; Town and Country Planning Act, 1976; and Streets, Drainage and Building Act, 1974.

Environmental Impact Assessment (EIA)

Environmental Impact Assessment or EIA is a decision-making tool which can be used to integrate environmental factors into project planning. EIA aids judgemental decision-making by giving decision-makers information with regards to environmental changes resulting from a proposed activity and the trade-offs of advantages and disadvantages for each of the possible project alternatives for achieving the project objectives. It aims to minimise the environmental im-

pacts and maximise the benefits that can be derived from an activity.

The aim of environmental impact assessment in Malaysia is to assess the overall impact on the environment of development projects proposed by the public and private sectors.

Legislative Provisions

EIA has been promoted as an environmental planning tool for projects since the late 1970's by the Department of Environment. The incorporation of environmental considerations during the planning of projects is deemed to be important in the context of efforts to prevent environmental problems that could arise from the implementation of development projects. EIA was, however, not a mandatory requirement prior to the Environmental Quality (Amendment) Act 1985 but was applied to specific projects through existing planning and administrative procedures for project approval. Recent amendments made to the Environmental Quality Act, 1974 which were gazetted on 9 January, 1986 carries with it a provision, Section 34A, which provides powers to the Minister to prescribe any activity which may have significant environmental impact as a prescribed activity.

Any person intending to carry out a prescribed activity shall, prior to the carrying out of such an activity submit a report which contains an assessment of the impacts the proposed activity will have or is likely to have on the environment, to the Director General of Environmental Quality for approval. To implement the provisions of the amended Act, action to determine the list of prescribed activities subject to Section 34A was initiated during the period. In addition, the draft EIA Handbook—Procedure and Guidelines prepared earlier in 1979 to assist developers in the carrying out of environmental impact assessment was reviewed and revised in line with changes made to the Act.

EIA Guidelines

Guidelines for the carrying out of EIA are prescribed by the Director General of Environmental Quality. For this purpose a Handbook of Environmental Impact Assessment Guidelines has been prepared in a draft form. It

is expected that these guidelines will be finalised for use when the proposed environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order is gazetted some time in 1987.

The EIA procedure in the Handbook outlines the approach to be taken for conducting EIA and for the preparation of EIA reports. It also includes the administrative procedures for the implementation of the EIA requirement. The three major components of the procedure are as follows:-

- (i) *Preliminary assessment* of prescribed activities;
- (ii) *Detailed assessment* of these projects for which significant residual environmental impacts have been predicted in the preliminary assessment; and
- (iii) *Review* of detailed assessment reports.

The procedure is outlined in Figure 36 and summary description of each of the components is given in Appendix 1.

Administration of EIA Requirements

The Department of Environment plays a key role in the implementation and administration of EIA requirements for prescribed activities by:

- (i) Providing necessary guidelines for project initiators undertaking EIA;
- (ii) Providing advice and information to project initiators, consultants, the public and project approving authorities;
- (iii) Co-ordinating the review of EIA reports; and
- (iv) Providing training on EIA either by itself or with assistance of other training institutions, agencies and private organisation.

Review of EIA reports is undertaken by ad-hoc Review Panels appointed by the Director General of Environmental Quality who is also the

Chairman of the Panels. The EIA Unit of the Department acts as Secretariat to the Review Panel as well as monitors the implementation of the recommendations of the Review Panel. Recommendations of the Review Panel are forwarded to the relevant project approving authority who decides on whether or not a project should proceed as planned or whether certain environmental conditions should be imposed on the developer or project agency.

During the period under review, work was completed to compile a list of reference material on EIA methodology and techniques. Work has also been initiated on the compilation of a list of a panel of experts for review of EIA; updating of sources of environmental information; compilation of consultants capable of undertaking EIA studies; and preparation of information pertaining to environmentally sensitive areas.

Projects Subject To EIA

Although EIA became a formal requirement by virtue of amendments made to the Environmental Quality Act, 1974, the enforcement of these provisions are subject to the gazetting of an order prescribing those activities which require EIA. Although the EIA order prescribing such activities is expected to be gazetted in 1987, implementation of EIA requirement for projects was nevertheless carried out for projects on an informal basis. During the period 1985—1986, some twenty one EIA studies were completed or proposed as shown in Table 41. A breakdown of the categories of projects for which EIA was completed or proposed during 1985/1986 is as shown in Table 42.

Detailed EIA studies were completed for two major projects during the period; a pulp and paper mill complex in Sabah and a liquefied petroleum gas (LPG) terminal at Port Klang.

The focus of the detailed EIA study for the pulp and paper mill was on the impact of effluent discharge into the Bay of Brunei, air pollution and the environmental impact from large scale forestry operations. Detailed study for the forestry operations are still being carried out, and is expected to be ready by the end of 1987. A detailed risk analysis was made of the proposed LPG terminal at Port Klang. The assessment was

made on the potential impact to health and safety in the event of an accident on the port and the residential cum industrial development in the vicinity of the proposed terminal.

A detailed EIA study has also been proposed for the Bakun hydro-electric dam project in Sarawak. The study will examine in greater detail, impact of the project on the socio-economic status of the affected population besides the hydrological and ecological issues identified in the earlier preliminary assessment.

Presiting Evaluation of Projects

As part of the preventive approach to environmental management, industrial applications continued to be submitted to the Department for comments to ensure that the siting is compatible with other land use and that the potential operator has taken the appropriate measures to control and abate pollution. For each application a site visit is conducted by officers from the appropriate Regional Office of the Department of Environment.

Site Evaluation

The site evaluation assessment ensures that the project site have adequate buffer zone from the built-up areas. Based on the site evaluation assessment report, appropriate comments on site suitability as environmental control requirements are submitted to land approving authorities at the state level for their final decision on the application.

As part of the Department's efforts in speeding up comments to relevant State Authorities, only applications for prescribed premises such as oil palm mills and rubber factories and industrial applications that are not supported by the regional offices are submitted to the Department for reappraisal. This is to ensure that all factors are taken into consideration before a recommendation to reject the factory location is given to the land approving authorities.

In 1985 one hundred and eighty two (182) site evaluation cases were processed at DOE Headquarters while comments for 547 industrial applications were forwarded by Regional Offices direct to the land approving authorities.

In 1986 a total of 119 applications for site evaluation were received by the Department of which 35 applications came from the state of Perak, 25 cases from Selangor, 12 cases from Johore and 41 cases from the other states in Malaysia. In terms of the type of industries, 30 applications were for minerals exploitation especially quarrying of stones, 24 applications for food manufacturing and 65 applications for other industries. In 1986, the number of comments forwarded by Regional Offices direct to the land approving authorities totalled 1242.

Technology Assessment and Written Approval

To minimise air pollution due to fuel combustion, all fuel burning equipment have to be approved by the Department under the Environmental Quality Act (Clean Air) Regulations, 1978 before they can be built.

In 1986, 152 applications for fuel burning equipment were approved of which the biggest number of applications was from Selangor (37). This was followed by Johore (21), the Wilayah Persekutuan (19), Pahang (16), and the remaining 70 cases were from the other states.

All industrial applications must also get a written approval from the Director General of Environmental Quality before the construction of any effluent discharge facility including treatment systems to ensure that the operation of the plant would have adequate control which will be able to meet all the emission and effluent discharge standards as stipulated under the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977, Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978, Environmental Quality (Clean Air) Regulations 1978, and the Environmental Quality (Sewage And Industrial Effluents) Regulations 1979.

In 1986, the Department processed 129 cases of such applications, of which the biggest number was again from Selangor (21) followed by Pulau Pinang (16) and Johore (13) and the rest from the other states.

In terms of type of industries, the biggest number of applications was from the agro-based industries such as palm oil mills (37) and rubber-based industries (7).

New Programme Development

Toxic and Hazardous Wastes

Following work plans developed in 1984 for the management of toxic and hazardous wastes, two major activities were carried out in 1985 and 1986.

- Redrafting of the proposed Environmental Quality (Scheduled Wastes) Regulations to be strictly in accordance with the provisions of the Environmental Quality Act, 1974.
- Detailed survey on the generation of toxic and hazardous wastes in Malaysia and identification of potential disposal sites.

Two separate sets of regulations were proposed to control the generation, storage, transportation, treatment and disposal of toxic and hazardous wastes. These proposed regulations are:-

- Environmental Quality (Scheduled Wastes) Regulations.
- Environmental Quality (Prescribed Premises) (Scheduled Wastes) Regulations.

In addition, an Order was proposed to prescribe the premises to be used for the treatment, storage and disposal of toxic and hazardous wastes.

- Environmental Quality (Prescribed Premises) (Scheduled Wastes) Order.

Under the proposed Environmental Quality (Scheduled Wastes) Regulations, toxic and hazardous wastes were defined by a listing of waste categories. By adopting and incorporating the cradle-to-grave concept, the movement of wastes from its point of generation to its final treatment and disposal site would be closely monitored. The regulations would emphasize the strategy to minimise or reduce waste at source and the principle requirement of rendering wastes innocuous before disposal.

The proposed Environmental Quality (Prescribed Premises) (Scheduled Wastes) Order

would list the various treatment and disposal facilities/premises to be licensed for purposes of treatment, recycling, storing and disposal of toxic and hazardous wastes. The procedures or the manner of operations to which these licenced premises should adhere to are stipulated under the proposed Environmental Quality (Prescribed Premises) (Scheduled Wastes) Regulations.

Knowledge and understanding of the types, quantities, methods of handling etc. of toxic and hazardous wastes generated by the existing industries provided the background information for the formulation or redrafting of the proposed regulations.

Also, it was envisaged that the implementation of these regulations would be less effective without the support of a proper treatment and disposal facilities. The design for the construction and operation of these facilities on the other hand, require essentially adequate information on waste generation. For these reasons, a detailed survey was conducted in 1985 with the following objectives:-

- to identify generators or potential generators of toxic and hazardous wastes.
- to determine current methods of treatment and final disposal practices generally adopted by the waste generators.
- to prepare a comprehensive inventory on the type and quantities of wastes generated in the study area thus updating the information obtained in the 1981 survey.
- to develop a preliminary plan or strategy for the treatment and disposal of toxic and hazardous wastes.

An important element in waste management strategy is the establishment of a disposal site. In almost all states on the West Coast of Peninsular Malaysia, state level committees were formed primarily to identify and select potential toxic and hazardous wastes disposal sites. The role of the Department of Environment in these committees has been towards providing input on the

suitability of the proposed sites particularly from the point of view of the environment.

In early 1986, an agreement was reached between the Government of Malaysia and the United States of America that a sum of US\$400,000/- would be provided by the United States of America to fund a feasibility study on the treatment and disposal of toxic and hazardous wastes in Malaysia. The study would identify and develop a conceptual design of appropriate treatment and disposal facilities recommended for wastes generated in Malaysia. It would also recommend possible siting of the facilities, regulatory modifications and operational procedures.

Also in 1986, the French Government provided technical assistance to the Malaysian Government again through the Department of Environment in conducting a feasibility study on a centralised physical/chemical treatment plant for a group of small and medium sized industries in the Klang Valley.

Toxic and Hazardous Chemicals

In Malaysia a variety of chemicals are being used. They can be broadly classified into industrial chemicals, agricultural chemicals, poisons, food additives, pharmaceuticals, radioactive substances and consumer products containing chemicals. In the 1985 survey, it was noted that about 500 industries produced various chemical products such as fertilizers, pesticides, acids, pharmaceutical products, petroleum products, paints, detergents etc. In addition, chemicals as well as chemical products were imported into the country. The use and production of some of the chemicals are controlled by several different legislations. Industrial chemicals, however, are not controlled adequately under any specific legislation. It was also found that there was no comprehensive and regulated procedure in handling, storage, and transportations, of these chemicals neither was there any contingency plan for emergencies involving a spill or accidental discharge of toxic or hazardous chemicals.

Realising the situation, the Department of Environment in early 1986 with technical assistance from WHO/PEPAS initiated another

new programme to review and draw up plans for the management of toxic and hazardous chemicals. In November, a proposal was drawn up for a Malaysian Chemicals Notification and Assessment Scheme. The objective of the scheme was to provide a mechanism for identifying and controlling new chemicals and chemical products before they are commercially available in the country. Existing chemicals of particular concern would be identified and their importation and manufacture subject to supervision and control. Before the scheme could be implemented, a Malaysian Inventory of Chemicals and Chemical Substances would need to be developed. The Department initiated work on the compilation of information on chemicals used, imported and manufactured in the country in 1986 with a view to set up the Inventory.

Water Quality Criteria and Standards

The management of water quality solely by regulating and licensing of effluent discharges sources through the effluent discharge standards stipulated in the Environmental Quality (Sewage and Industrial Effluent) Regulations 1979 or other related effluent discharge regulations present some constraints. Specifically, cumulative pollutant loads may eventually exceed the safe levels or the assimilative capacity of the rivers despite the fact that effluent discharges into the rivers are in compliance with the prescribed standards. Therefore, a complementary approach of more effective water quality management and planning was to set water quality goals in terms of water quality criteria and standards for various water bodies according to designated beneficial uses. In December 1984, the Department of Environment commissioned the Institute of Advanced Studies, University of Malaya to undertake a comprehensive consultancy study to review and develop water quality criteria and standards for Malaysia covering beneficial uses for domestic water supply, fisheries and aquaculture, livestock, recreation and agriculture. The study was closely monitored by a steering committee and a technical committee consisting of representatives from relevant government agencies, institutes and universities. The final report of the study was submitted on 28 May, 1986 with a set of recommended water quality criteria and a set of recommended interim water quality standards for Malaysia.

Development of Motor Vehicle Noise Regulations

Several specific studies were conducted in 1985 and 1986 to collect additional information for the purpose of determining appropriate maximum sound levels permitted or allowed to be emitted by various categories of motor vehicles. A number of meetings were held with relevant agencies/organizations/associations such as the Motorcycles and Scooters Assemblers and Distributors Association of Malaysia (MASAAM), Malaysian Motor Traders Association (MMTA) and Ministry of Transport to deliberate on specific provisions of the proposed motor vehicle noise regulations. Basically, the regulations prescribed acceptable or permissible sound levels management procedures.

On 26 March, 1986, a draft of the proposed regulations known as the Environmental Quality (Motor Vehicle Noise) Regulations 1986 was presented to the Environmental Quality Council. The council accepted the proposed regulations in principle, and agreed that the Department of Environment should proceed in the subsequent steps towards implementing the regulations.

Environmental Input for Development Planning

The incorporation of environmental considerations into development planning is an area which has been promoted by the Department of Environment as a preventive strategy for environmental protection. The Department has been frequently consulted by various government and statutory organisations in relation to the environmental requirement for various projects or plans proposed by the agencies. Response of the Department to these requests have been by way of review of the proposals and providing necessary comments and suggestions, provision of data and information, and preparation of specific chapters or reports on the environment.

The type of studies for which the Department provided environmental input ranged from physical planning to natural resource planning and development studies. Table 43 shows a breakdown of major categories of the studies/plans evaluated in 1985 and 1986.

Water Resource Development

The National Water Resources Study completed in 1982 established a basic framework for the orderly planning and implementation of water resources development programmes and projects in the country and for rational water resource management consistent with the overall national socio-economic development objectives. Pursuant to this study, comprehensive regional water resources studies were carried out in various regions of the country.

The Southern Johore Water Resources Study undertaken with Japanese assistance and the Development of Johore River Water Resources Study jointly undertaken with Singapore were completed during the period 1985/1986.

In the same period, a Coastal and Riverine Transport Review was made for rivers in Sarawak to assess the potential of rivers for transportation development. All the above studies were co-ordinated by the Drainage and Irrigation Department which is also the Secretariat of the National Committee on Water Resources. The Department of Environment was a member of the steering committee set up for these studies.

Regional/Urban Development

The Town and Country Planning Act, 1976 provides for the regulation, control and planning of development and use of land and buildings within local authorities. To achieve the objectives of this Act, structure/development plans are being prepared for several areas in the country. The Department of Environment has actively participated in the formulation of these structure and development plans by providing environmental inputs and in some cases preparing the sectoral study on the environment. During the review period, the Department prepared environment sectoral studies for the Gombak Development Plan, Kemaman Structure Plan, Review of Regional Planning and Development in Johore State and the Seberang Prai Structure Plan. Other studies in which the Department participated included the Development of the New Township of Bukit Tinggi, Perlis Master Plan and the Perlis Structure Plan.

Natural Resource Management/Development

Studies related to Natural Resource Manage-

ment and Development in which the Department participated include the review of a proposed wildlife park, development of mangroves for aquaculture and formulation of legislation on natural resources for Sarawak. During the same period, the Department started work on the compilation of a handbook for "environmentally sensitive areas". This work covers natural and other socio-cultural areas sensitive to impact of development activities. Information related to forest reserves, mangroves, coral reefs, fishing grounds, scenic and aesthetic areas, cultural and historical monuments, tourist areas, parks, wildlife sanctuaries, dams and lakes, water supply intakes and others were collected and compiled with the aid of micro computers.

Klang Valley Environmental Improvement Project

The Klang Valley Environmental Improvement Project (KVEIP) is the first major comprehensive environmental planning project to be carried out in the country. The project which is financed by a US\$350,000 grant provided by the Asian Development Bank (ADB) is aimed at the establishment of a framework to undertake regional environmental improvement and management of the Klang Valley which comprises the areas of the Federal Territory of Kuala Lumpur and the four districts of Hulu Langat, Petaling, Gombak and Klang in Selangor. The proposed environmental improvement plan is for the purpose of ensuring that socio-economic development in the Region is undertaken with consideration given to maintaining an acceptable environmental quality and where possible, enhancing such quality. The study covers aspect for water quality, air quality, solid wastes, watershed and natural resources management, studies on squatter and other underserved areas, as well as legislative institutional, economic and financial arrangements for environmental management. The project which commenced in August 1986 is expected to be completed within seven months.

Other Projects

Other projects in which the Department provided environmental input included sewerage and drainage plans for Kuala Lumpur, Muar, Kuantan, Port Dickson and Seremban; and an industrial estate development in Melaka.

Sound Environmental Planning for ...



...Minimal Impact on Areas of Natural Beauty

CHAPTER 7
**ENVIRONMENTAL
EDUCATION,
TRAINING AND
INFORMATION**

ENVIRONMENTAL EDUCATION, TRAINING AND INFORMATION

Introduction

To achieve an objective as ambitious as the total management of the environment, man's outlook and attitudes must be transformed and new knowledge must be acquired. In this connection, environmental education, training and information plays an important role by introducing new approaches and new data that are indispensable for fostering changes in attitudes, creating a new awareness and disseminating the necessary knowledge which throws new lights onto the complex reality of environmental problems and how they can be overcome or minimised.

The Information and Education Unit and the Technical Training Unit set up in 1981 and 1982 respectively were reorganised into three separate units under the Department's restructuring exercise in 1985. The objectives of the programmes of the Environmental Education Unit are to increase public awareness on the state of the environment vis-a-vis environmental issues and to inculcate in the public a sense of responsibility towards environmental protection and enhancement.

The Information Unit was established to disseminate environmental information to a multiplicity of users while the Technical Training Unit was charged with the responsibility of coordinating all in-service and external training activities for the department's officers as well as officers in environment related agencies.

Environmental Education

Environmental awareness in the country has grown rapidly during the past decade. Both formal and informal environmental education, technical training, mass media and non-governmental organisations and citizen groups have all played a role in the process of building environmental awareness.

In spite of the growing awareness on the environment, the man in the street has yet to discard this old habits of littering in public and treating public places such as roads, rivers, beaches, playfields and parks as their backyards or waste disposal areas.

In non-formal environmental education, many activities have been conducted by various Government Agencies as well as Universities, Non-governmental Organisations and the private sector. These activities include both indoor and outdoor activities such as symposia, conferences, enviro-walks, nature trips etc. In 1985 the Department of Environment published a special issue of the SEKITAR Magazine and distributed free to Government Departments and Agencies, Universities, secondary schools and public libraries. Other publications distributed by the Department included annual environmental quality reports and information pamphlets on air, water, noise pollution and about the Department.

The year 1985 marked the tenth anniversary of the establishment of the Department of Environment. As such the 1985 World Environment Day was celebrated on a grander scale with the theme "A Decade of Environmental Management in Malaysia". The objectives of the celebration was two-fold; firstly to enhance the consciousness and awareness of the public towards environmental issues and their impact so that people can act positively, either individually or as a group to protect the environment and secondly, to review the present status of environmental management so as to protect and further enhance the quality of the environment.

Apart from the launching of the World Environment Day which was officiated by the Deputy Prime Minister, other activities carried out included an exhibition, a seminar on the status of the environmental quality in Malaysia, photographic competition, art competition, essay

writing competition, inter-university/institutions of higher learning debate on environmental issues, competition among industries and among local authorities for being best-managed environmentally, school children visits to places of environmental interest, postal franking, and special features on the environment via the mass media.

An Environmental Education and Awareness Campaign was held in March, 1986 in an effort to increase the environmental awareness among the public and to instill new knowledge, positive perception, attitudes and value systems which harmonise with the environment. The theme for the campaign which was launched in conjunction with the World Environment Day was "Love Your Environment". The campaign which lasted for 2 months was preceded by a 2-weeks survey conducted in Selangor to assess the level of environmental awareness of the public. Results of the survey showed that the majority of general public in the State of Selangor still lacked knowledge on what is meant by environmental pollution and ranked environment last but one as a public issue out of eight issues listed. The result of the survey also indicated that, not only more programmes need to be carried out to raise the level of awareness of the general public about the environment, but the strategy and method employed also need to be revamped particularly in terms of target groups and the media of communication.

During the Campaign, activities including exhibitions (both at the state and district levels in Selangor State) radio and television programmes, press reports and a National Seminar on Environmental Awareness and Communication were held. Brochures, posters, t-shirts and car stickers carrying the slogan on environment were distributed to put the environmental message across.

Training

Despite budget cut-backs due to economic recession, the Department nevertheless gave emphasis on training in environmental management to its personnel. This was made possible by taking advantage of assistance provided by the relevant United Nations agencies as well as through regional and bilateral assistance program-

mes. The Department also organised in-house training sessions which included courses, lectures and weekly colloquia. The weekly colloquia were mainly to enable a dissemination of knowledge and experience gained by the Department's staff who had been sent to seminars, workshops, courses and conferences both within the country and abroad. Appendices 2 to 9 provide details of the various training-related and non-training overseas trips attended by the staff of the Department in 1985/86. The detailed breakdown of the internal and external training programmes attended by officers of the Department are summarised in Table 44 and 45. Figure 37 shows the number of staff attendance at courses overseas according to major topics during the period 1979 to 1986.

In-house Training

In 1986, in-house training courses organised are as follows:-

- Stack sampling (17—26 February, 1986)
- Orientation for new officers (19—28 February, 1986)

Three other courses, co-organised with other agencies, are as follows:-

- Environmental Planning and Management, co-organised with INTAN (14—26 July, 1986).
- Environmental Impact Assessment Course, co-organised with the Public Services Department and the Asian Institute of Technology, Bangkok (3—28 November, 1986).
- National Course on Industrial Waste Water Monitoring, co-organised with the Ministry of Health, University of Agriculture, Malaysia and WHO/PEPAS (17—22 November, 1986).

A total of 123 trainees including 69 officers from the Department of Environment were trained through these in-house training sessions.

Guest Lectures

To fulfill the training needs of the Department, guest lecturers were also invited to give lectures in their field of expertise. In 1986, the following five lectures were presented by guest lecturers:-

- (i) Waste Effluent Treatment — by Dr. Petrillo, Polvon, Italy (30th May, 1986).
- (ii) Noise Control Treatment for Generators — by Mr. W.C. Lei, Semangat Maju Engineerings Malaysia (20th June, 1986).
- (iii) Air Monitoring and Pollution Control — by Dr. Nikolas Kirov, WHO Expert, (28—29 August, 1986).
- (iv) Safe and Effective Use of Pesticides — by representatives from ICI Malaysia Sdn. Bhd. (11 November, 1986).
- (v) Titanium Dioxide Industry — Waste Management, by Environmental Group ICI (6 December, 1986).

Weekly Colloquium

Apart from talks and lectures, the Technical Training Unit also organised a colloquium each week by officers who had attended meetings, training or courses within the country or abroad. In 1986, a total of 20 colloquium sessions were conducted.

International Meetings

Apart from participating in training programmes, officers of the Department also attended environment-related meetings and conferences abroad. A total of 14 international meetings were attended by officers of the Department as shown in Appendices 10 and 11.

Other Activities

Preparation of training module

A training module on water quality monitoring was prepared by the Quality Control Circle

(QCC) On Training, formed to co-ordinate the preparation of training modules.

Analysis of training needs

In 1986, an exercise to determine the training needs of the Department was conducted by distributing questionnaires to all officers. The exercise identified and prioritised training needs as follows:

Rank No:	Field (%)	Needs
1.	Environmental Management	58
2.	Enforcement of the Environmental Quality Act, 1974 and its Regulations	46
3.	Instrumentation	29
4.	Pollution Control Equipment/New Control Technology	23
5.	Data Management/Computer	21
6.	Work Productivity and Self Development	20
7.	Introduction to Environmental Management/Function of Various Units in the Department	18
8.	Environmental Impact Assessment Procedure and Needs	16
9.	General Administration/Finance/Office Administration	13
10.	Project Management and Analysis	9
11.	Departmental Examination	2

Information

Rational management of the environment, which means making the best use of nature's limited resources must be based on a sound knowledge of all the interacting elements within a larger framework of development. To this context, reliable, relevant and timely information play a crucial role in achieving the objectives of environmental management and for proper decision making. The Department of Environment through its monitoring, source inventory survey and other related programmes have gathered a considerable amount of data that is necessary for accessing the state of environmental quality and for the purpose of environmental planning.

The Information Unit apart from having been entrusted with the task of collecting and collating information for dissemination, also handles query-response service in environmental information. A total of 116 and 159 queries for environmental information were received in 1985 and 1986 respectively.

The library of the Department of Environment was open to agencies and individuals having interest and doing research on subjects related to the environment. In 1985 and 1986 the library recorded a total of about 100 and 130 users respectively, apart from officers from the Department of Environment. The library had a total collection of 8,084 books and reports on a broad spectrum of environmental topics and had been in the mailing list of about 152 national, regional and international journals, newsletters, bulletins and magazines. In addition, the library had also a modest collection of audio-visual aids which comprised slides, photographs, maps and posters for use in exhibitions and talks organised by the Department. In 1985, an exercise was undertaken to reorganise and catalogue all materials available for easy reference and retrieval. The exercise was conducted with the assistance of the National Library.

In 1985/1986, a continuation study with technical assistance from WHO/PEPAS was conducted by the Department following the decision, to acquire an in-house computer systems installation in order to establish the Department's computer-based environmental data processing and information management systems and associated operational capabilities. In the meantime, four personal computers were acquired for immediate use.

The Information Unit continued to function as the National Focal Point (NFP) for the International Referral System for Sources of Environmental Information (INFOTERRA) and the National Correspondent for International Register of Potentially Toxic Chemicals (IRPTC).

INFOTERRA

INFOTERRA seeks to supply information needed for arriving at rational choices for harmonious development of the people and their environment. The data base of the system is the International Directory of Sources of Environmental Information which had its latest up-date in June 1985. It has more than 10,000 sources of Environmental Information registered. In its query-response service, the NFP processed a total of 11 queries, 6 of which were from foreign countries which included India, Nepal and the Republic of China.

By 1986, the INFOTERRA Programme Activity Centre had enlisted 12 Special Sectoral Sources (SSS). INFOTERRA SSS are leading institutions in their field and provide important services to INFOTERRA users, including data base searches and substantive information and documents. Request for information in environment-related field or from the SSS can be made through the Department of Environment. The enlisted SSS are as follows:-

- (i) For Toxic Chemicals and Related Subjects:
International Register of Potentially Toxic Chemicals, UNEP.
- (ii) For Industry and Environment:
Informational Services of the Industry & Environment Office, UNEP.
- (iii) For Environmental Legislation:
Environmental Law Centre, IUCN.
- (iv) For Water Supply and Sanitation:
Environmental Sanitation Information Centre, AIT, Bangkok.
- (v) For New and Renewable Energy Resources:
Renewable Energy Resources Information Centre, AIT, Bangkok.
- (vi) For Desert and Arid Land;
International Centre for Arid and Semi-Arid Lands, Texas Technical University, U.S.A.
- (vii) For Environment Education:
Division of Science, Technical and Vocational Education, UNESCO, Paris.
- (viii) For Appropriate Technologies:
Technology and Employment Branch, ILO, Geneva.
- (ix) For Environmental Information In Industrial Sectors:
Industrial and Technological Information Bank (INTIB) of the United Nations Industrial Development Organization, Vienna, Austria.

- (x) For the subject area of Hydrometeorology:

All-Union Research Institute for Hydrometeorological Information (VNIIGMITSD) which is the World Data Centre of the USSR State Committee for Hydrometeorology & Environment Control.

- (xi) For Environmental Management and Planning, and particularly, the environmental impact assessment:

Centre for Environmental Management and Planning (CEMP) University of Aberdeen, Scotland, U.K.

- (xii) For Environmental Monitoring and Assessment:

Global Resource Information Database (GRID) of UNEP'S Global Environmental Monitoring System (GEMS) Nairobi, Kenya.

International Register of Potentially Toxic Chemicals (IRPTC)

The Department of Environment continued to be the National Correspondent for the International Register of Potentially Toxic Chemicals, an information system under the United Nations Environment Program which is specifically concerned with the dissemination of Information on Chemicals. The National Correspondent was involved in the transfer of information on chemicals from the Programme Activity Center in Geneva to national agencies involved with the use of chemicals in this country and vice versa. In its query-response service the Department of Environment handled a total of nine queries on chemicals. Most queries involved the use of pesticides and other industrial chemicals.

Information gathering for the National Register of Potentially Toxic Chemicals (NRPTC) which was established in 1984 with the assistance of IRPTC Program Activity Centre, Geneva was carried out. NRPTC aims at gathering information and data on chemicals used in this country. Twenty eight chemicals were selected for a start and data gathering is being conducted with the assistance of a National Committee on National Register of Potentially Toxic Chemicals.

The committee comprised national agencies involved either directly or indirectly with the use of chemicals in this country including the Chemistry Department, Ministry of Health, Pesticides Board, Factories and Machinery Department etc.

The IRPTC Programme Activity Centre (PAC) also compiled a consolidated list of products whose consumption and/or sale have been banned, withdrawn, severely restricted or not approved by governments. The PAC also coordinates the implementation of the Provisional Notification Scheme for Banned and Severely Restricted Chemicals which allows competent authorities in countries to assess the risk associated with the chemical and to make timely and informed decisions thereon taking into account local environment, public health, economic and administrative conditions. The Department of Environment is the national authority designated for participation in the implementation of the scheme.

The IRPTC Bulletin which contains useful information and news on chemicals including banned hazardous chemicals and pharmaceutical products, and general legislation was distributed to all members of the Committee on the National Register of Potentially Toxic Chemicals.

Information and Management System for Executive Heads (SMPKE)

SMPKE was established in 1984 under the Computer Division of the Prime Minister's Department. It is an information system designed to assist higher and mid-management executives of the government agencies in drafting national policies and strategies by having access to important and crucial information through the computers in the Prime Minister's Department. In addition, the objectives of SMPKE are to enable higher and middle management executives make sound management decisions and to analyse issues for various requirements of their departments.

SMPKE data base covers information needed for both planning and development purposes. This includes information on land-use, population, agriculture, transport, communication, socio-economic indicators, education, health, fisheries, environment etc.

Since reliable, up-dated and relevant environmental information is crucial in planning and management of development projects, it is necessary to make these information available to the higher and middle management executives and decision-makers. With this objective in mind, the Department of Environment initiated the entry of environmental data into the SMPKE.

The environmental data that is included in the SMPKE include:

- Public Awareness on the Environment
- Air Quality
- Noise
- Inland Water Quality
- Marine Water Quality
- Resources

ENVIRONMENTAL EDUCATION



*Launching in Shah Alam,
Selangor Darul Ehsan.*



*Exhibition
in Shah Alam.*



*Another Exhibition
in Alor Setar, Kedah.*

ENVIRONMENTAL EDUCATION: ART COMPETITION



Some of the Young Talented Winners.



A Record of 5,000 Entries.

A DECADE OF ENVIRONMENTAL MANAGEMENT



Opening Ceremony.

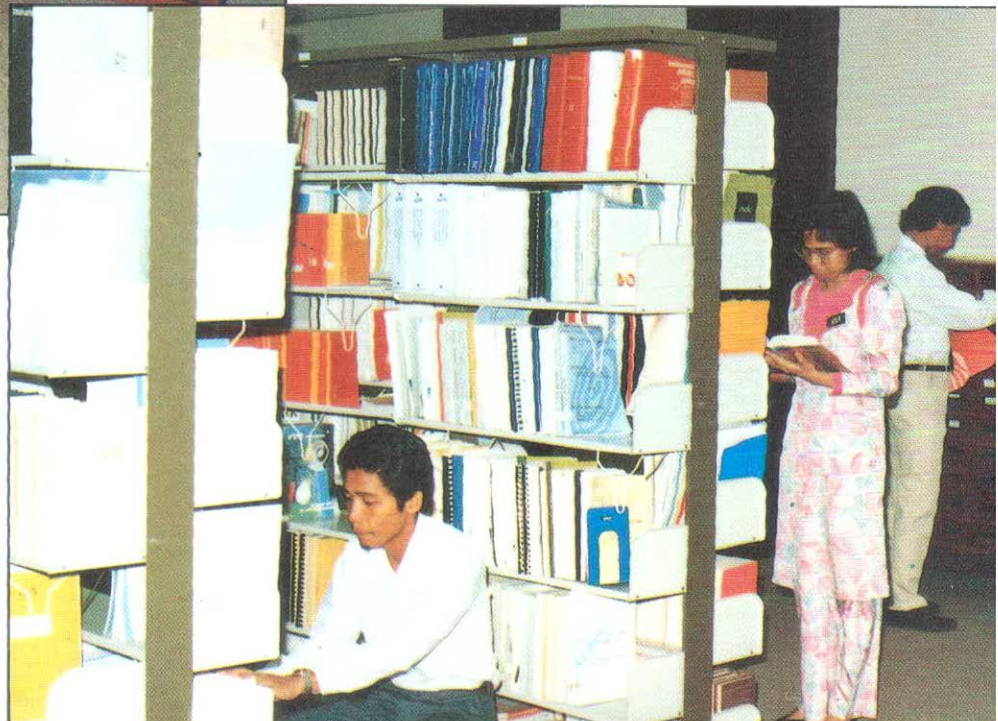


*Part of Celebration
in Kuala Lumpur.*

ENVIRONMENTAL INFORMATION



*Computerised Information
Storage and Retrieval:
Open Search.*



*Environmental Library:
Open to the Public.*

CHAPTER 8
**INTERNATIONAL
AND REGIONAL
AFFAIRS**

INTERNATIONAL AND REGIONAL AFFAIRS

International

Malaysia continued to participate actively in environmental activities at the international level through a number of international organisations under the United Nations umbrella. The most significant of these were the United Nations Environment Programme (UNEP), the International Maritime Organisation (IMO) and the International Hydrological Programme (IHP) under UNESCO.

United Nations Environment Programme (UNEP)

The Department of Environment acts as the focal point of UNEP activities in Malaysia. In 1985 and 1986, Malaysia, not only continued to be a member of UNEP, but also served on the Governing Council of UNEP for a fourth consecutive term of 3 years.

Malaysia attended the 13th Session of the UNEP Governing Council held on 14—24 May, 1985 and as a result follow-up action with respect to several major environmental areas of concern was initiated as follows:-

- (i) Preparation of a national document on 'Environmental Perspectives to the Year 2000 and Beyond';
- (ii) Establishment of a national task force to deliberate on the Convention for the Protection of the Ozone Layer, held in Vienna on March, 1985 with regard to ratification and implementation of the recommendations of the Convention;
- (iii) Monitoring of progress on the preparation of guidelines and principles on the environmentally sound management of hazardous wastes by the *Ad-Hoc* Working Group of Experts on the 'Environmentally Sound Management of Hazardous Wastes' con-

vened by the Executive Director of UNEP; and

- (iv) Participation in the international programme on the 'Exchange of Information on Potentially Harmful Chemicals' through the International Programme on Chemical Safety (IPCS).

The Department of Environment has also been responsible for the co-ordination and implementation of several projects under the UNEP — Sponsored Regional Seas Programme and other environmental areas; however, the activities under these programmes were carried out mainly on a regional basis and more specifically at the ASEAN level.

Malaysia was unable to attend the 14th Session of the UNEP Governing Council in 1986, but nevertheless the Department of Environment proceeded with appropriate follow-up action on the basis of the proceedings of the meeting. The main activities in 1986 involved either an extension or the completion of the activities identified above for 1985.

International Maritime Organisation (IMO)

In relation to the activities of IMO, the Ministry of Transport, Malaysia has been responsible for playing the main role as focal point for matters of marine navigational safety; involvement of the Department of Environment has mainly centred on matters relating to marine pollution.

In 1985, appropriate follow-up action was initiated in relation to the "Convention on Liability and Compensation in Connexion with the Carriage of Noxious and Hazardous Substances by Sea" held in London from 25 April — 25 May, 1984. This included the commencement of national committee level deliberations on the main issues arising out of the Convention and an assessment of Malaysia's capabilities in terms of available resources and facilities for purposes

of ratification and implementation of the various provisions. Up until the end of 1986, deliberations have continued without any firm decisions owing to the prevailing lack of resources for implementation of the recommendations of the Convention.

Involvement of the Department of Environment in other IMO — sponsored activities in 1986 included attendance at the following:-

- (i) Training Course for On-Scene Commanders and Others Involved in Oil Spill Control Operations, 8 September — 3 October 1986, Copenhagen, Denmark; and
- (ii) Workshop on Strengthening of the Network for Oil Spill Counter Measures in Lombok/Makasar Straits and The Suluwesi Sea, 22—25 July, 1986, Australia.

UNESCO International Hydrological Programmes (IHP)

Following the recommendation of member states on 1 January, 1975, UNESCO launched the long-term International Hydrological Programme (IHP) as an extension to the former International Co-operative Programme in Hydrology — the International Hydrological Decade (1965—1974). The main purpose for the establishment of the IHP was to develop a scientific and technological basis for the rational management of water resources, both, as regards quantity and quality.

The Malaysian National Committee for the IHP was formed in March, 1975 with a membership composed of 22 Government Departments/Agencies/Institutions. The Executive Committee consisting of UNESCO National commission, Drainage and Irrigation Department (Lead Agency/Secretariat), Geological Survey Department of Malaysia, Malaysian Meteorological Services, Public Works Department and Universiti Teknologi Malaysia. The main functions of the committee were to coordinate the general development of hydrological programmes/activities at the National and International levels thus enables the implementation of specific hydrological activities within the framework of the IHP and involving multi-disciplinary approach in water resources assess-

ment, planning and management. Several sub-committees were established under the Executive Committee to deal with specific subject matter.

The Department of Environment participated in a number of project/activities organised by the Malaysian National IHP Committee, as follows:-

- (i) Regular meetings of the Working Committee under the Malaysian National Committee for the IHP and its Annual General Meeting;
- (ii) Inter-Agency Research Project on Sungai Tekam. Experimental Basins Study, aimed to study the effects of landuse conversion from virgin forest to agricultural plantation;
- (iii) Talks on subjects related to water resources to upper secondary school students with the main purpose to introduce the subject of Hydrology and various aspects related to water resources investigation, evaluation and management; and
- (iv) Basic course in water resources assessment, conducted annually since 1983, with the aim to introduce to management personnel and professionals available techniques and information in the field of water resources.

Members of the Malaysian National Committee have benefited from active participation in the relevant UNESCO — sponsored education and training programme including courses, workshops, seminars and dissemination of publications and reference materials.

Regional Co-operation

ASEAN Experts Group on the Environment (AEGE)

The 8th Meeting of the AEGE was held on 17—20 April, 1985 in Manila, Philippines. A total of 23 recommendations resulted from the Meeting on various programme matters relating to on-going ASEAN environmental projects and new

project proposals. New project proposals considered by the 8th Meeting and the existing proposals for which funding was sought include:

- (i) An Environmental Impact Assessment training programme for relevant governmental and non-governmental personnel;
- (ii) Seminar for National Industrial Development Banks on Loan Policy for Industrial Pollution Control;
- (iii) Collaboration for the Enhancement of Regional Capability in Environmental Legislation;
- (iv) Environmental Impact Assessment for Mini-Hydro Power Plants;
- (v) Anti-Pollution Technologies for Urban and Rural Areas;
- (vi) Urban Air Quality Monitoring and Management;
- (vii) Toxic and Hazardous Chemicals and Wastes Management;
- (viii) Development of Master Plans for the ASEAN Heritage Parks and Reserves;
- (ix) ASEAN Guidelines on the Development and Management of Coastal Areas;
- (x) Marine Turtles Conservation;
- (xi) ASEAN Action Plan on Environmental Education and Training;
- (xii) Regional Programme for the Training of Trainers on Environmental Education in the ASEAN Region;
- (xiii) Strengthening Public Awareness on Environment at Village Level;
- (xiv) Computerised Environmental Information and Data; and
- (xv) Regional Technical Co-operative Programme for Improving Environ-

mental Monitoring and Surveillance through Remote Sensing.

The Meeting elected the Director-General of the Environment Department, Malaysia as the Interim Co-ordinator for a 2-year period from April 1985 to April 1987. The following AEGE-related activities were implemented in 1985:-

- (i) Workshop on Environmental Communication, 1—3 April, 1985, Singapore;
- (ii) Training-cum-Study Tour on Air Pollution Monitoring, 15 April — 7 June, 1985, Turin, Italy;
- (iii) ASEAN-EEC Workshop/Seminar on Air Pollution Monitoring, 17—25 June, 1985, Bangkok, Thailand;
- (iv) Regional Training Course on Water Quality Management in Tropical Regions, 25 June — 10 July 1985, Chiangmai, Thailand;
- (v) ASEAN-UNIDO Meeting on Monitoring and Control of Pollution from Industrial Wastes, 3—4 October, 1985, Bangkok, Thailand;
- (vi) 4th Meeting of ASEAN Experts on Nature Conservation, 22—24 October, 1985, Kuala Lumpur, Malaysia; and
- (vii) Meeting of Experts on Environmental Education and Training and Public Awareness in the Asia-Pacific Region, 11—14 November, 1985, Bangkok, Thailand.
- (viii) 12th meeting of ASEAN Committee on Science and Technology 29 April — 3 May 1985. Bandar Seri Begawan, Brunei Darussalam.
- (ix) 13th meeting of the ASEAN Committee on Science and Technology 4—8 November 1985, Hua Hin, Thailand.

The 9th Meeting of the AEGE was held on 22—24 April, 1986 in Singapore. At this Meeting

Malaysia as the Interim Co-ordinator presented a report on the developments and actions taken since the 8th Meeting. The Meeting also noted that the ASEAN Sub-Environment Programme (ASEP II) would be completed in 1987 and felt that the ASEAN Environment Programme should be continued. It was agreed to request UNEP assistance in formulating ASEP III 1988—1992 after making a critical assessment and review of ASEP II and submit the draft ASEP III for the consideration of the 10th Meeting of AEGE and for adoption by the 3rd ASEAN Ministerial Meeting on Environment, both to be held in 1987.

The 9th Meeting of the AEGE identified the following new projects:-

- (i) Application of Meteorological Data in Air Pollution Monitoring and Control;
- (ii) Vehicle Exhaust Emission in the ASEAN Region;
- (iii) Air Pollution Control and Management in Flue Gas Desulphurisation and Denitrification;
- (iv) Wildlife Resources Development and Utilisation for Rural People;
- (v) Wildlife Protected Areas Training and Technical Assistance;
- (vi) Training in Recovery of Tropical Forest Following Disturbances;
- (vii) Training on Wastewater Control, Planning and Management; and
- (viii) Environmental Guidelines for Development Planning.

The following AEGE related activities were implemented in 1986:

- (i) Regional Workshop on Environmental Toxicity and Carcinogenesis, 15—17 January, 1986, Bangkok, Thailand.
- (ii) A Special One-day Seminar on Environment during First ASEAN Science

and Technology Week, 24—30 April, 1986, Kuala Lumpur, Malaysia;

- (iii) ASEAN-UNEP-CDG Workshop on Policies and Strategies for Managing Hazardous Wastes in Asia and the Pacific, 7—9 May 1986, Singapore;
- (iv) 14th Meeting ASEAN Committee on Science and Technology (COST), 21—23, April 1986, Kuala Lumpur, Malaysia.
- (v) 15th Meeting of ASEAN Committee on Science and Technology (COST), 22—25 October, 1986, Denpasar, Indonesia.

UNEP Co-ordinating Body on the Seas of East Asia (UNEP-COBSEA)

The Co-ordinating Body on the Seas of East Asia (COBSEA) was established essentially as an extension of the ASEAN Experts Group on the Environment (AEGE) to-operate on activities related to the marine environment. The Group was provided the ASEAN linkage to the UNEP Regional Seas Programme.

The first Meeting of COBSEA held in Bangkok on 3rd April 1982 initiated the implementation of six priority projects by a network of National members mainly from ASEAN:

Project 1 Oceanography

EAS 1.1 Observation of a Maritime Meteorological Phenomenon.

EAS 1.2 Study of Oceanographic Features.

EAS 1.3 Oceanographic Reference Studies.

Project 2 Assessment of Oil Pollution

EAS 2.1 Survey of Sources and Monitoring of Oil Pollution.

EAS 2.2 Co-operative Research on Oil and Oil Dispersant Toxicity.

Project 3 Control of Oil Pollution

EAS 3.1 Survey of Rivers and Land-Based Sources of Non-Oil Pollutants.

EAS 3.2 Study of Concentration Levels and Trends of Non-Oil Pollutants.

EAS 3.3 Study of the Effects of Non-oil Pollutants in the Marine Environments.

EAS 3.4 Assessment of Land Based Sources of Pollution.

Project 4 Mangrove and Coral Ecosystem

EAS 4.1 Survey of the State of Mangrove and Coral.

EAS 4.2 Effects of Pollutants and Destruction Factors on Mangrove and Coral Communities and related fisheries.

Project 5 Oil Pollution Control

EAS 5.1 Training Programme for Oil Pollution Control.

EAS 5.2 Support Programme for Contingency Planning.

Project 6 Pollution Control and Waste Management

EAS 6.1 Waste discharge into Coastal Waters.

EAS 6.2 Marine sites for dumping of hazardous waste.

Project 7

EAS 7 Development of National Co-ordinating Mechanisms for the Management and Establishment of a Regional Data Exchange System.

Since then annual meetings of COBSEA were held to review the progress of the projects.

Malaysia participated practically in every project and had also taken the lead in one of the projects namely; Project EAS 12: Co-operative Research on Oil and Oil Dispersant Toxicity in

East Asian Seas Region under the Assessment of Oil Pollution Component.

The Department of Environment is the national focal point for COBSEA for Malaysia. In 1985 the Fourth COBSEA meeting was held in Manila, Philippines on 22—23 April. Besides reviewing the progress of on-going projects, the meeting also considered the allocation of available funds for on-going projects. Project EAS 6.2 on Marine Sites for Dumping on Hazardous Wastes was replaced by a new project entitled 'Cleaning Up of Urban Rivers' with Singapore as the lead country. In addition the following project proposals were prioritised:-

— Wastewater Discharges into Coastal Waters.

— Land Based Sources of Pollution.

— Mangrove Component.

During the year, Malaysia also participated in the Review Meeting of UNEP/EAS Project 2.2 on Co-operative Research on Oil and Oil Dispersant Toxicity Testing held in Sydney, Australia.

In 1986, the Fifth COBSEA Meeting held in Singapore, besides reviewing the progress of the on-going projects, approved the project prioritised in 1985 for inclusion in the plan.

In addition, the Meeting also proposed new projects as listed below for consideration:

— Waste Discharge into Coastal Waters Part II.

— Red Tides and Shellfish Toxicity.

— Marine Mammals.

— Research Advisory Service on Oil Pollution.

— Training Programme for Oil Pollution Control.

— Operational Pollution Control from Ships.

Apart from the above Meeting, Malaysia had

also participated in the following COBSEA related activities during 1986:-

- COBSEA Workshop on Cleaning-Up of Urban Rivers, 14—16 Jan 1986, Singapore.
- Consultative Meeting on Information and Data Exchange on its Seas of East Asia. 17—19 March 1986, Bali, Indonesia.
- UNEP/UNESCO Coral Taxonomy Workshop and Training Course II, 12—21 May 1986, Bolinao, Philippines.
- SREP/UNEP/IOC/COBSEA Workshop on Organochlorines, 23 Jun — 4 July 1986, Port Moresby, Papua New Guinea.
- Joint Survey in the Straits of Malacca 21—27 August 1986, Pulau Sambu, Indonesia.
- Meeting of Experts on the East Asian Seas Action Plan, 8—12 December 1986, Bangkok, Thailand.

As far as Malaysia is concerned participation in the COBSEA programme has brought some changes either directly or indirectly in various policies, programmes, plans and legislation related to the marine environment.

The Straits of Malacca and Singapore Revolving Fund Committee

A Memorandum of Understanding between the Governments of Indonesia, Malaysia and Singapore on one part and Malacca Straits council for and on behalf of the Japanese Non-Governmental Associations on the other part was signed on February 11, 1981 for the establishment and operation of a revolving fund to combat oil spill from ships in the Straits of Malacca and Singapore. The initial quantum of the Revolving Fund donated by the Japanese Non-Governmental Associations was four hundred million Yen.

In accordance with the Memorandum of Understanding, a Management Committee call-

ed the Revolving Fund Committee (RFC) was established to administer the Fund, the members being a representative each from the Littoral States of Indonesia, Malaysia and Singapore. The RFC reports to the Tripartite Technical Experts Group Meeting on the Safety of Navigation in the Straits of Malacca and Singapore. Indonesia was the first State to administer the Fund and provided the Chairmanship for RFC for five (5) years.

The Fund was officially handed over to Malaysia on September 29, 1986 in Kuala Lumpur with Malaysia providing the Chairman and authority for the Fund. Prior to 1985, RFC adopted the Rules on the Deployment of the Revolving Fund including the limits of the area of the Straits of Malacca and Singapore in respect of which the Revolving Fund could be validly deployed.

In 1985, the fifth annual meeting was held in Parapat, Indonesia on 17—18 May 1985 and the second technical meeting was held in Jakarta in December 1985. Arising from these meetings, a Joint Oil Spill Combating Exercise was held in the Straits of Singapore from April 8, 1986 through April 11, 1986 to test the efficiency of communications in implementing the procedures for the deployment of the Revolving Fund.

The Exercise identified a number of constraints among which are those relating to communication and the procedure to deploy funds in emergencies as well as operating procedure to combat oil spills at sea. At the Sixth Meeting of the RFC on 26—27 June 1986, the committee decided to convene a technical meeting to consider a draft procedure for deployment of funds as well as a draft standard operating procedure (SOP) on the operational combat of oil spill at sea. The technical meeting held in Fraser's Hill Malaysia on 18—19 December 1986 formulated:-

- (a) Standard Operating Procedure (SOP) for Joint Oil Spill Combat in the Straits of Malacca and Singapore; and
- (b) Rules relating to the Procedure for the Disbursement of Advance from and Repayment to the Revolving Fund.

ASEAN Co-operative Programmes on Marine Science

On 27 January, 1986, the Department of Environment was designated as the national focal point for ASEAN Co-operative Programmes on Marine Science, namely ASEAN-Australia Project on Tides and Tidal Phenomena and on Living Coastal Resources, ASEAN-Canada Programme on Development and Management of Living Marine Resources and ASEAN-US-AID Project on Coastal Resources Management. The Department of Environment was also designated the lead agency for co-ordinating the ASEAN-Canada Programme.

The lead countries for the respective ongoing marine science programmes were as follows:-

Programme	Lead Country
1. ASEAN-Australia	
(a) Tides & Tidal Phenomena	Singapore
(b) Living Coastal Resources	Thailand
2. ASEAN-Canada	Malaysia
3. ASEAN-US AID	Philippines

The activities under the Co-operative Programmes were as follows:-

1. ASEAN-Australia

- (a) The Second Meeting of Project Management/Steering Committee on Tides and Tidal Phenomena 18—21 February, 1986 in Phuket, Thailand.
- (b) ASEAN-Australia/Malaysia Memorandum of Understanding (MOU) on both, the Tide and Tidal Phenomena Project and Living Coastal Resources Project, was signed on 28 May, 1986 in Kuala Lumpur.
- (c) An In-country Training Workshop on Research Methodology for Coral Reef and Soft Bottom Communities was held between 1—5 July, 1986 at the Universiti Pertanian Malaysia, Selangor and at Port Dickson, Negeri Sembilan.

- (d) The Meeting of the 3rd. ASEAN-Australia Project on Coastal Living Resources was held between 22—24 July, 1986 in Bangkok, Thailand.
- (e) In-country Training Workshop on Research Methodology for Mangrove Studies was held between 24—29 August, 1986 in Penang, Malaysia.
- (f) The ASEAN-Australia Technical Workshop on Tides and Tidal Phenomena was held between 20—29 October, 1986 in Singapore.
- (g) The Microbian Seminar of the Asean-Australia Project on Coastal Living Resources was held between 28 November — 2 December, 1986 in Malaysia.

2. ASEAN-Canada

An ASEAN Tour of Canadian Marine Facilities was conducted between 6—24 June 1986.

3. ASEAN-US AID

- (a) Commencement of the ASEAN-US Co-operative Programme on Marine Sciences; Coastal Resources Management Project, 1 January, 1986, Kuala Lumpur.
- (b) 1st. Meeting of ASEAN-US AID Project Steering Committee, 21—23 May, 1986 in Manila, Philippines.
- (c) ASEAN-US AID Training Course on Information Research and Management held between 29 September — 12 October, 1986 in Manila, Philippines.

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

ESCAP as the regional arm of the United Nations Organization has helped 44 countries in the region to overcome their economic and social problems. As a member country of ESCAP, Malaysia participated in the following meetings held in Bangkok in 1985:-

- (i) ESCAP Ministerial Level Conference on the Environment in Asia, 6—14 February, 1985.
- (ii) 9th session of Committee on Industry Technology and Environment, 10—16 1985.

In 1986, there was no meeting held. However Malaysia participated in a Regional Seminar on the Application of Remote Sensing Techniques to Coastal Zone Management and Environmental Monitoring organised by ESCAP in Bangladesh on 15—19 September, 1986.

World Health Organisation-West Pacific Regional Centre for the Promotion of Environmental Planning and Applied Studies (WHO-PEPAS)

The WHO through PEPAS situated at Serdang, Selangor has over the years rendered considerable assistance to the Department of Environment by way of consultancy services, jointly sponsoring seminars by providing resource persons in various environmental fields. In 1985 and 1986 the following activities were conducted with WHO-PEPAS's expert assistance:-

- (i) Advisory Services for Air Pollution Monitoring and Sampling Technology;
- (ii) Advisory Services for National Training Courses on Industrial Waste Monitoring;
- (iii) Marine Pollution Control Legislation and Coastal Zone Management;
- (iv) Environmental Information System Development;
- (v) Air Pollution Stationary Source Emission;
- (vi) National Training Course on Industrial Waste Monitoring;
- (vii) Review of EIA Guidelines; and
- (viii) Notification and Assessment of Chemical.

Bilateral Co-operation and Assistance

During the years under review the Depart-

ment of Environment had received technical assistance from foreign countries under the bilateral co-operation and assistance programme. The technical assistance programmes which had approval from the Economic Planning Unit of the Prime Minister's Department included:-

France

- (i) Mr. Jean-Paul Larcher, an environmental education expert from France assisted the Department in drafting an Environmental Education and Awareness Programme. A pilot programme on Environmental Education was also launched in the State of Selangor to assess the knowledge and awareness of the public on environmental issues. Mr. Larcher's assistance lasted from 15 January, 1985 — 1 April, 1986.
- (ii) Mr. J. Periere from GUIGUES SA, France conducted a Feasibility Study on a Physical Chemical Central Treatment Plant in the Klang Valley. The study was funded by the French Government. The objectives of the study was to identify the treatment needs of the industries involved in the generation of toxic and hazardous waste and to design a centralised physical-chemical treatment facility that will handle the treatment of these waste. Mr. J. Periere's assignment began in 1986 and is expected to complete in 1987.

Japan

Under the technical assistance programme of the Japan International Co-operation Agency (JICA), a team of Japanese Experts assisted Malaysia in conducting a study to assess the need for setting up an Environmental Training Institute. The study team was in Malaysia from 29 May—2 June, 1985.

Technical Assistance Rendered

Under the Malaysian Technical Assistance Programme for Developing Countries, Mr. A. Maheswaran, the Director-General of the Environment provided consultancy services to the Government of Vanuatu through the United Na-

tions ESCAP Pacific Operations Centre. The Consultancy which lasted from 14 July — 15 August 1986 included assistance in formulating

the National Environmental Policy and an appropriate environmental management strategy for the Republic.



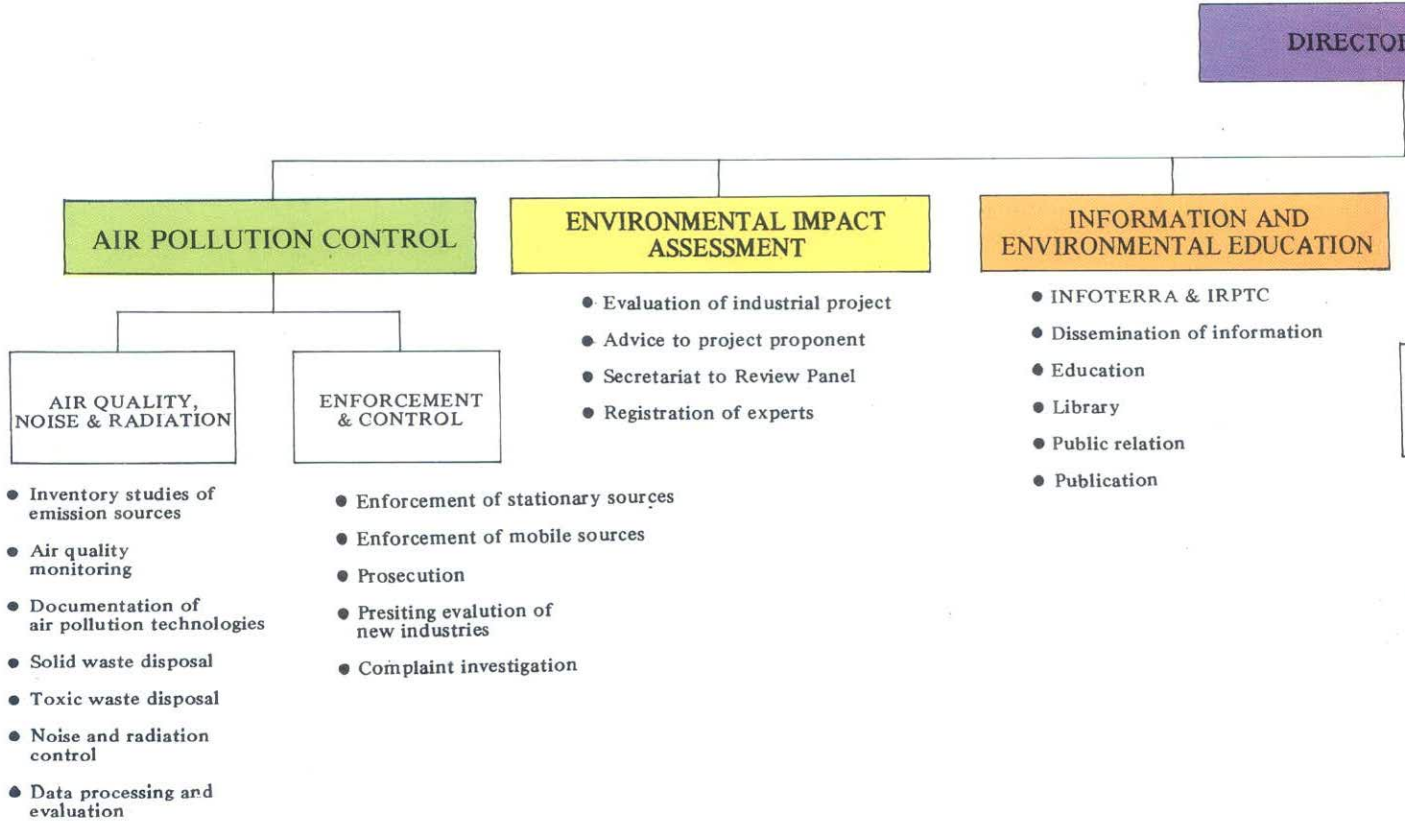
Participants at the Ninth Meeting of the ASEAN Experts Group on the Environment.

Figures



Figure 1

**ORGANISATION CHART OF THE DEPARTMENT OF ENVIRONMENT
MINISTRY OF SCIENCE, TECHNOLOGY AND ENVIRONMENT
1975—1984**



**DEPARTMENT OF ENVIRONMENT
SCIENCE AND TECHNOLOGY AND THE ENVIRONMENT,
1984**

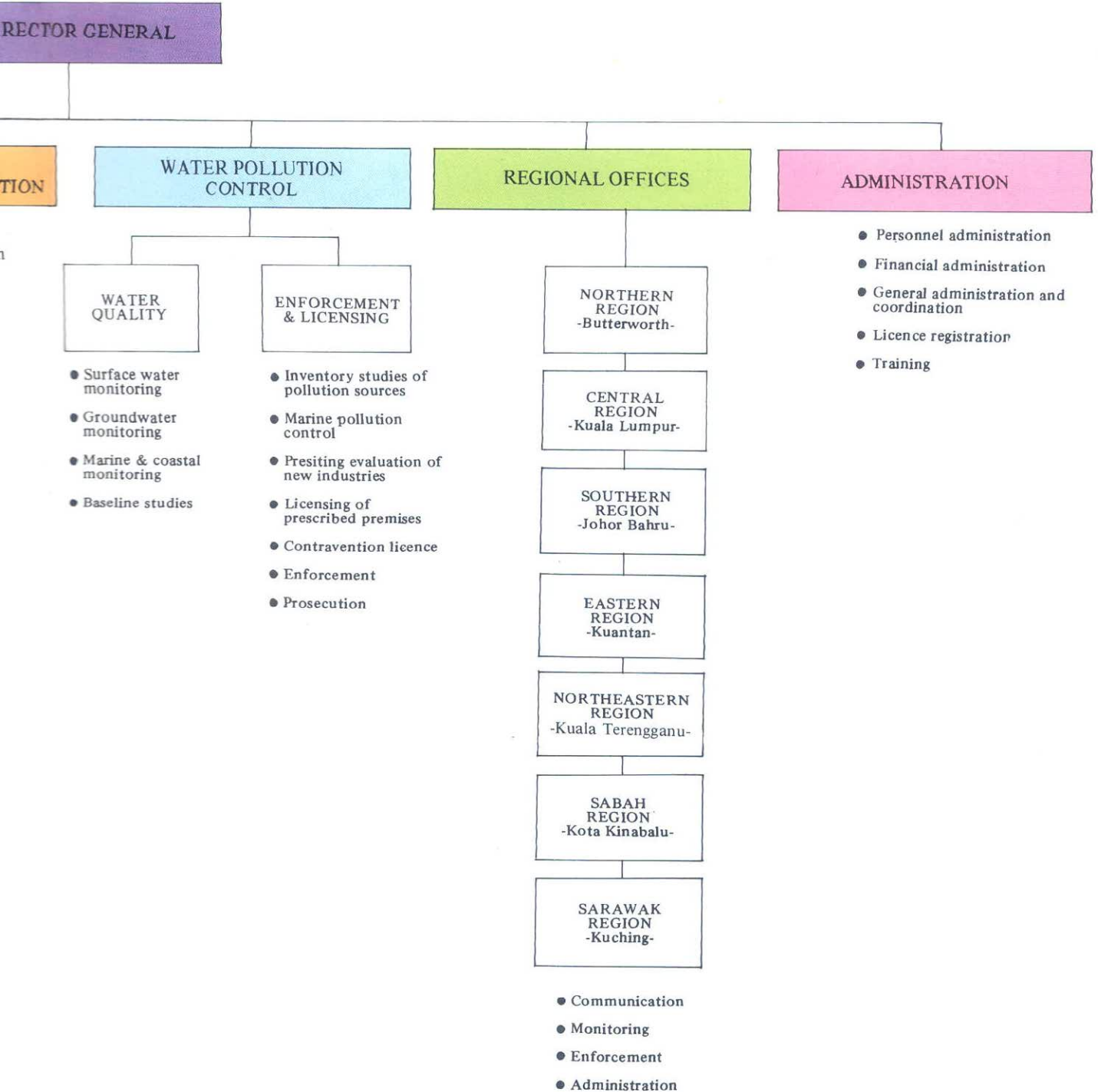
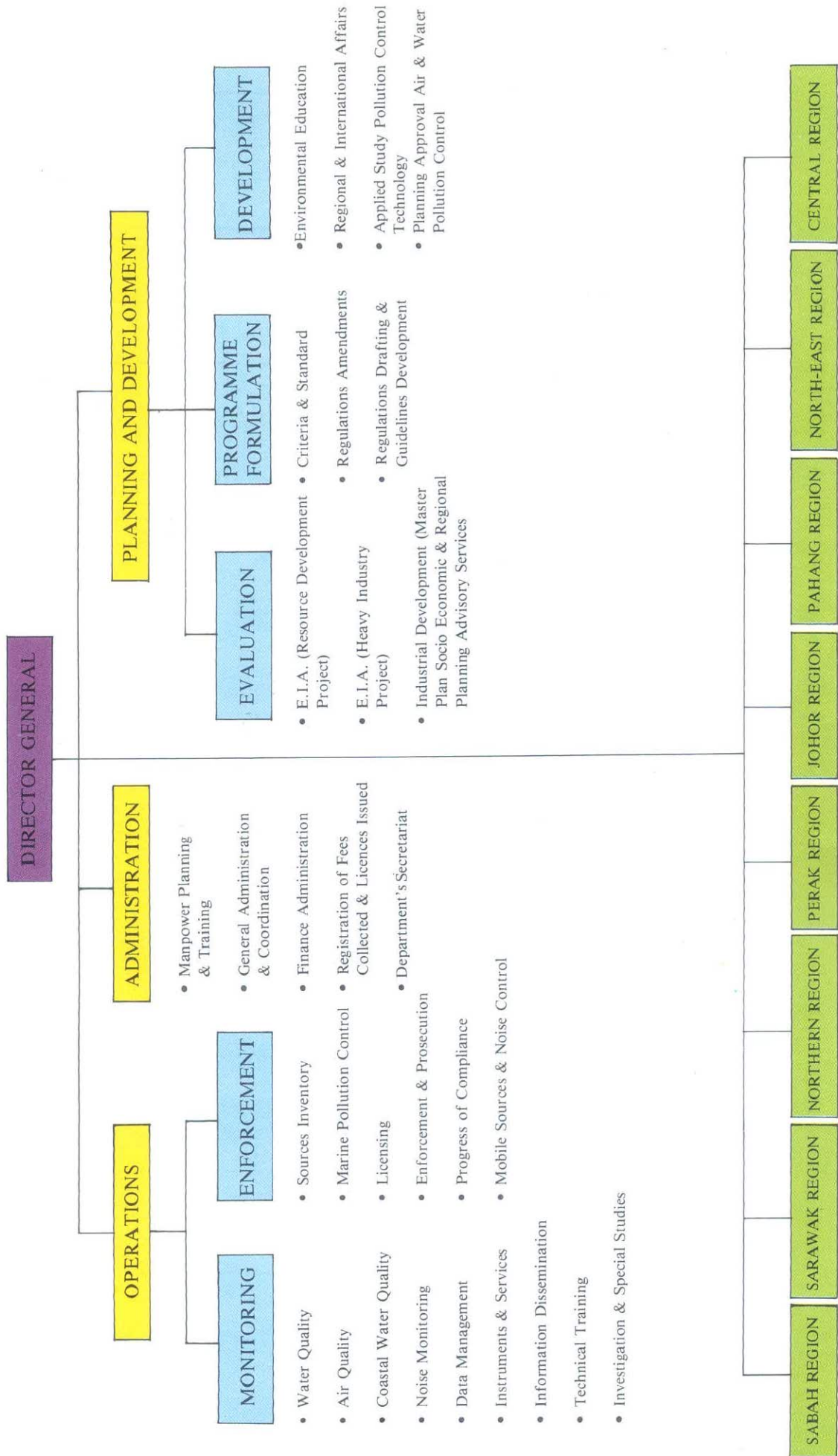


Figure 2

ORGANISATION CHART OF THE DEPARTMENT OF ENVIRONMENT,
MINISTRY OF SCIENCE, TECHNOLOGY AND THE ENVIRONMENT, 1985—1986



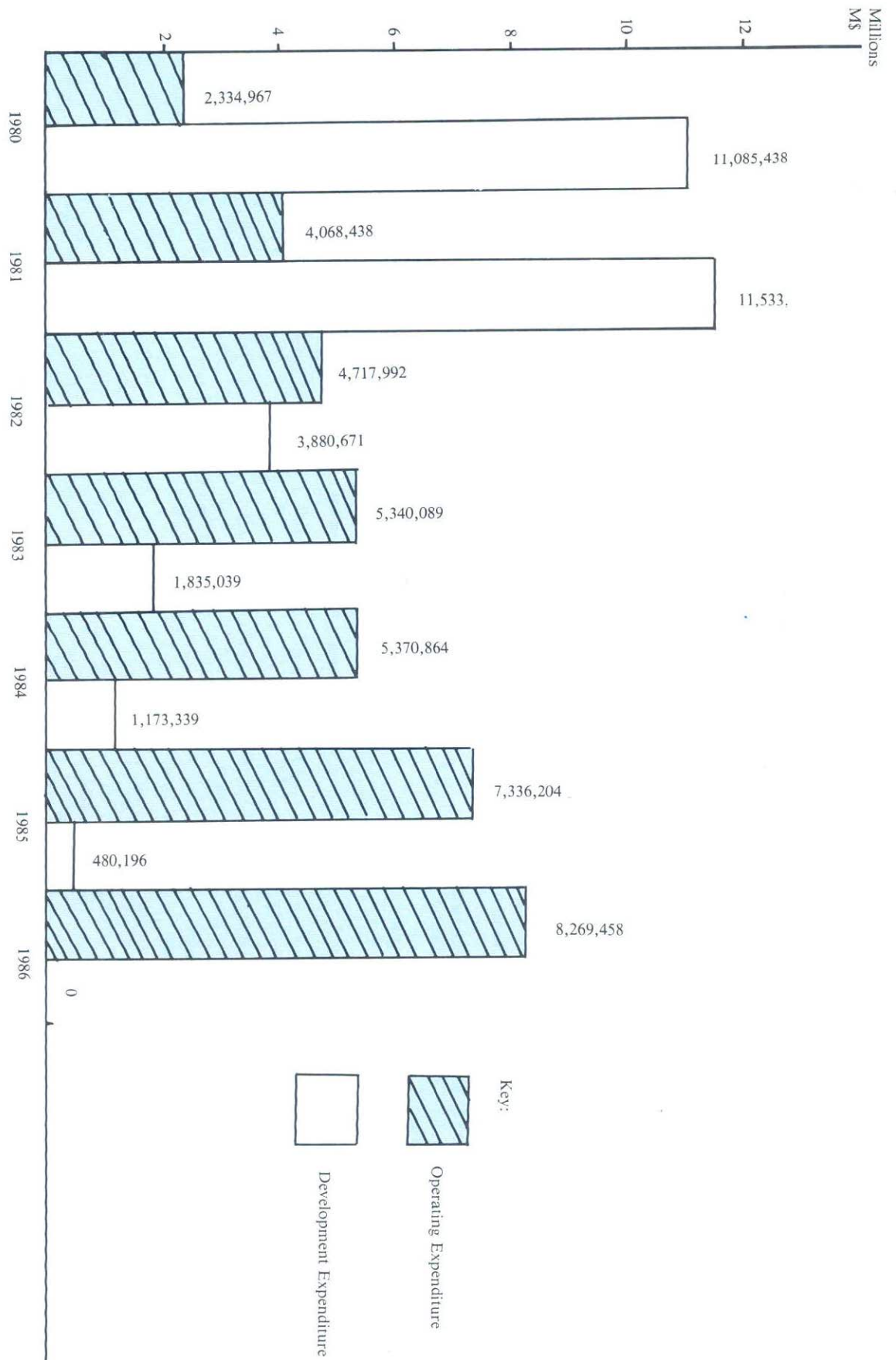


Figure 3. Expenditure of the Department, 1980—1986

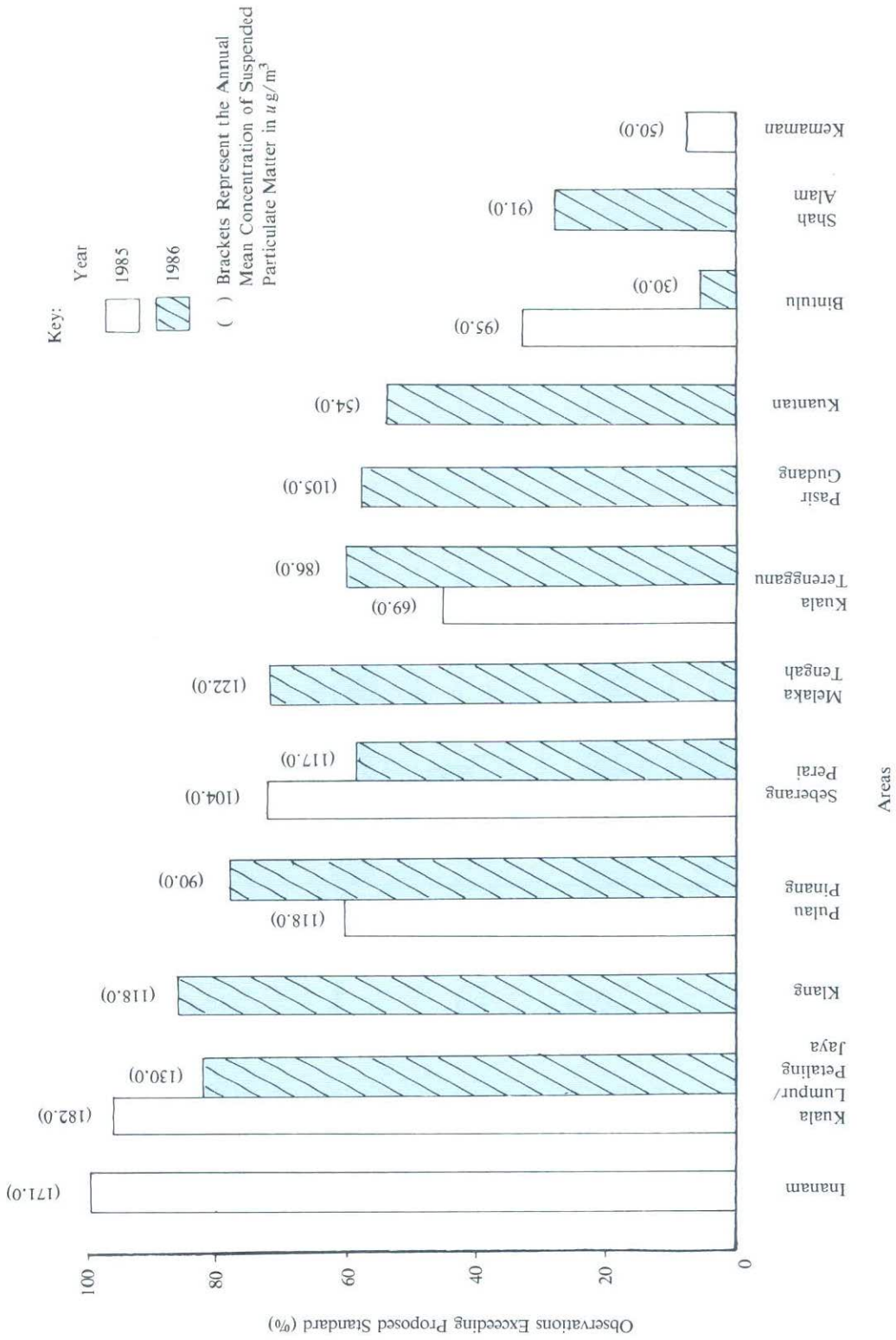


Figure 4. Malaysia: Status of Air Quality. Total Suspended Particulate by Area, 1985—1986

Note:
 The Interim Proposed Standard for Suspended Particulate Matter is $75 \mu\text{g}/\text{m}^3$ (24-hour average)

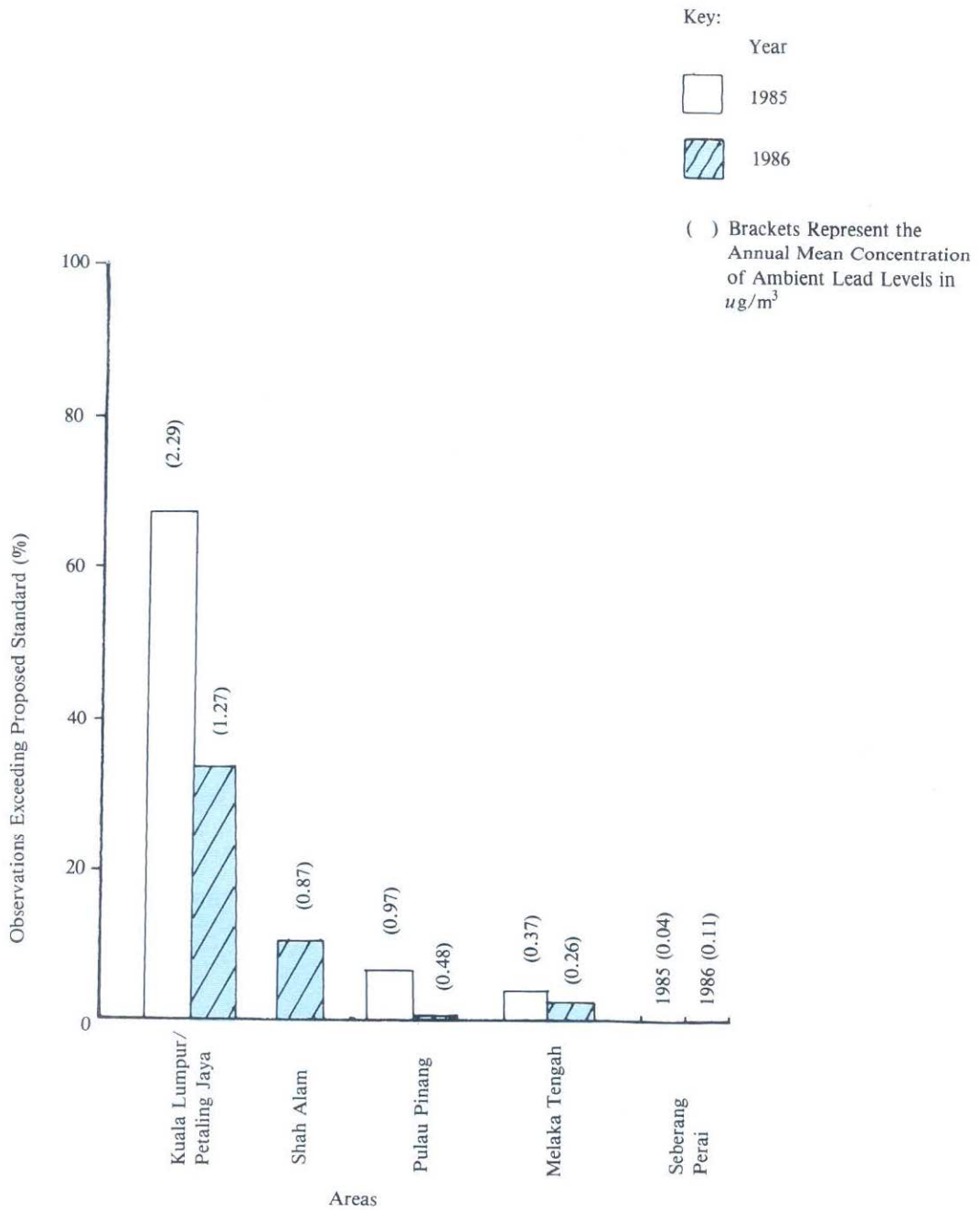


Figure 5. Malaysia: Status of Air Quality. Ambient Lead Levels by Area, 1985—1986

Note:
Maximum Limit of Lead Level for Health Purposes is $2.0 \mu\text{g}/\text{m}^3$ (WHO, 24 hour average)

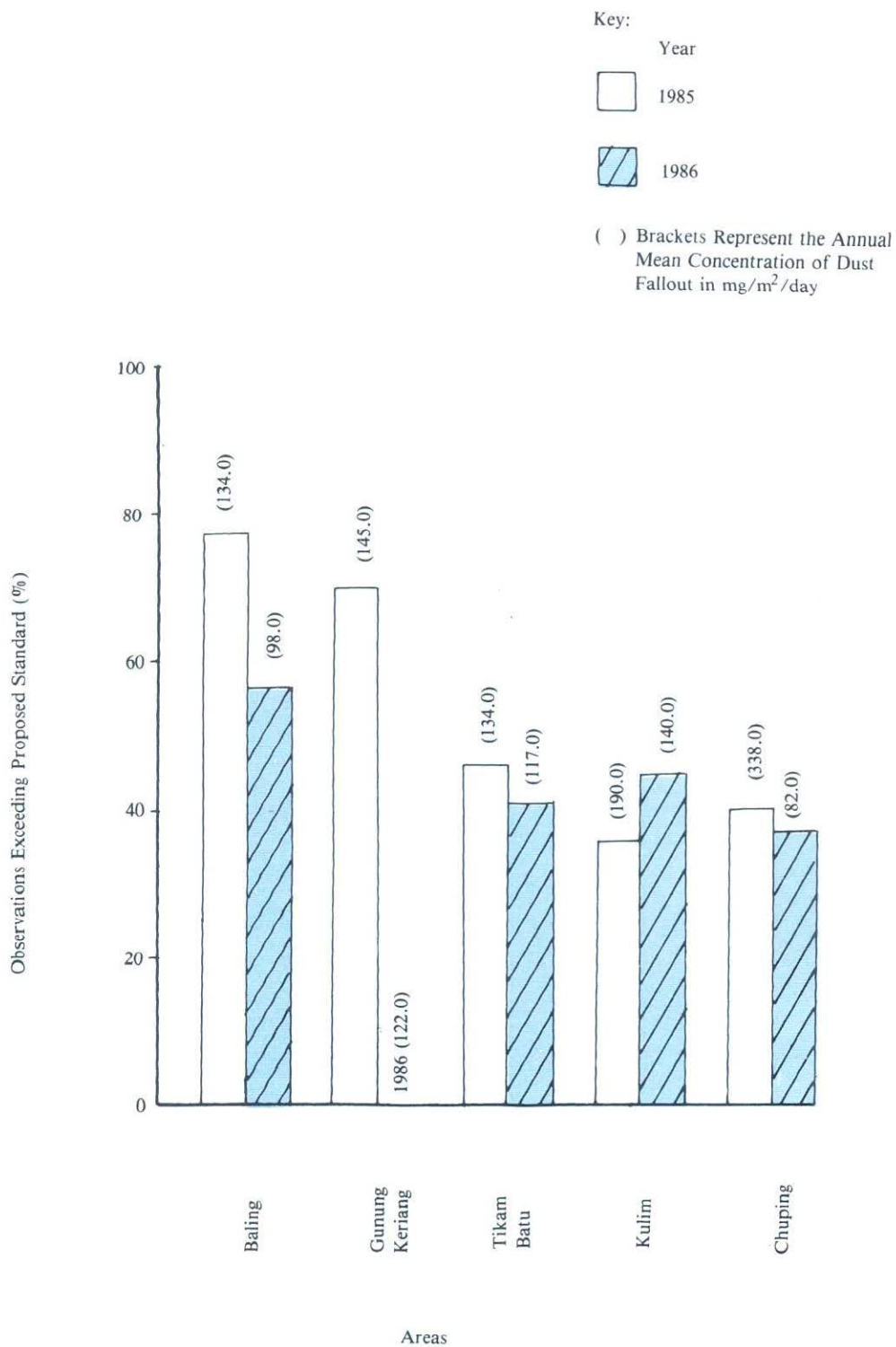


Figure 6. Kedah and Perlis: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is $130 \text{ mg}/\text{m}^2/\text{day}$ (one month average)

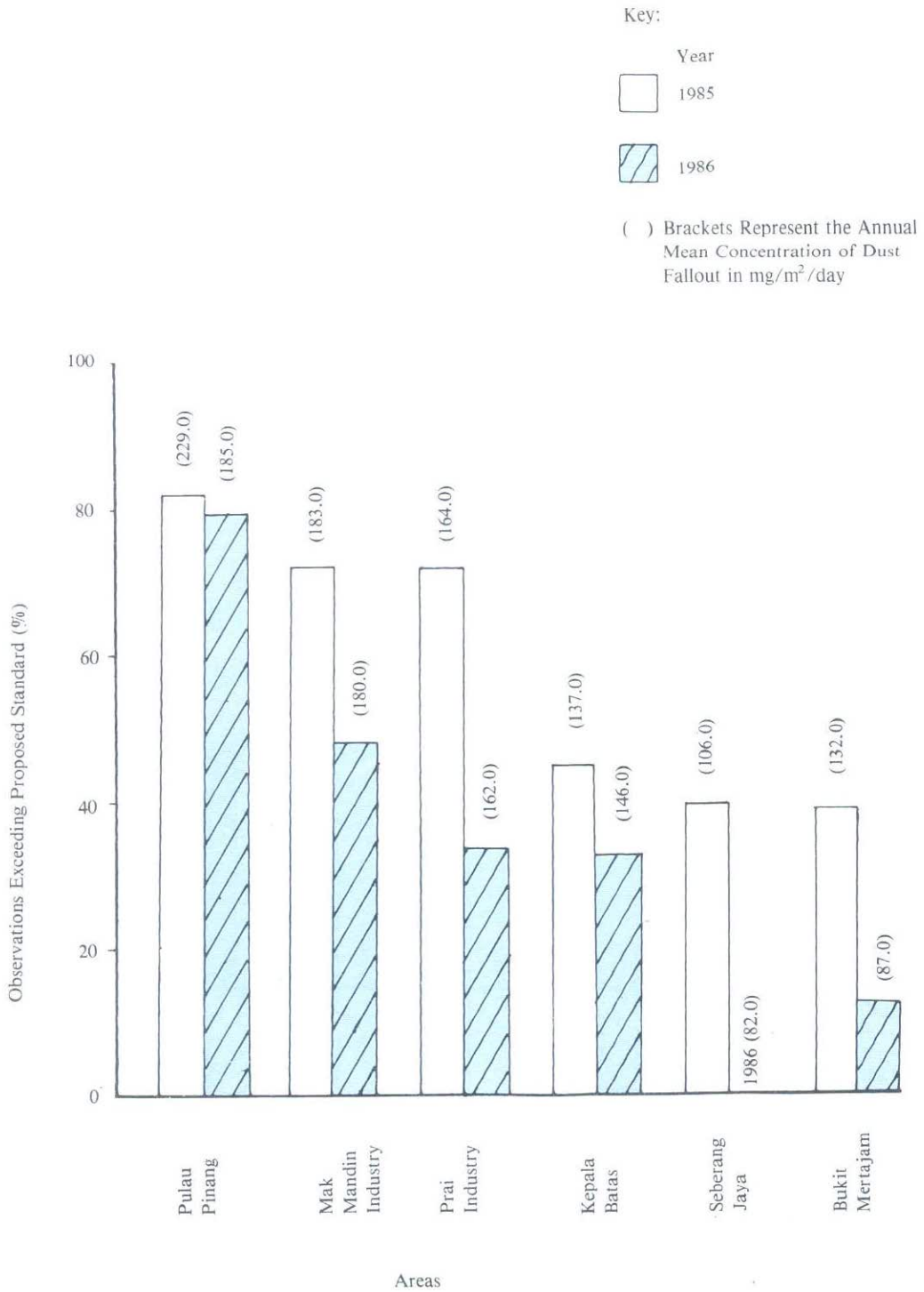


Figure 7. Pulau Pinang and Seberang Perai: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:
The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

Key:

Year

1985

1986

() Brackets Represent the Annual Mean Concentration of Dust Fallout in $\text{mg}/\text{m}^2/\text{day}$

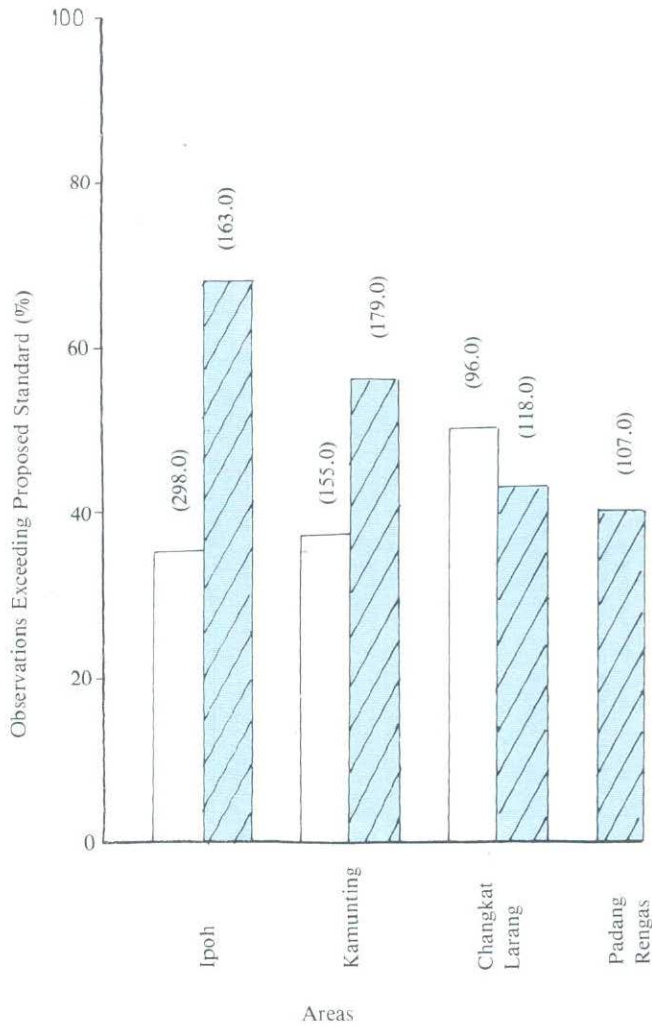


Figure 8. Perak: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is $130 \text{ mg}/\text{m}^2/\text{day}$ (one month average)

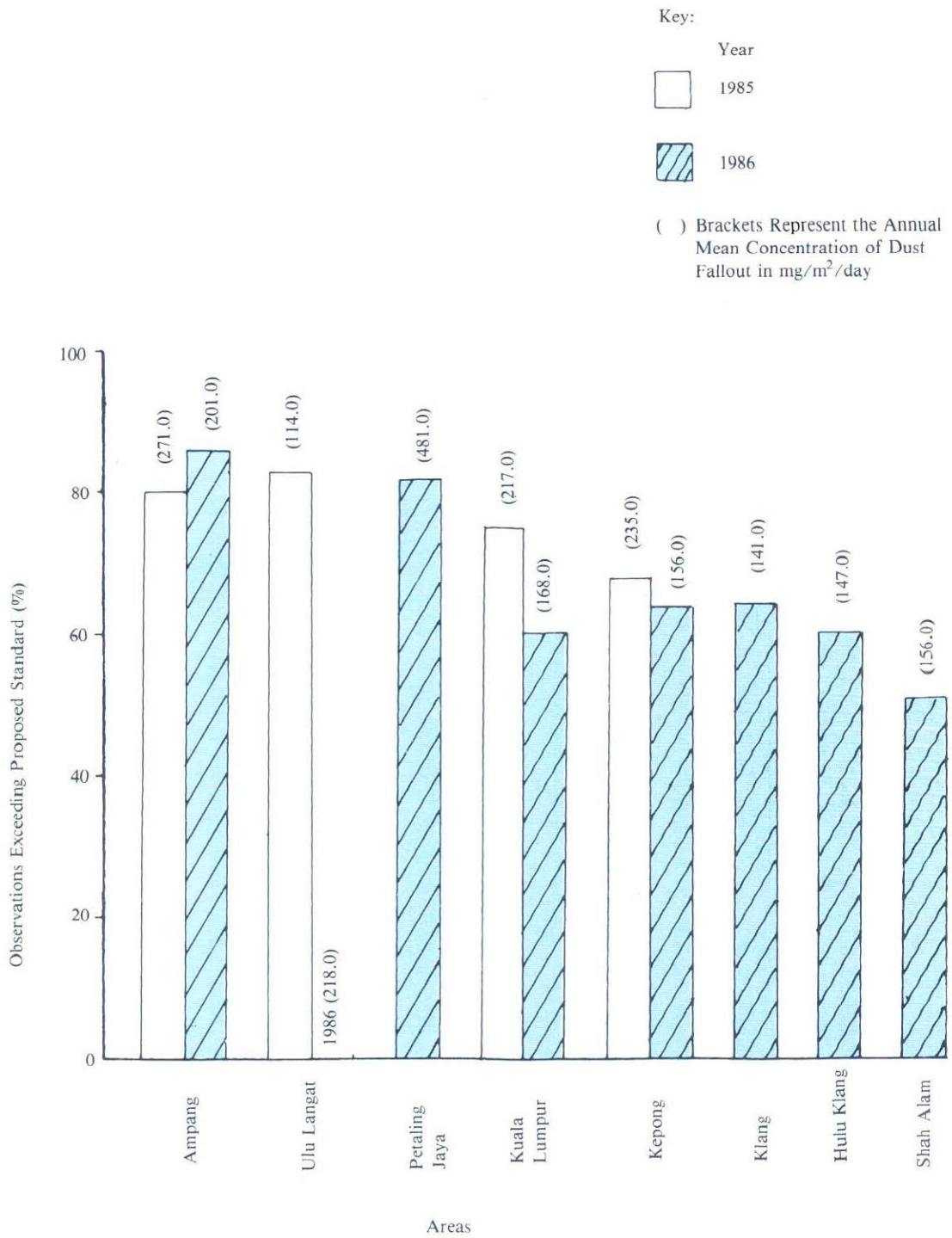


Figure 9. Wilayah Persekutuan and Selangor: Status of Air Quality.Dust Fallout by Area, 1985—1986

Note:
The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

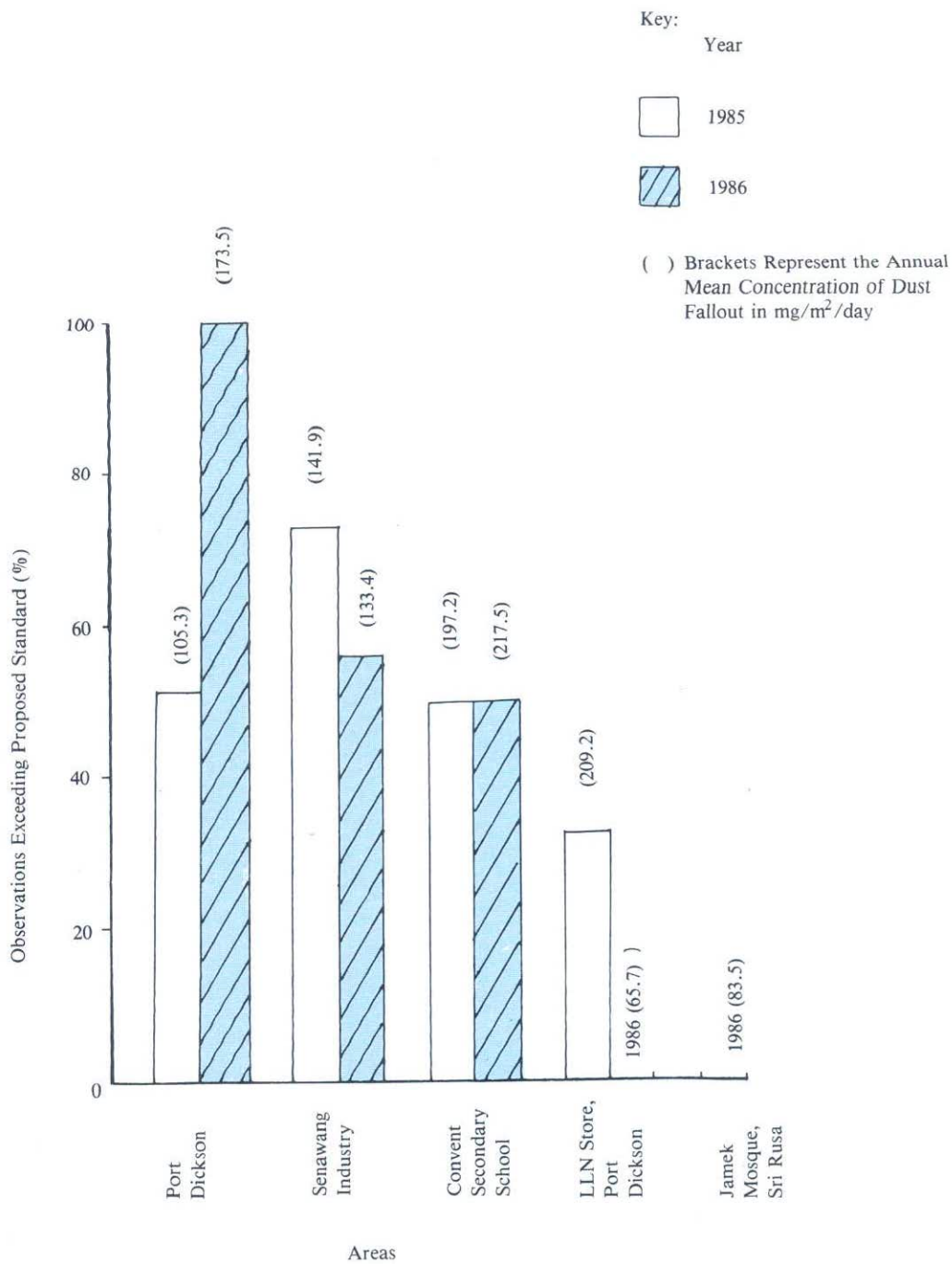


Figure 10. Negri Sembilan: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is $130 \text{ mg}/\text{m}^2/\text{day}$ (one month average)

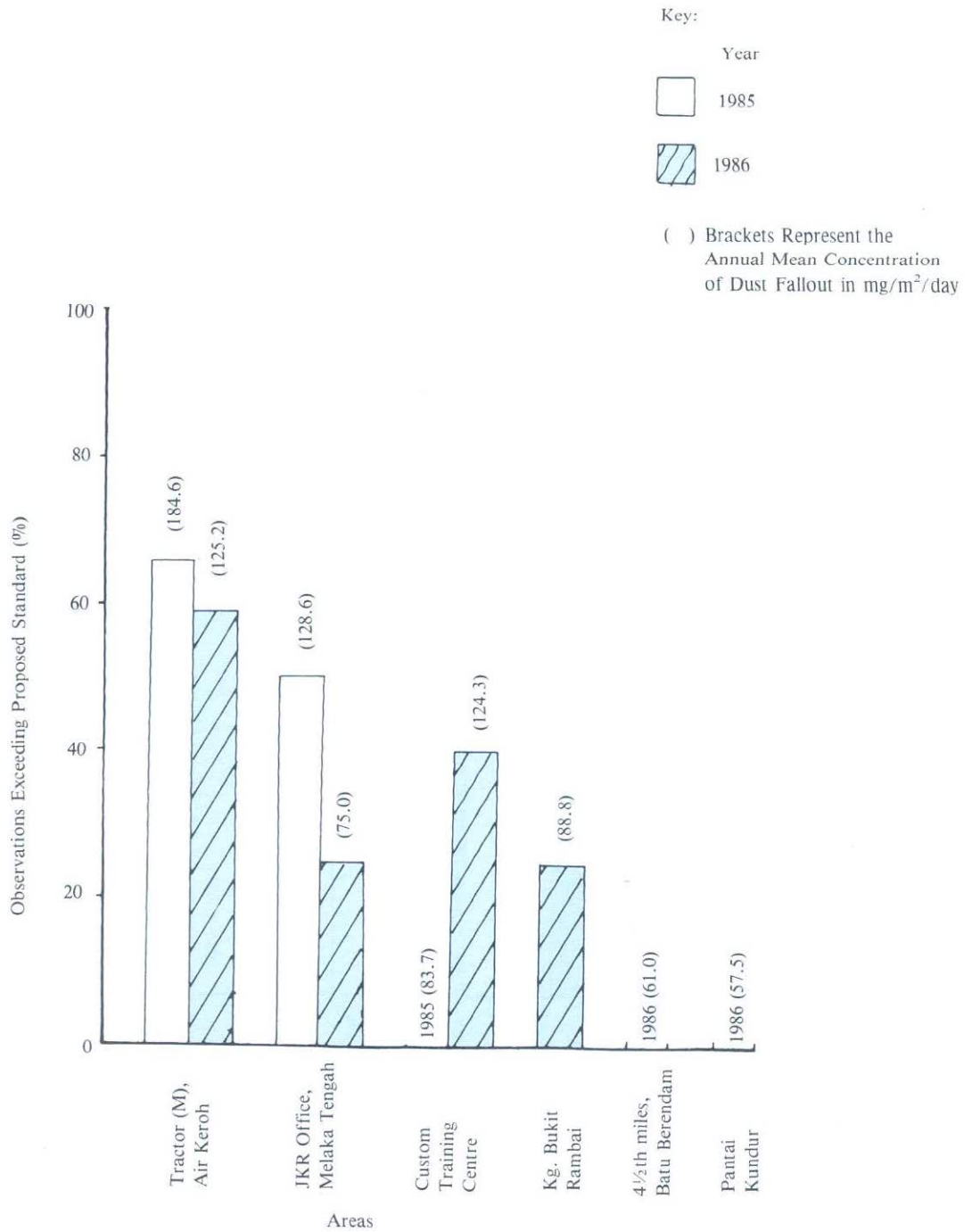


Figure 11. Melaka: Status of Air Quality.Dust Fallout by Area, 1985—1986

Note:
The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

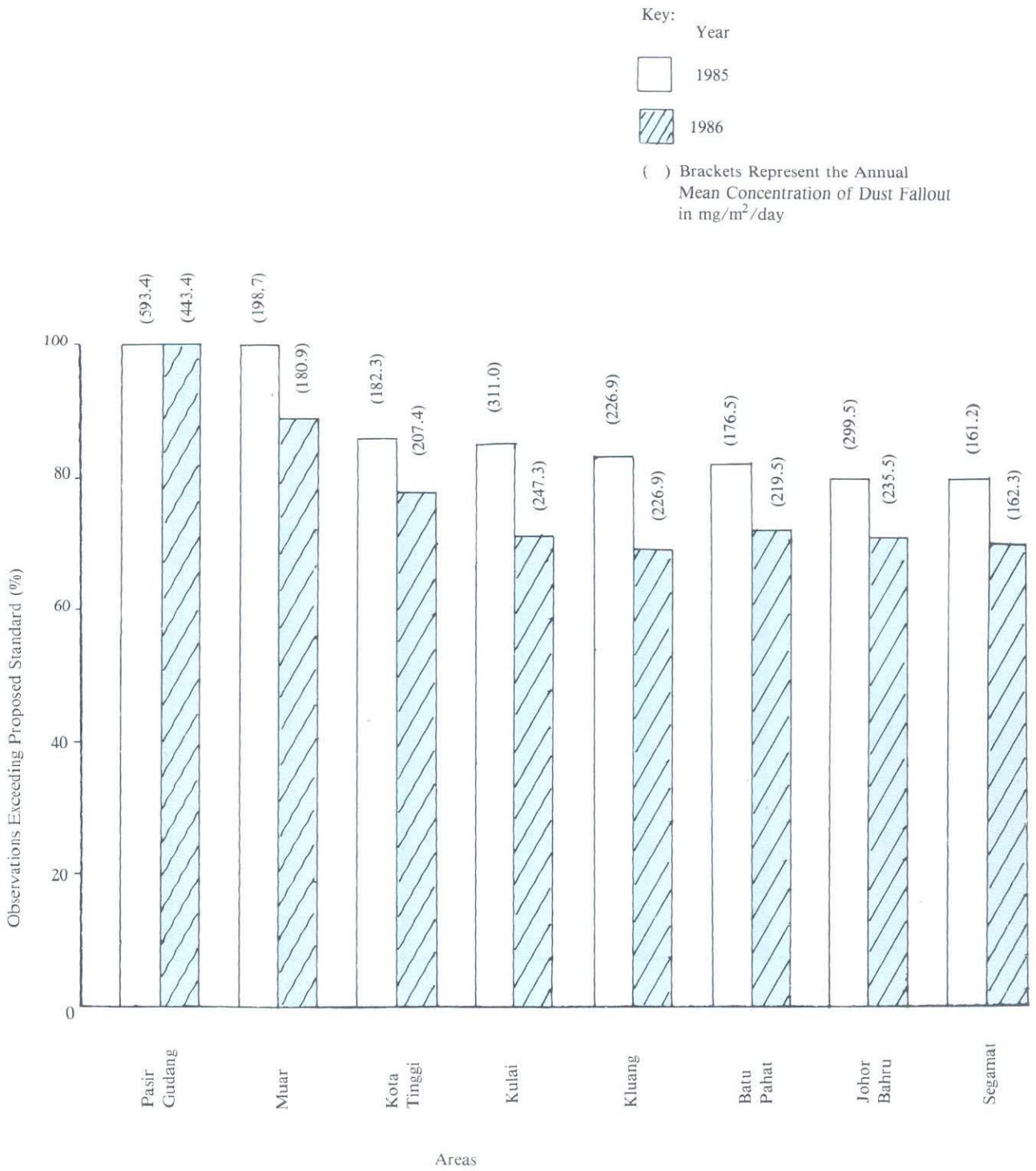


Figure 12. Johor: Status of Air Quality.Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

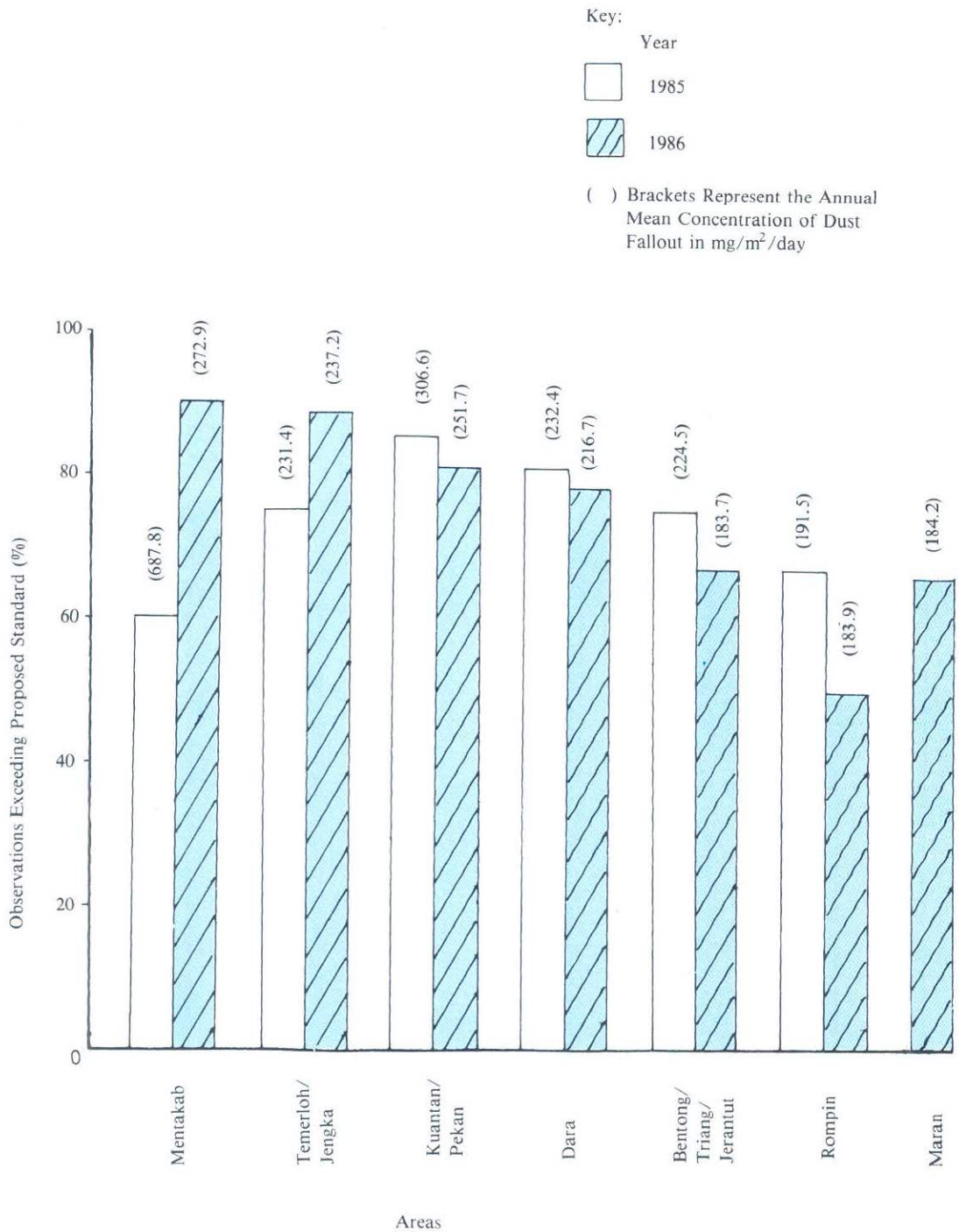


Figure 13. Pahang: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:
 The Interim Proposed Standard for Dust Fallout is $130 \text{ mg}/\text{m}^2/\text{day}$ (one month average)

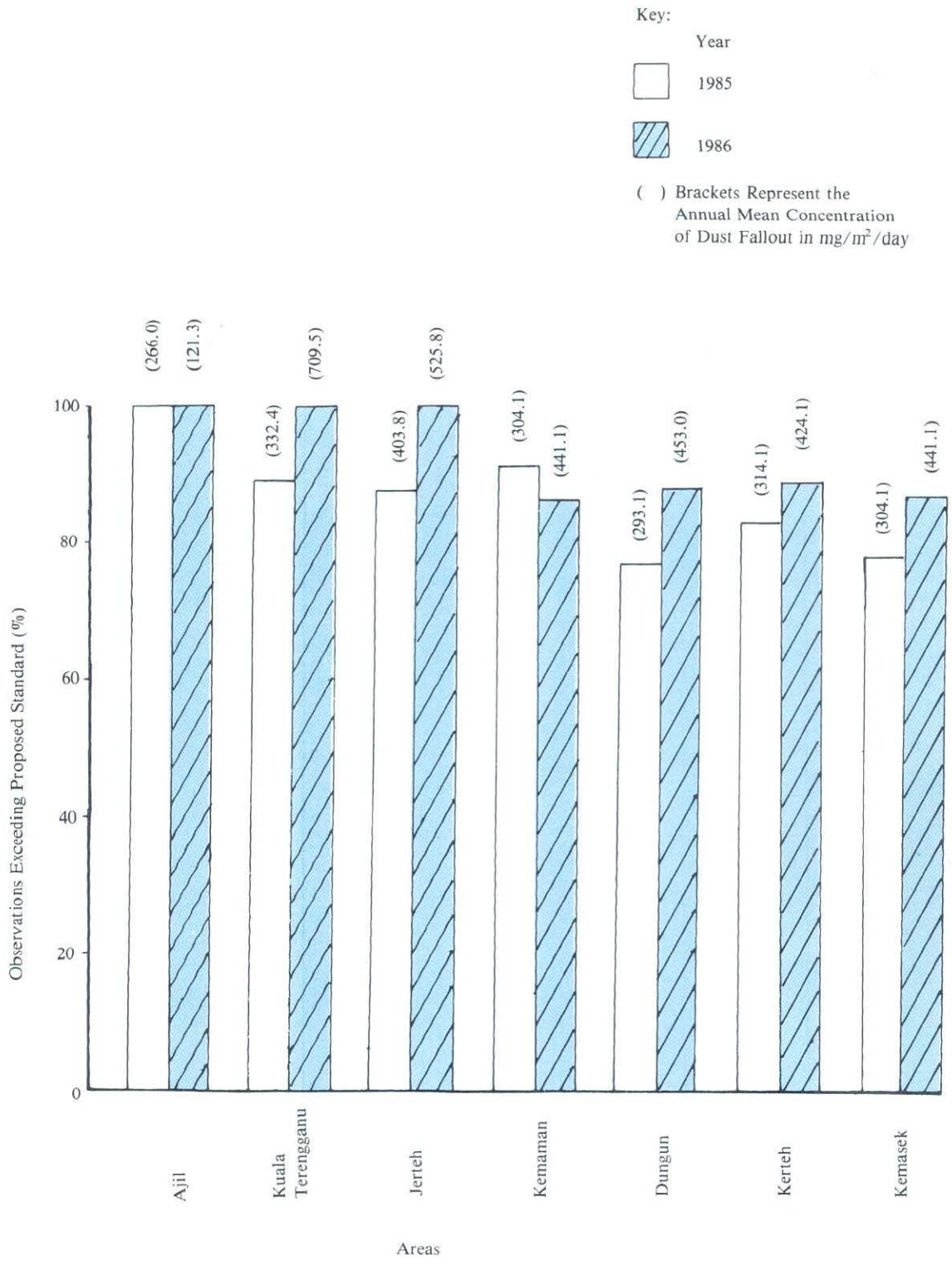


Figure 14. Terengganu: Status of Air Quality, Dust Fallout by Area, 1985—1986

Note:
 The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

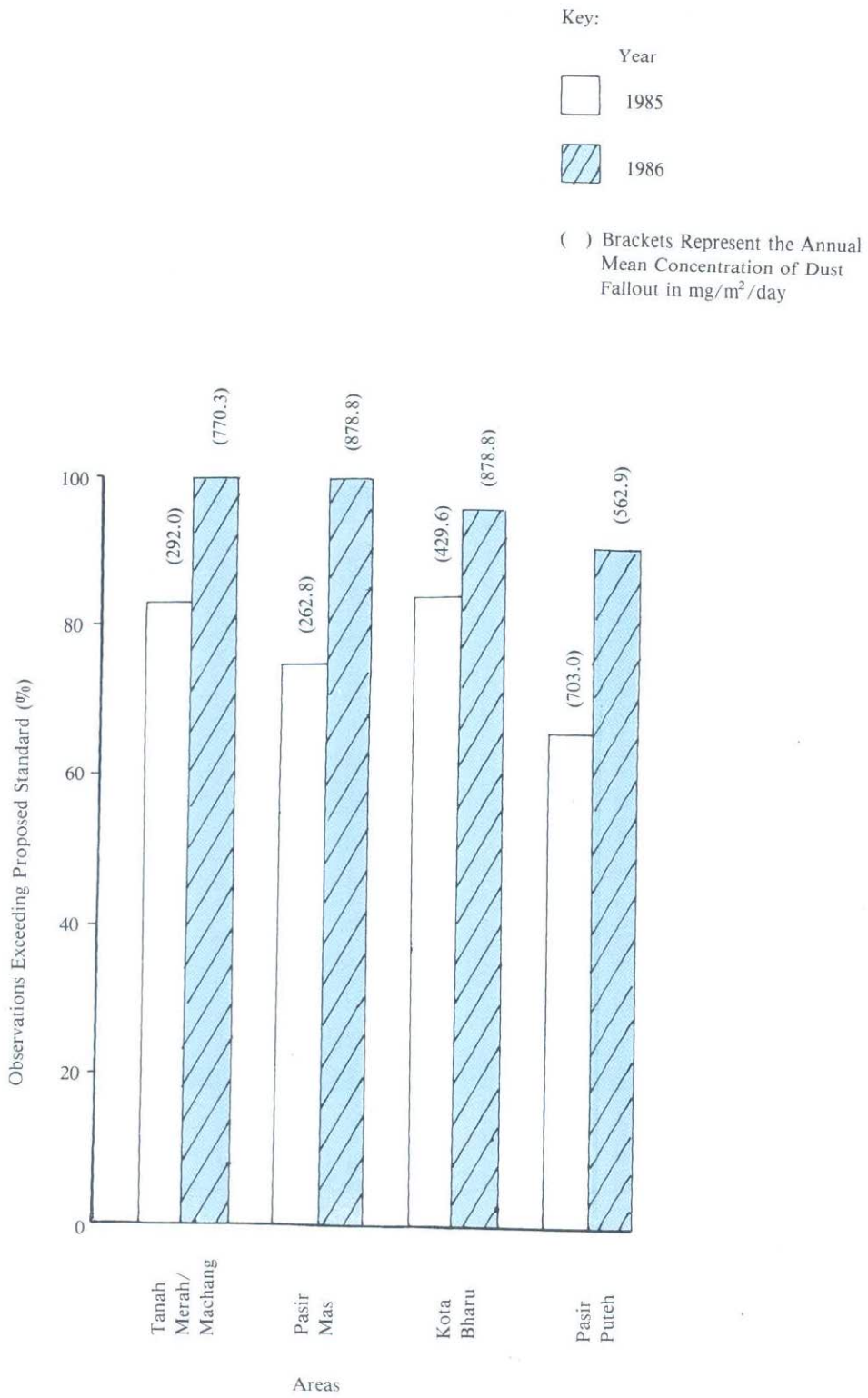


Figure 15. Kelantan: Status of Air Quality.Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is $130 \text{ mg}/\text{m}^2/\text{day}$ (one month average)

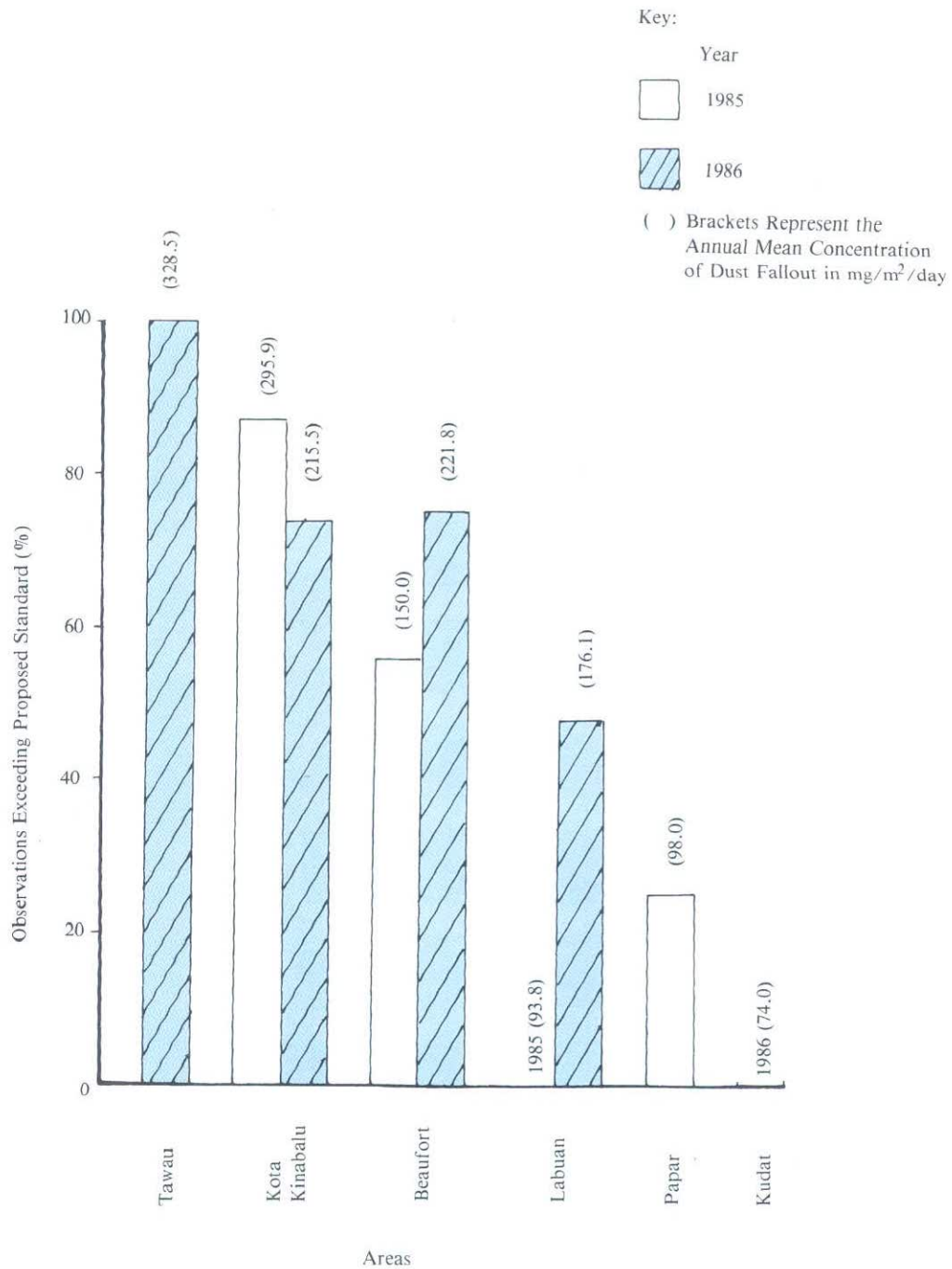


Figure 16. Sabah: Status of Air Quality. Dust Fallout by Area, 1985—1986

Note:
The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

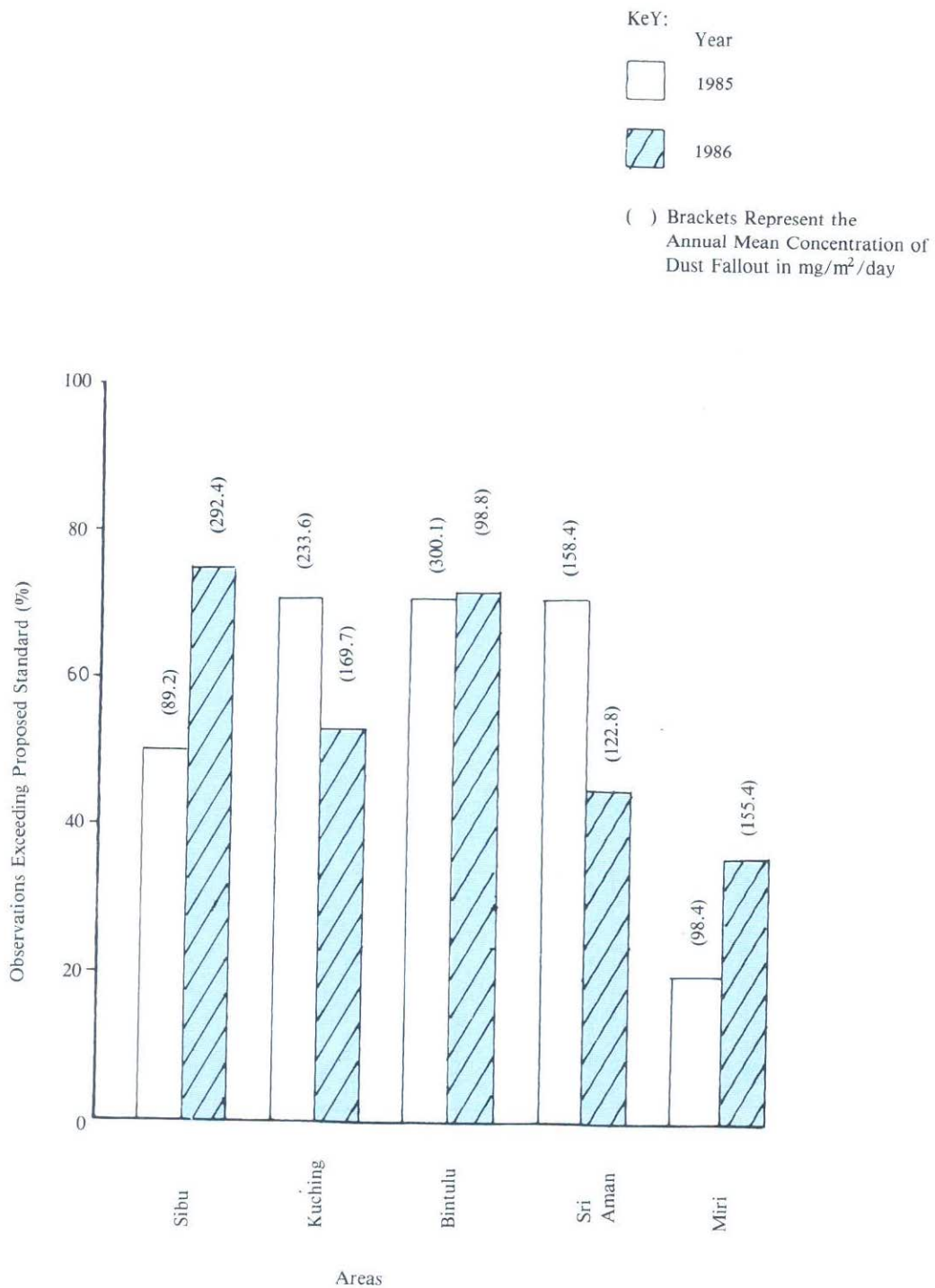


Figure 17. Sarawak: Status of Air Quality, Dust Fallout by Area, 1985—1986

Note:

The Interim Proposed Standard for Dust Fallout is 130 mg/m²/day (one month average)

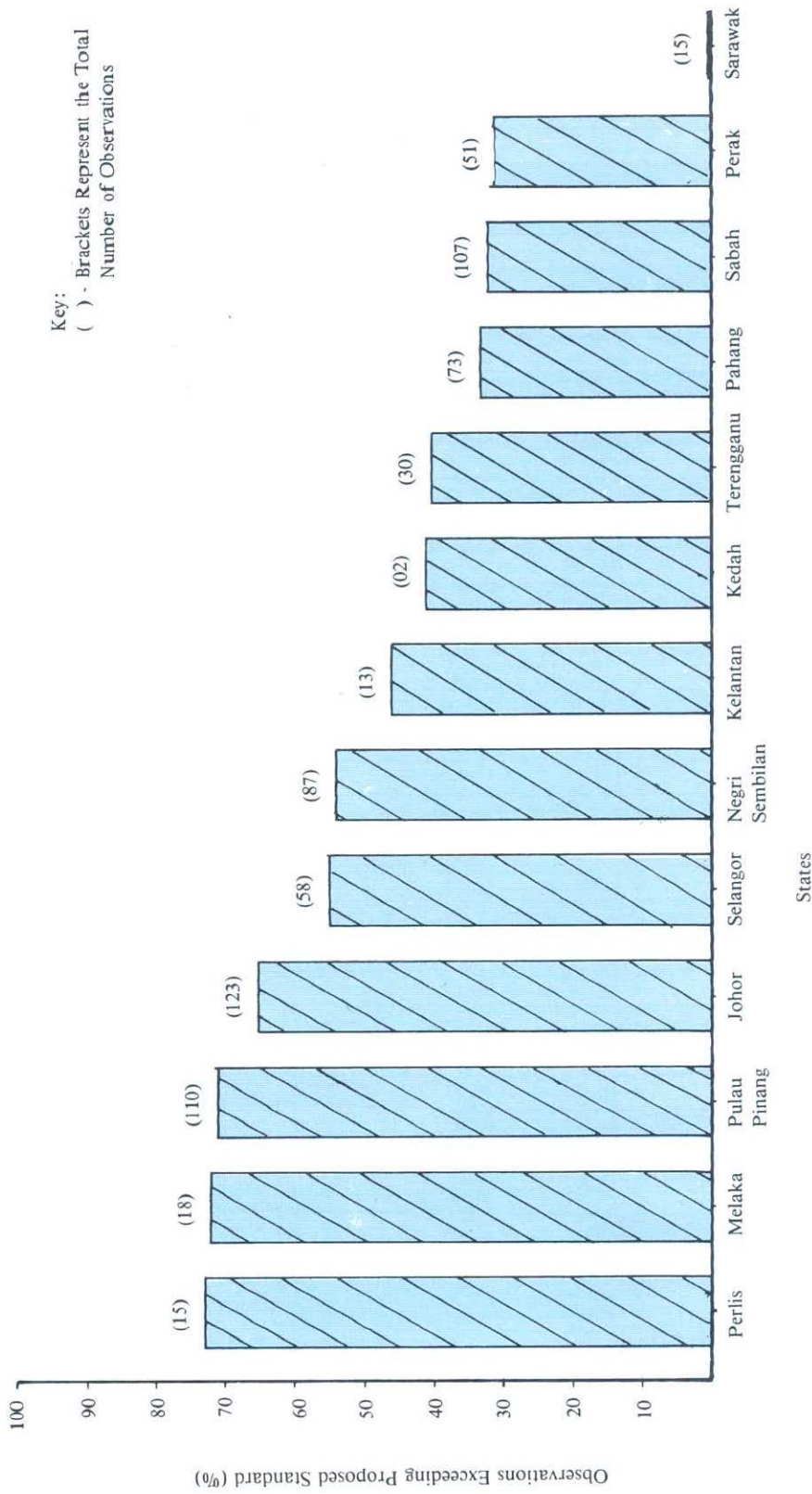


Figure 18. Malaysia: Status of Marine Water Quality in Terms of Faecal Contamination by State. 1985—1986

Note:
The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Faecal Contamination is MPN/100ml

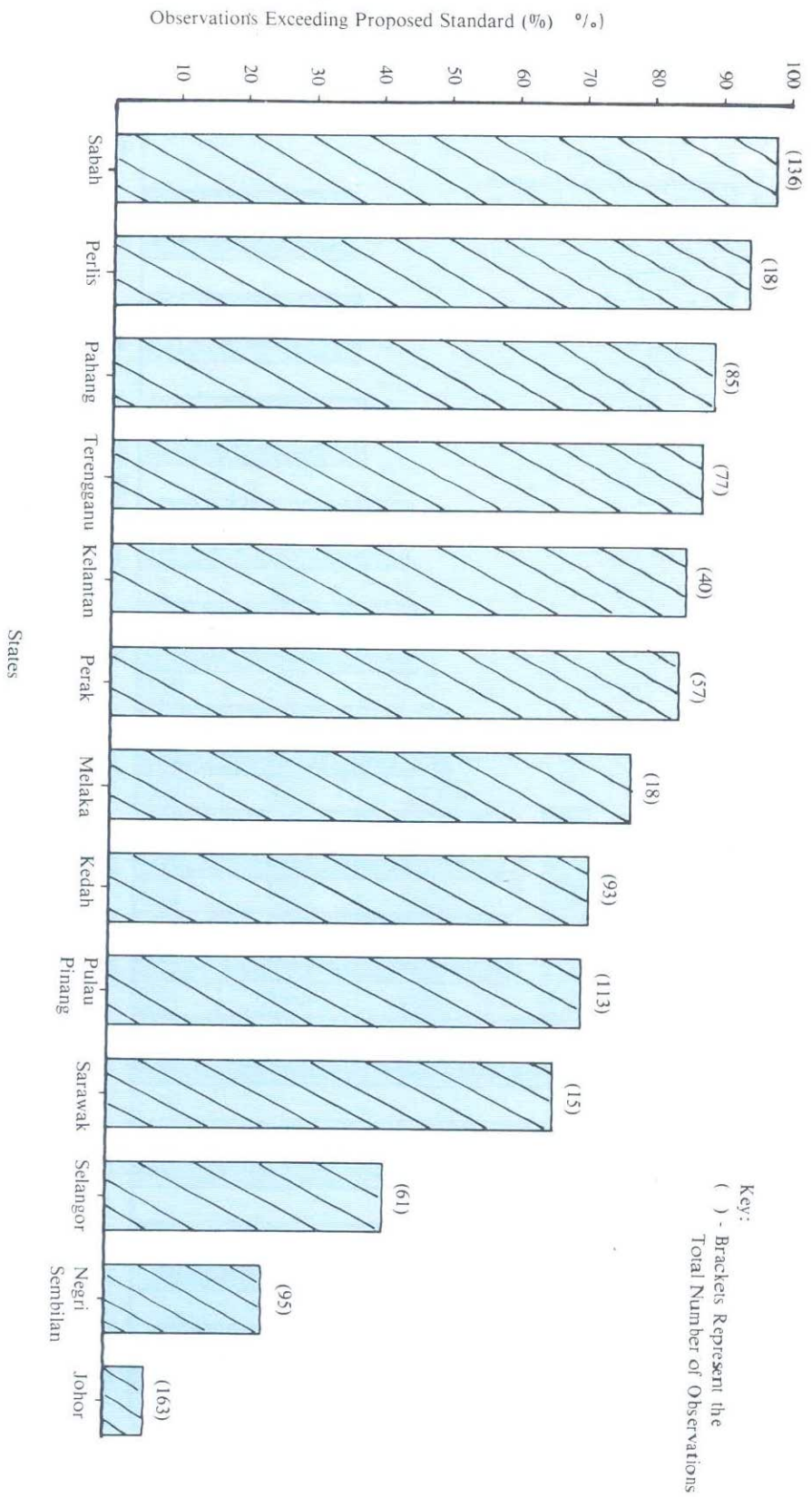


Figure 19. Malaysia: Status of Marine Water Quality in Terms of Total Suspended Solids by State, 1985—1986

Note:
The Interim Proposed Standard on Recreation for Total Suspended Solids is 50 mg/l

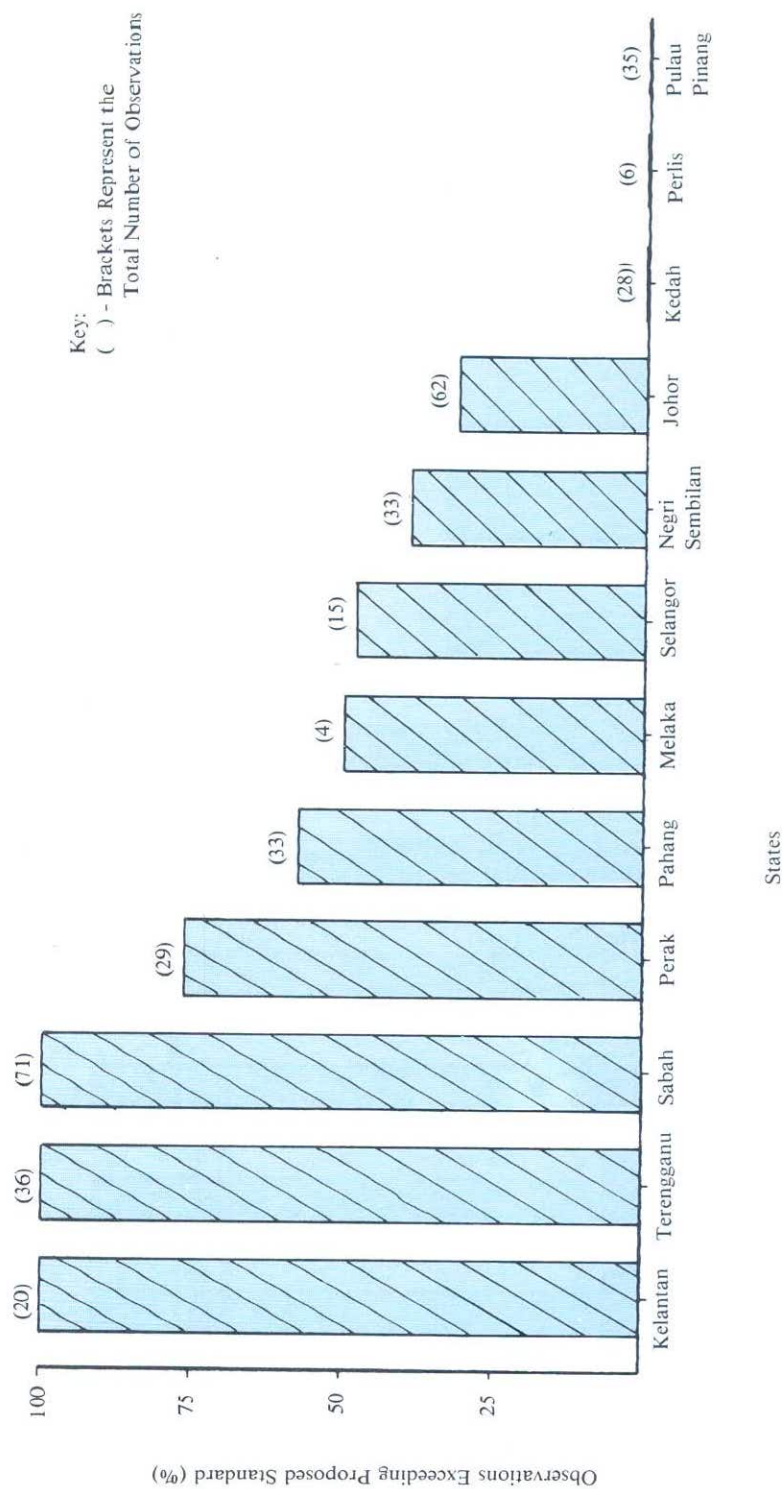


Figure 20. Malaysia: Status of Marine Water Quality in Terms of Oil and Grease by State, 1985

Note:
The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Oil and Grease is 0.00 mg/l

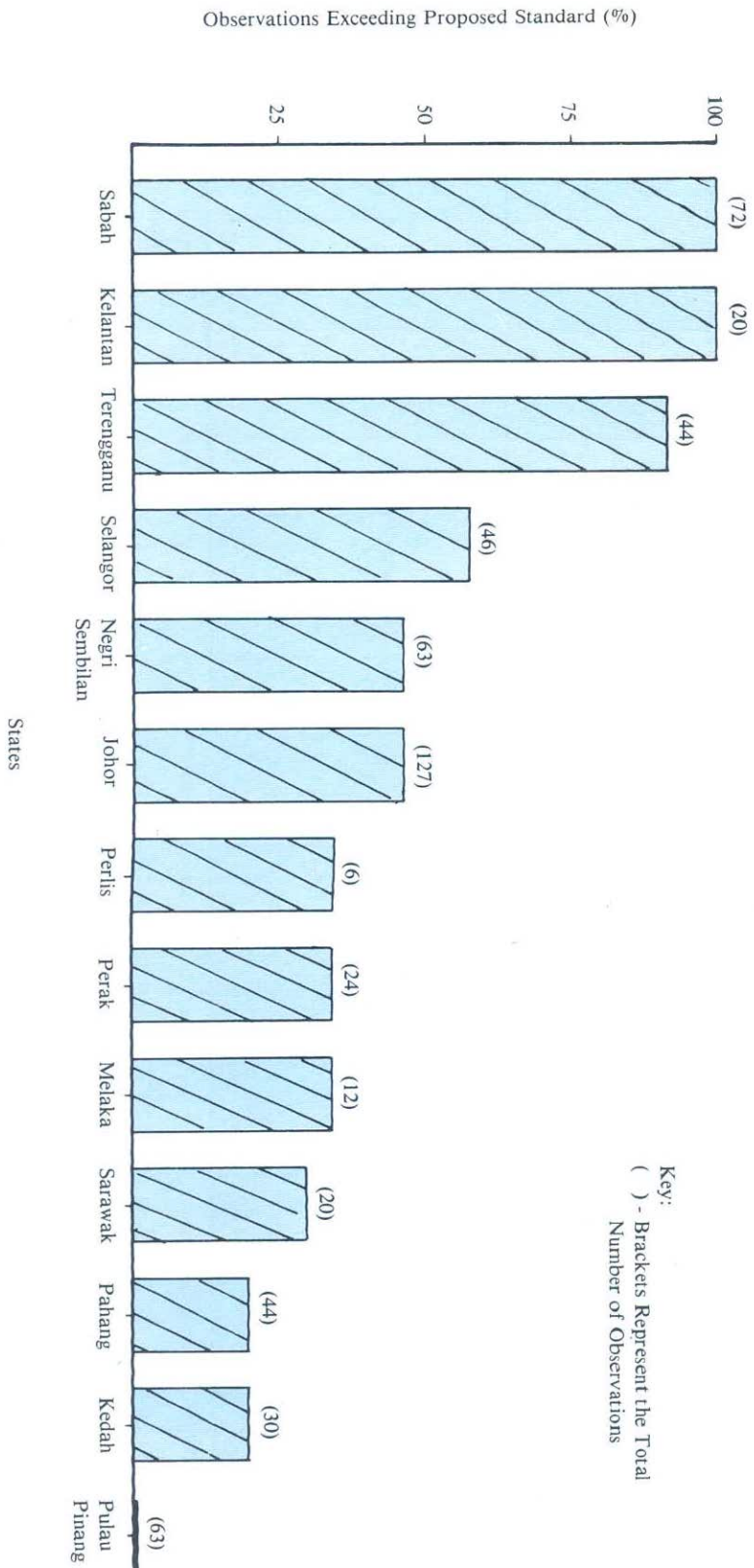


Figure 21. Malaysia: Status of Marine Water Quality in Terms of Oil and Grease by State, 1986

Note:

The Interim Proposed Standard on Conversation of Marine Aquatic Resources for Oil and Grease is 0.00 mg/l

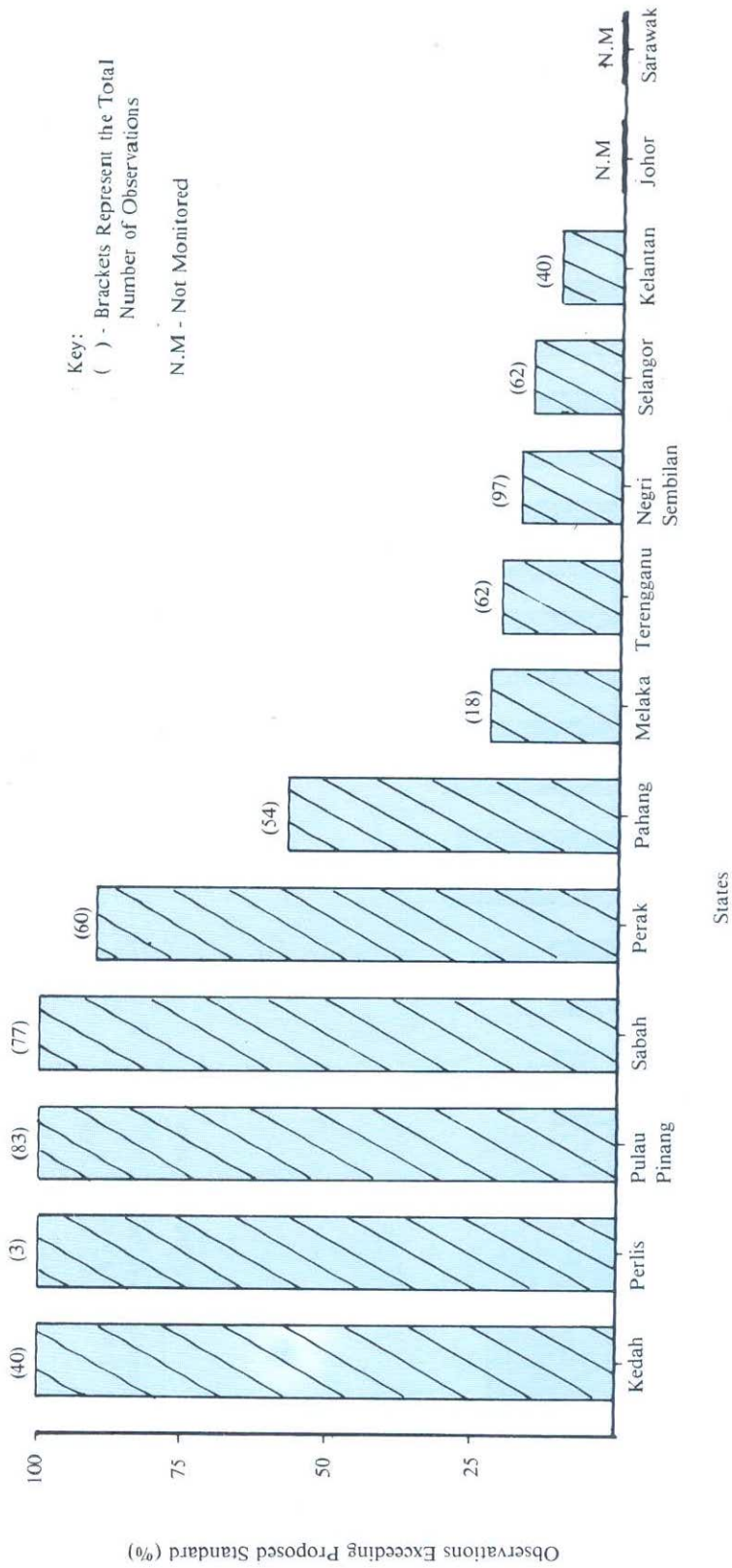


Figure 22. Malaysia: Status of Marine Water Quality in Terms of Nickel by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Nickel is 0.01 mg/l

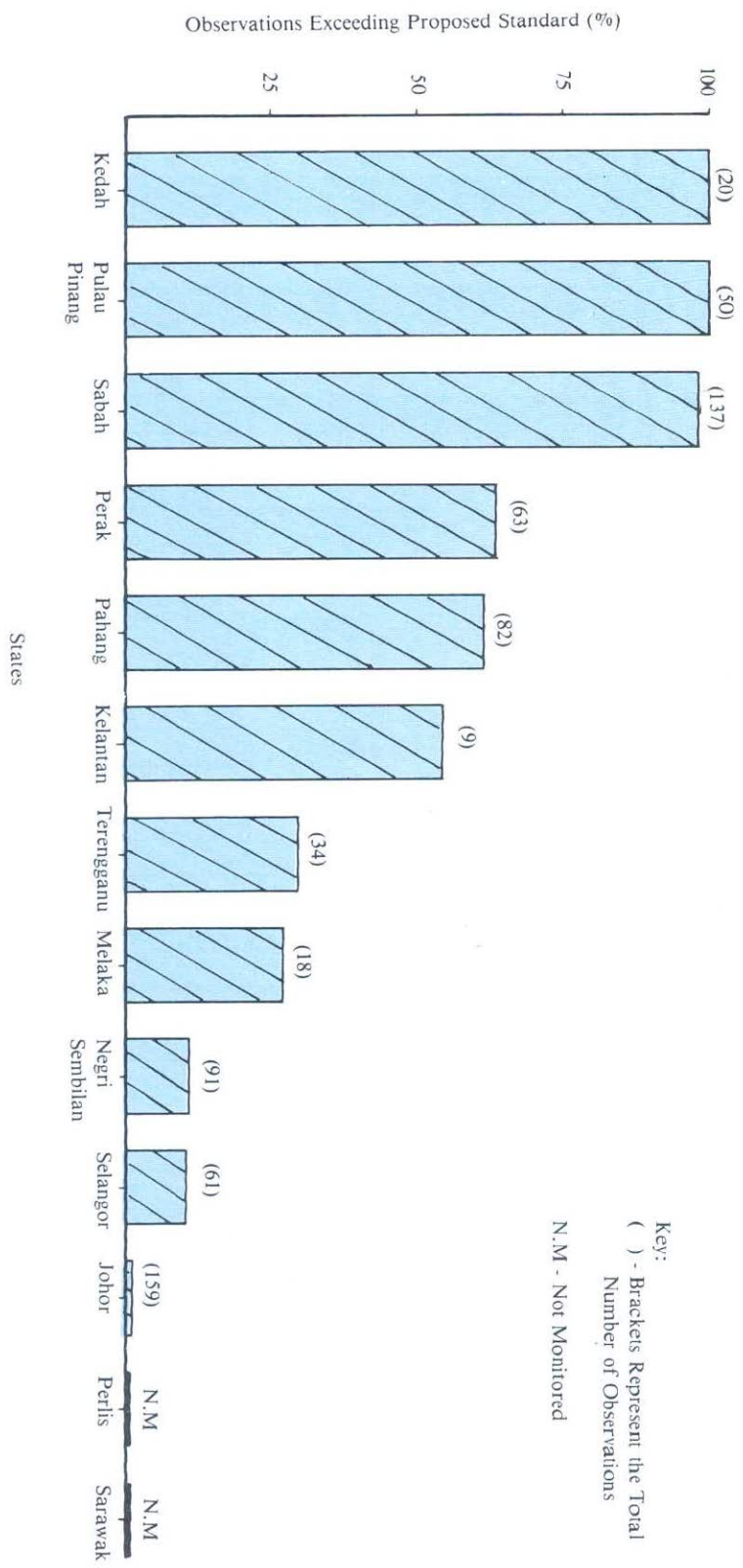


Figure 23. Malaysia: Status of Marine Water Quality in Terms of Copper by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Copper is 0.01 mg/l

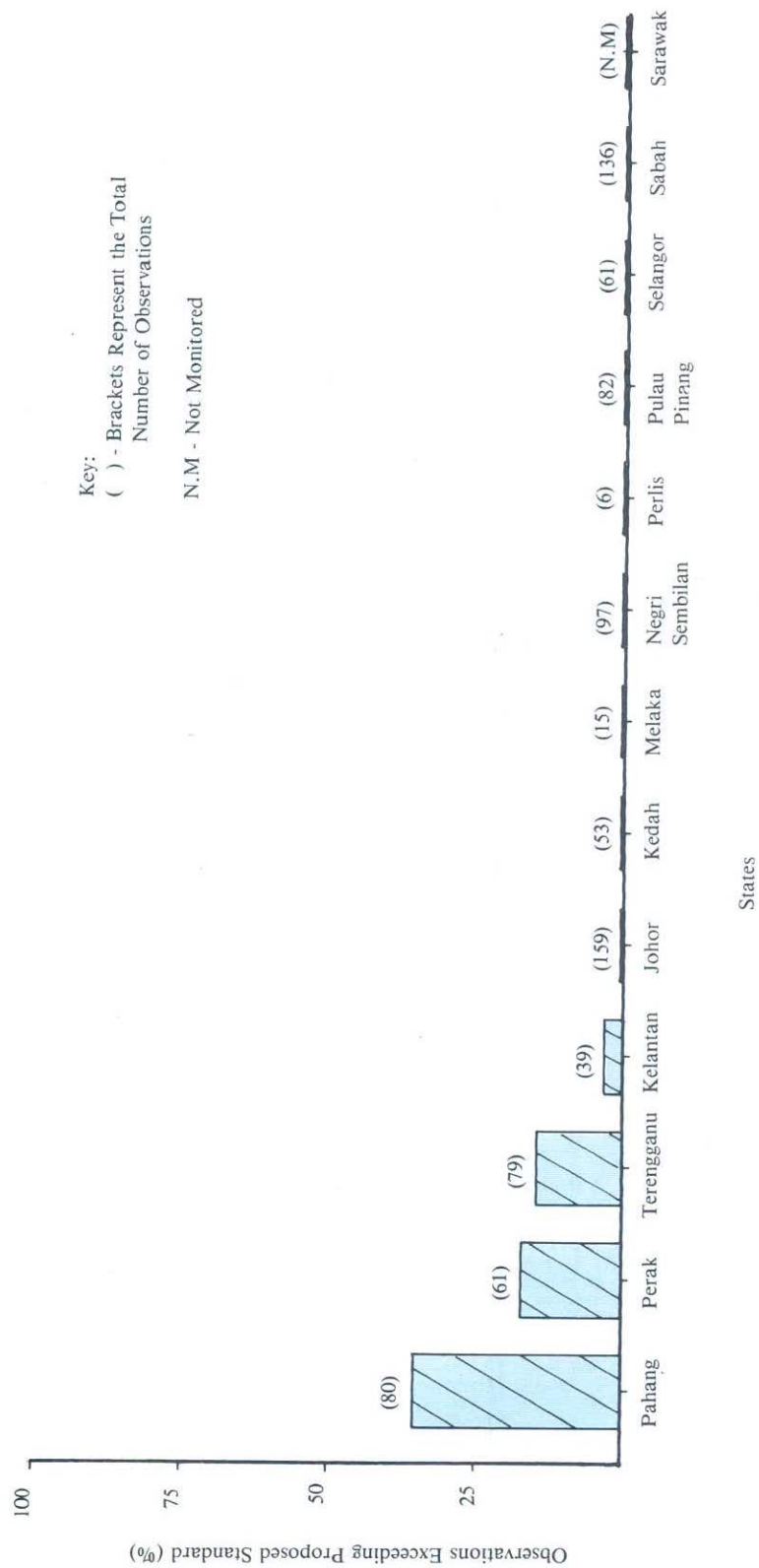


Figure 24. Malaysia: Status of Marine Water Quality in Terms of Chromium by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Chromium is 0.1 mg/l

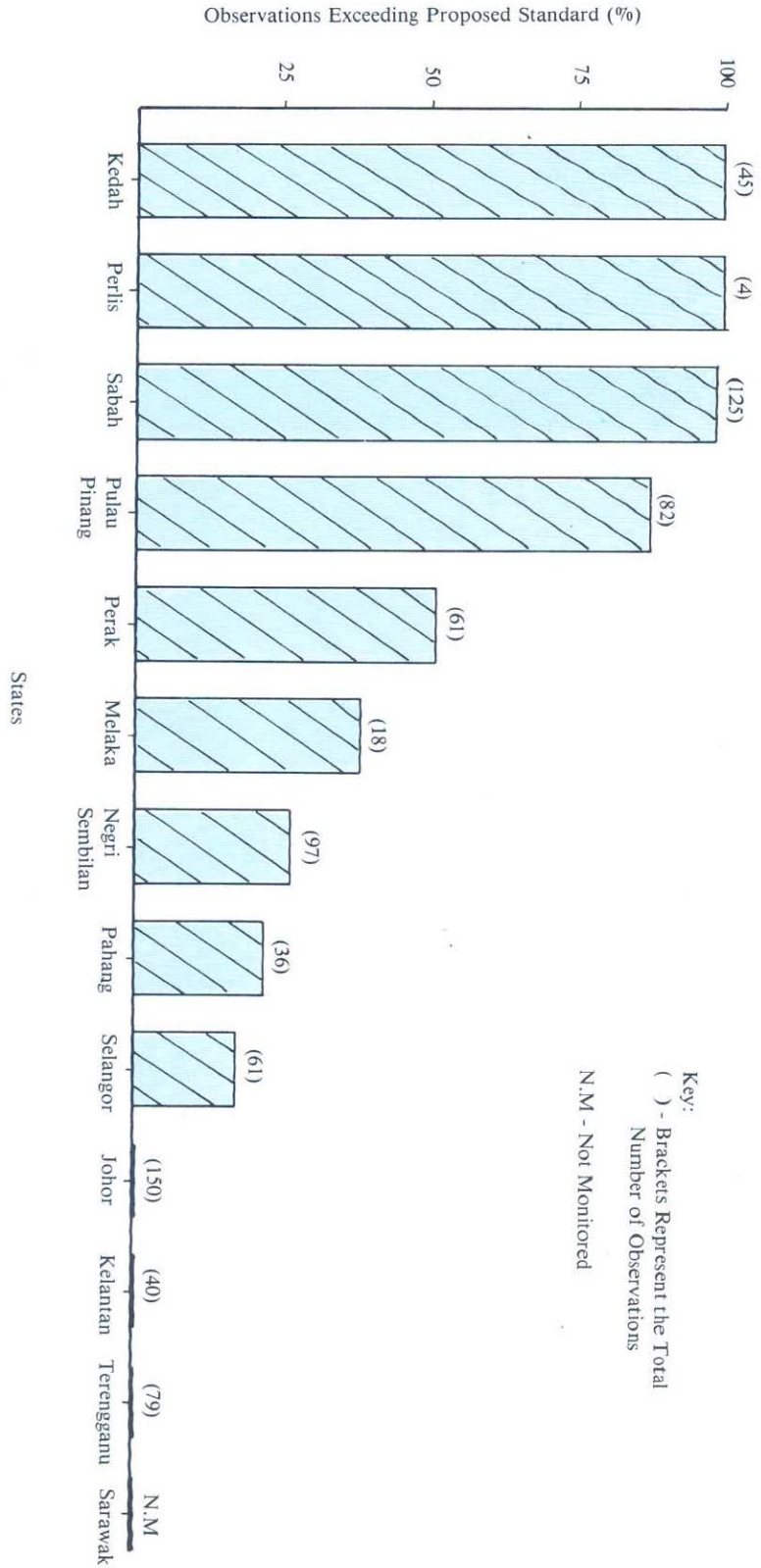


Figure 25. Malaysia: Status of Marine Water Quality in Terms of Mercury by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Mercury is 0.0005 mg/l

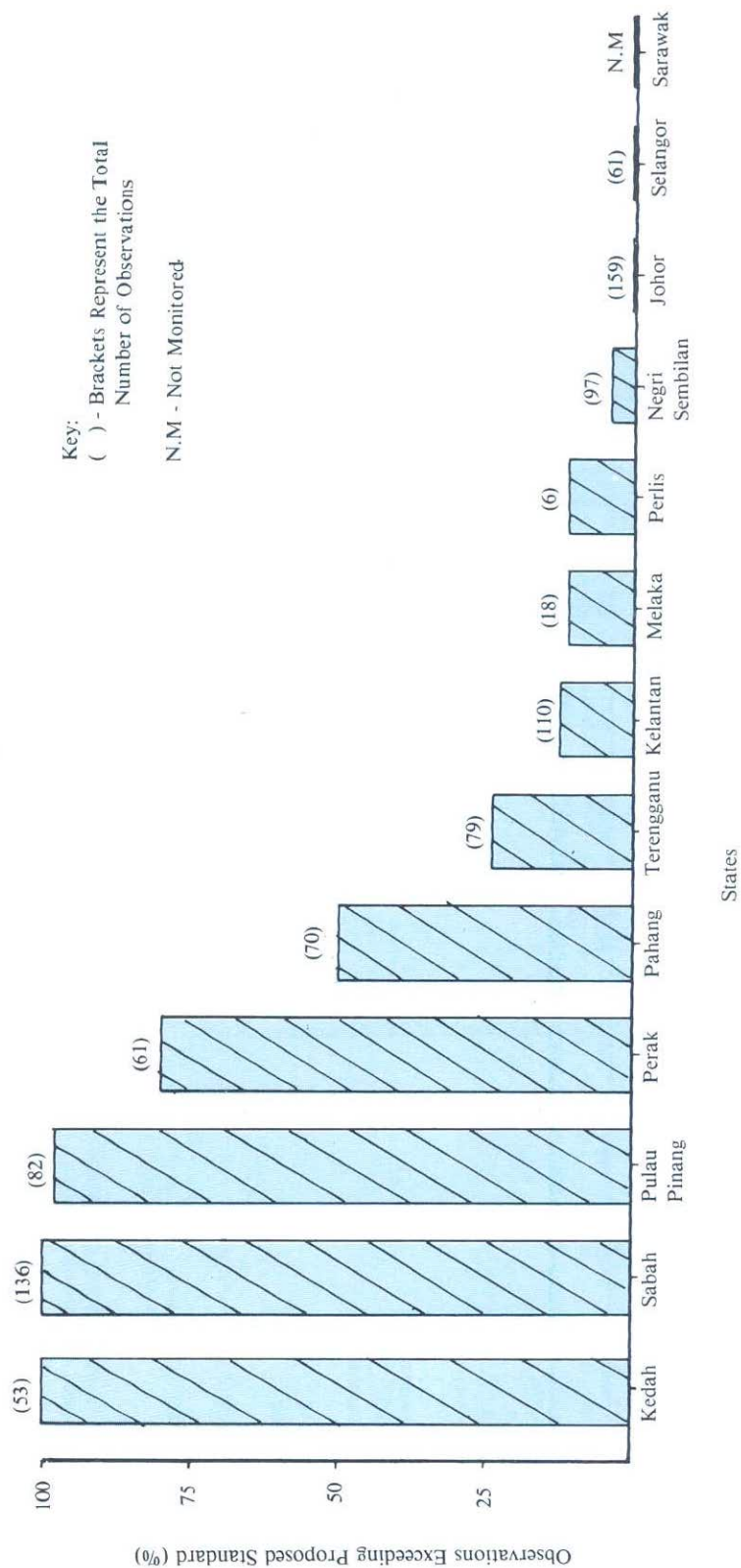


Figure 26. Malaysia: Status of Marine Water Quality in Terms of Cadmium by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Cadmium is 0.005 mg/l

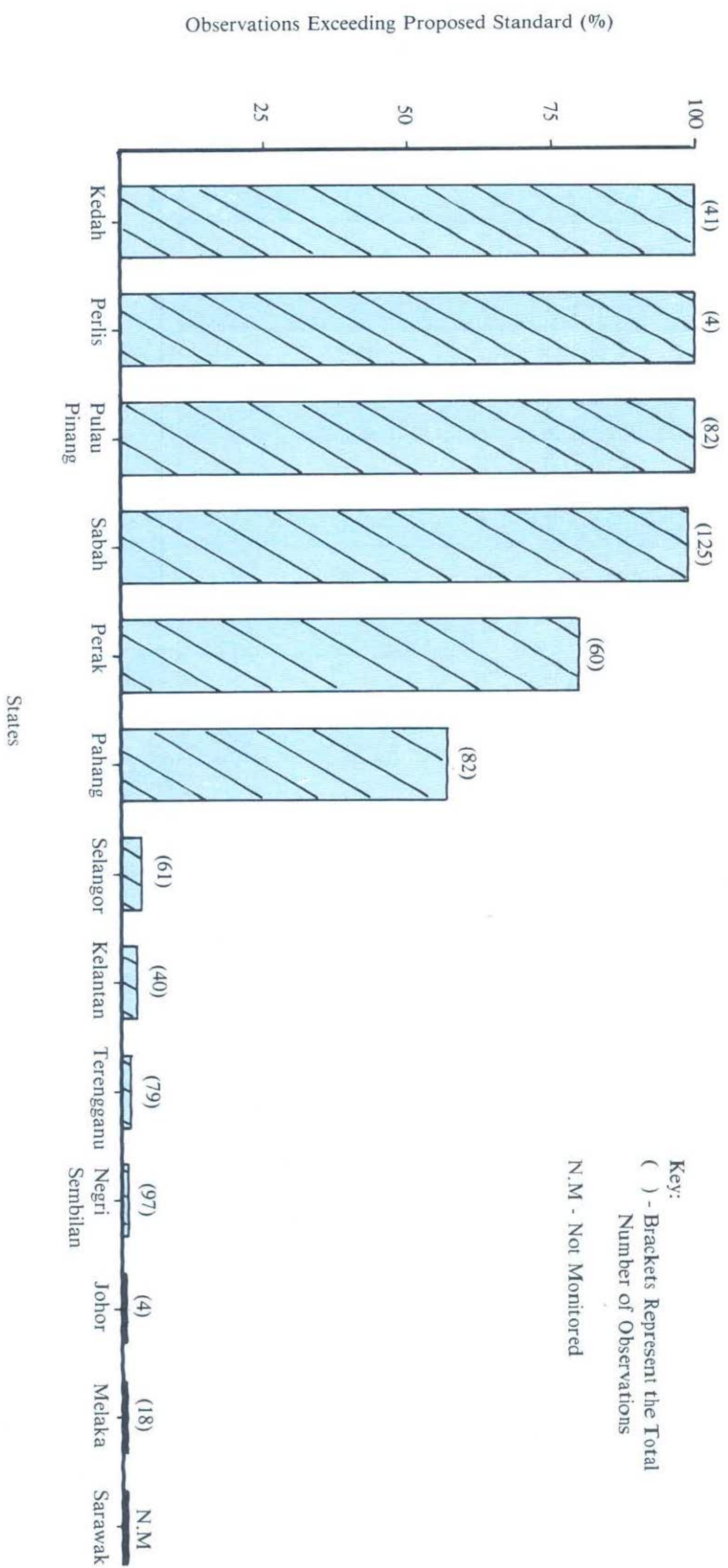


Figure 27. Malaysia: Status of Marine Water Quality in Terms of Lead by State, 1985—1986

Note:
 The Interim Proposed Standard on Conservation of Marine Aquatic Resources for Lead is 0.05 mg/l

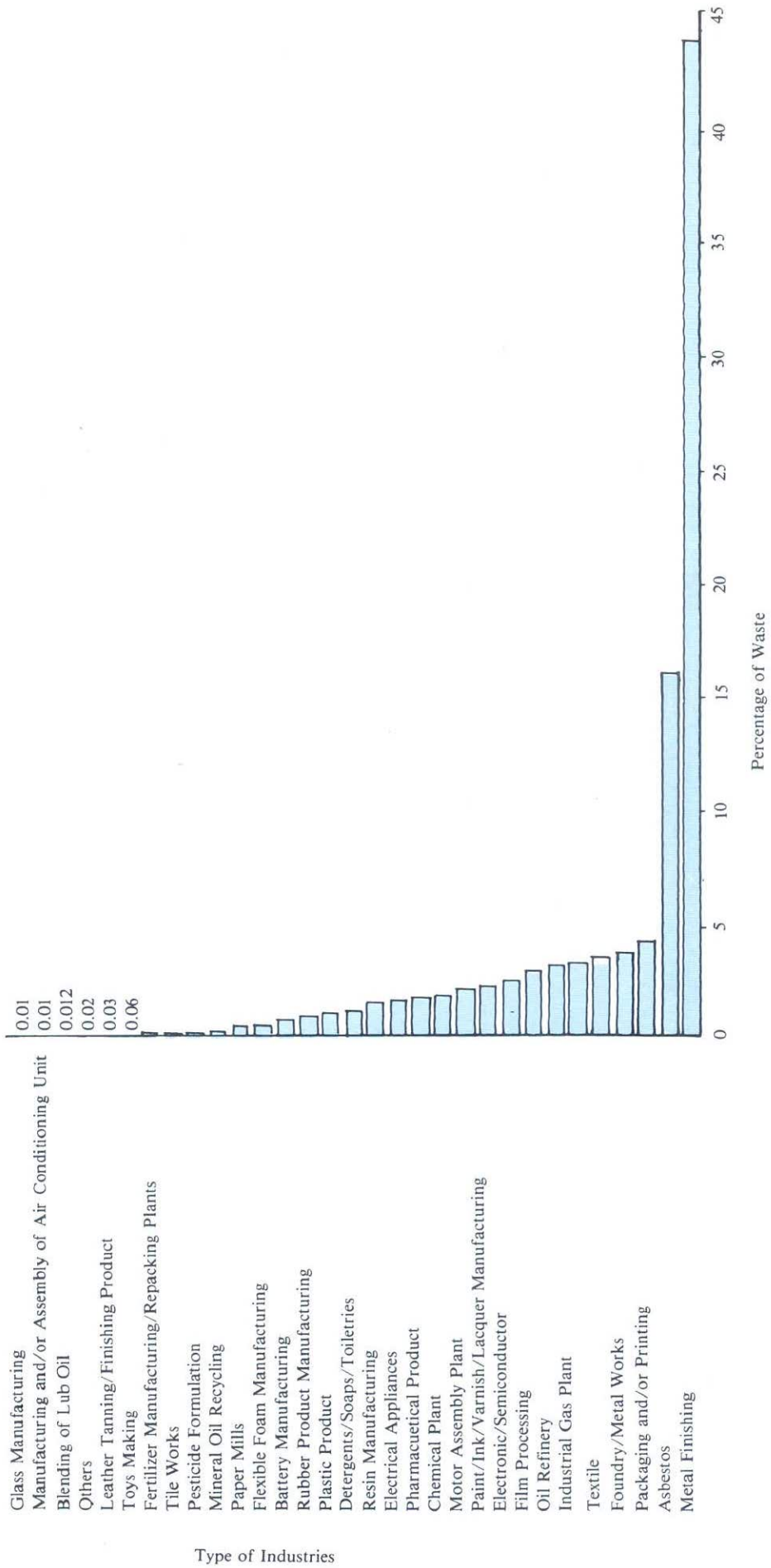


Figure 28. Malaysia: Distribution of Wastes by Industry, 1985

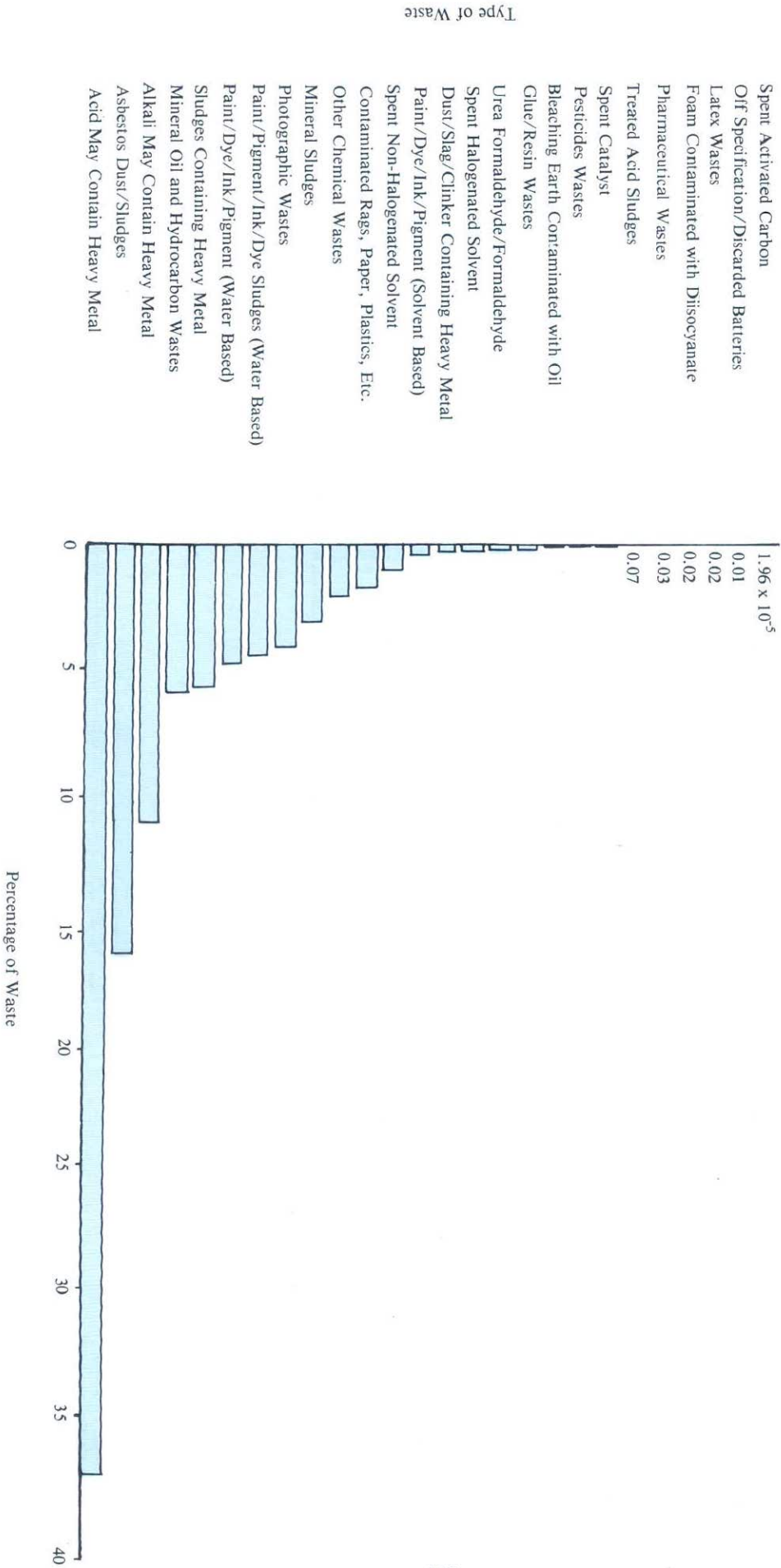


Figure 29. Malaysia: Distribution of Wastes by Type, 1985

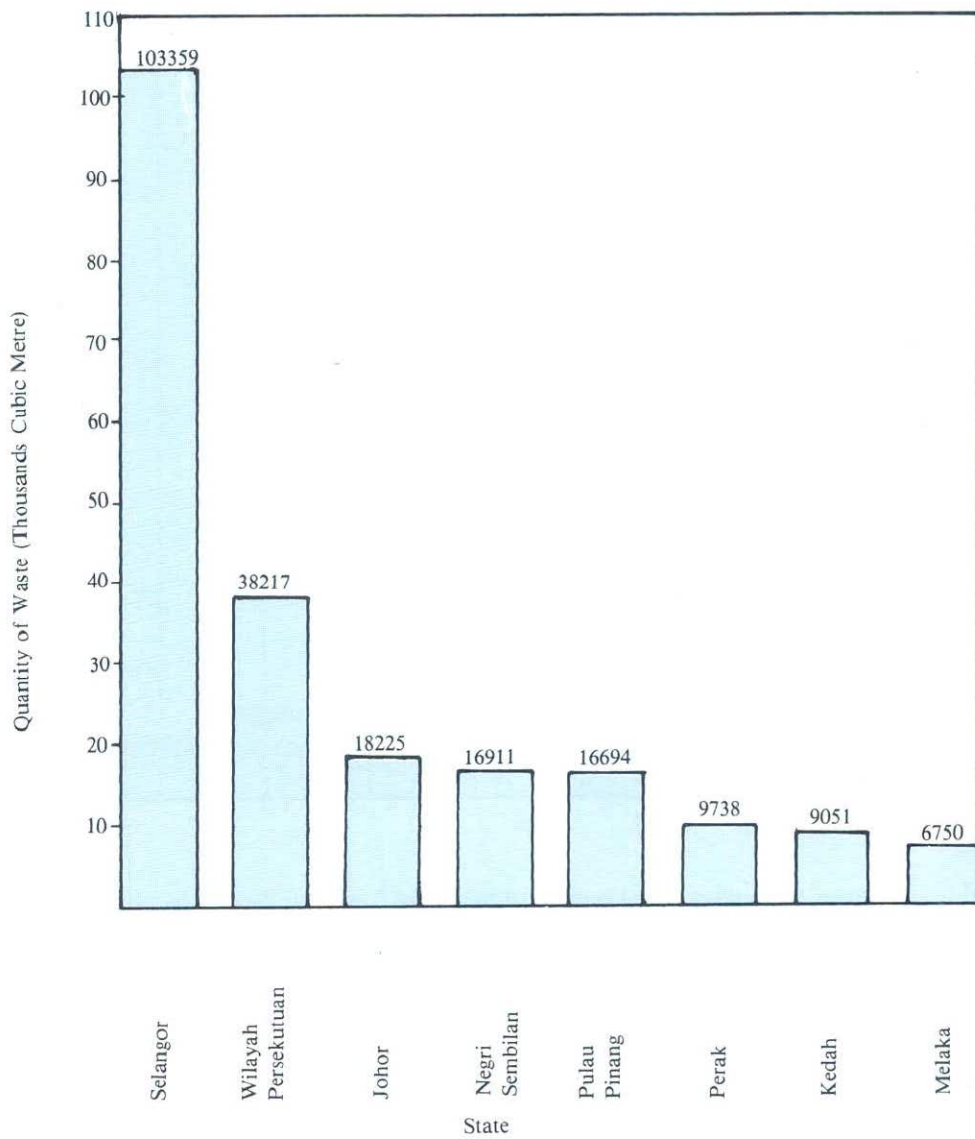


Figure 30. Peninsular Malaysia: Generation of Toxic and Hazardous Waste by State, 1985

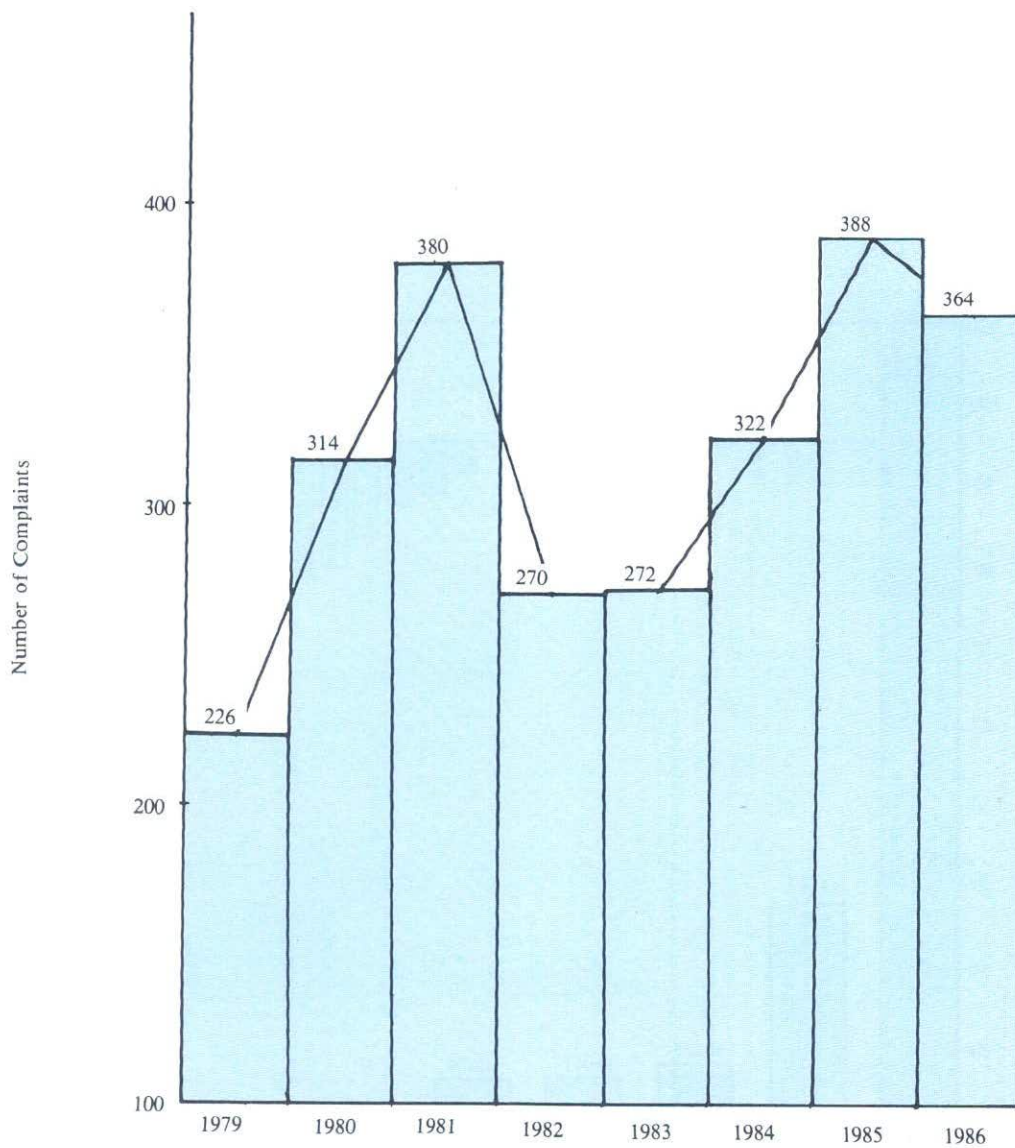


Figure 31. Malaysia: Trend in the Total Number of Complaints Received by the Department of Environment 1979—1986

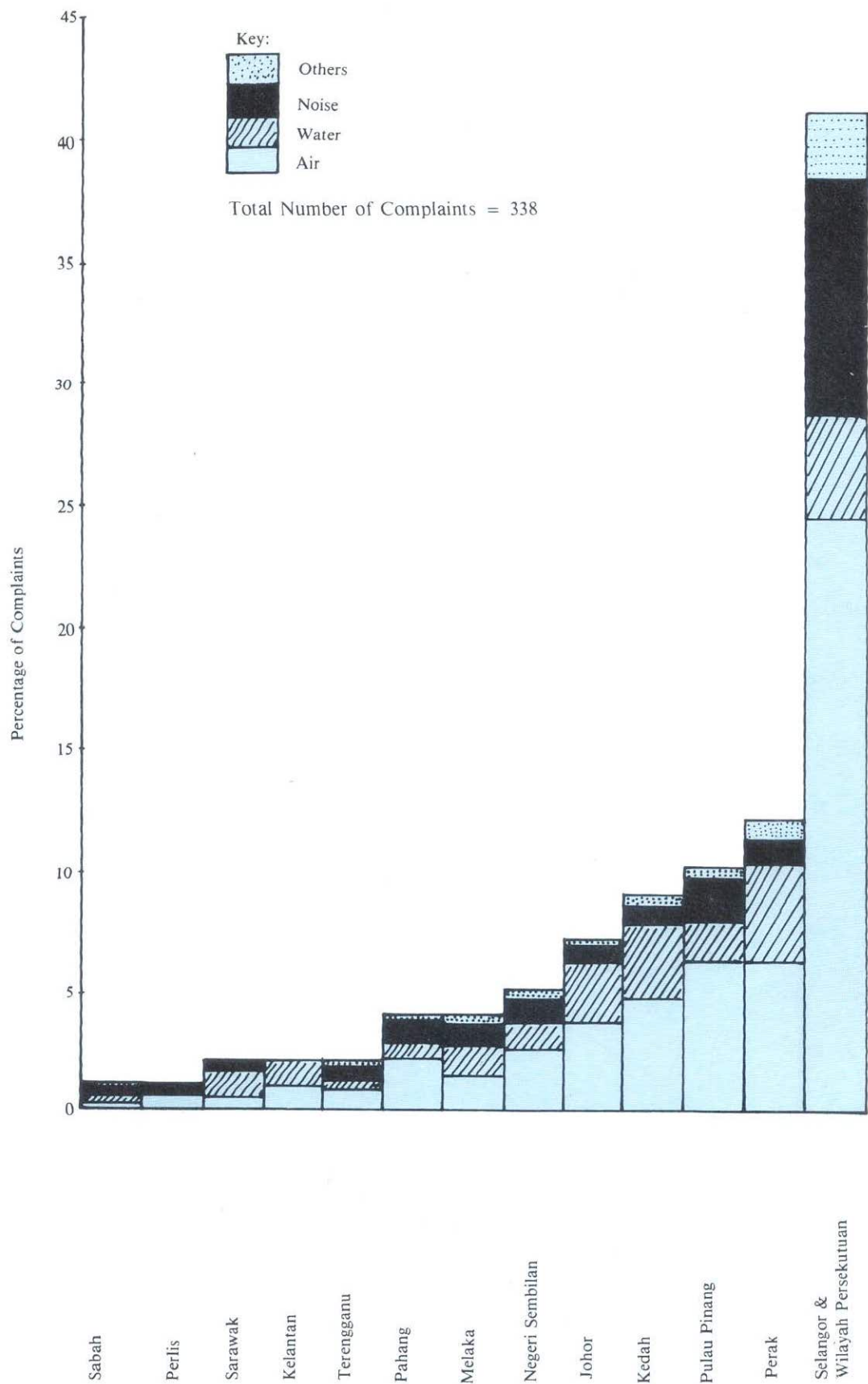


Figure 32. Malaysia: Nature of Pollution Complaints Received by the Department of Environment, 1985

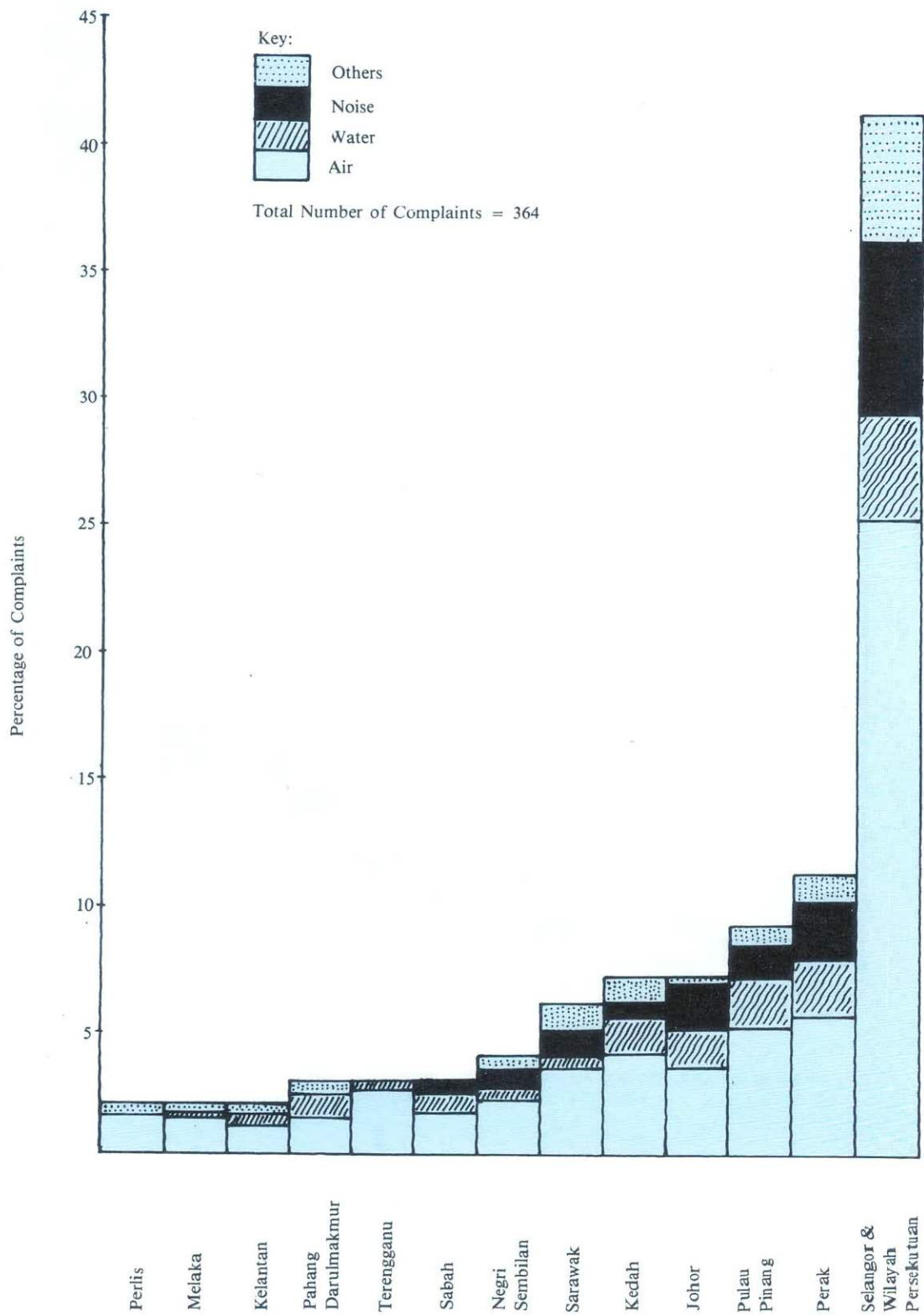


Figure 33. Malaysia: Nature of Pollution Complaints Received by the Department of Environment, 1986

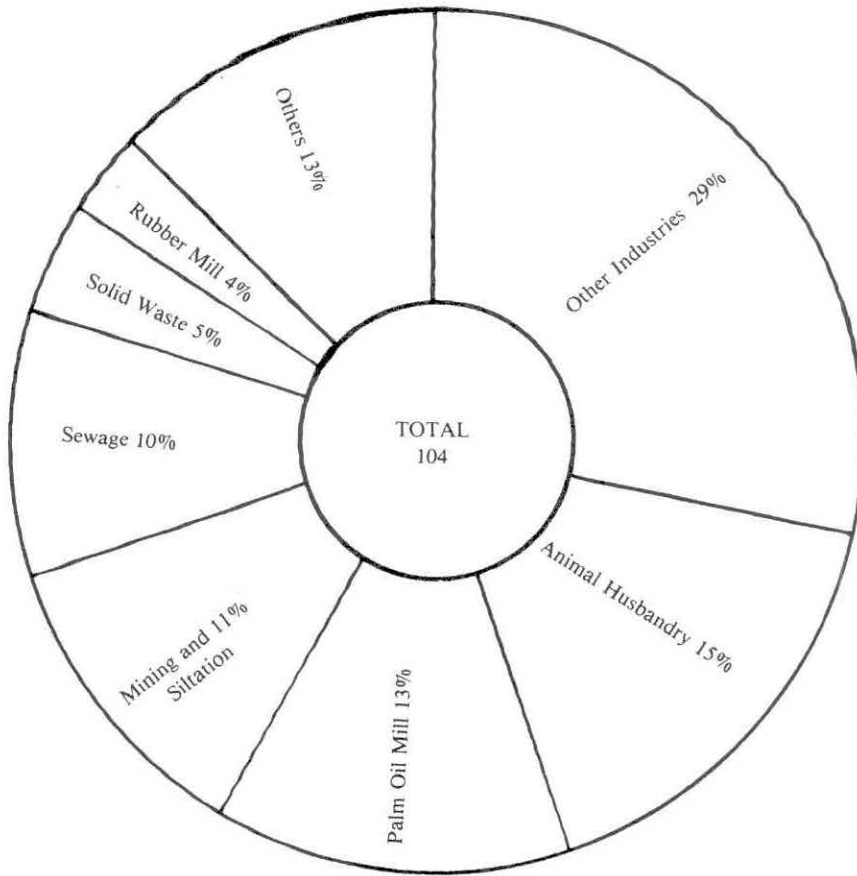


Figure 34. Malaysia: Sources of Water Pollution Complaints, 1985

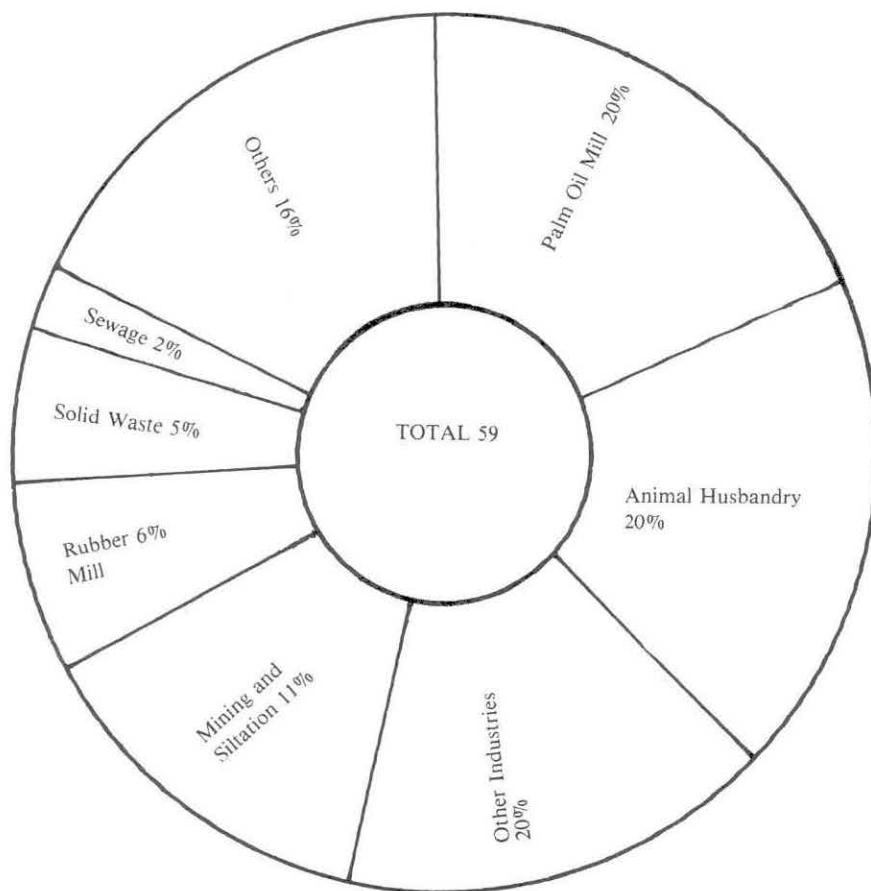


Figure 35. Malaysia: Source of Water Pollution Complaints, 1986

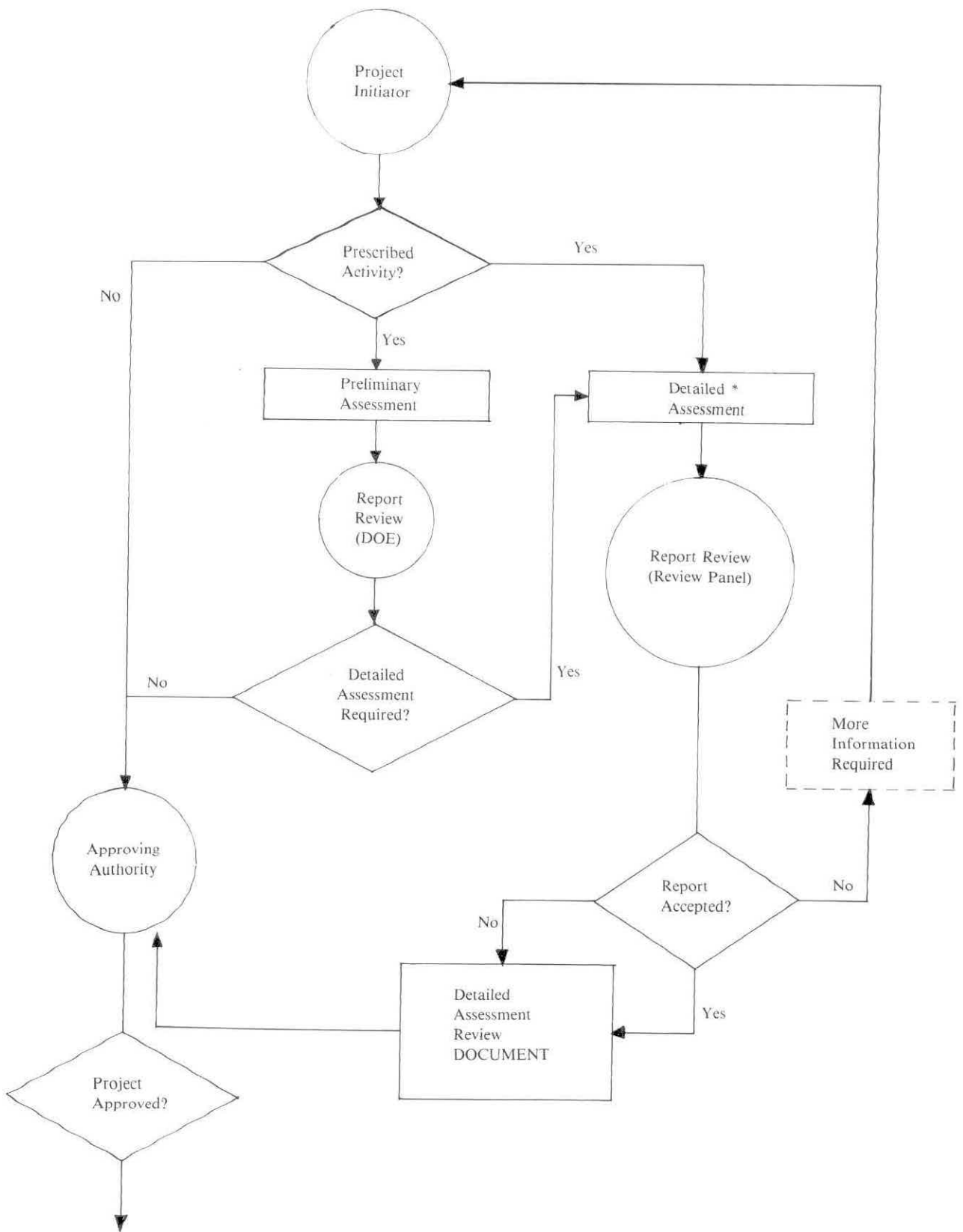


Figure 36. Malaysia: Outline of Environmental Impact Assessment Procedure

* Consultation with DOE on Terms of Reference

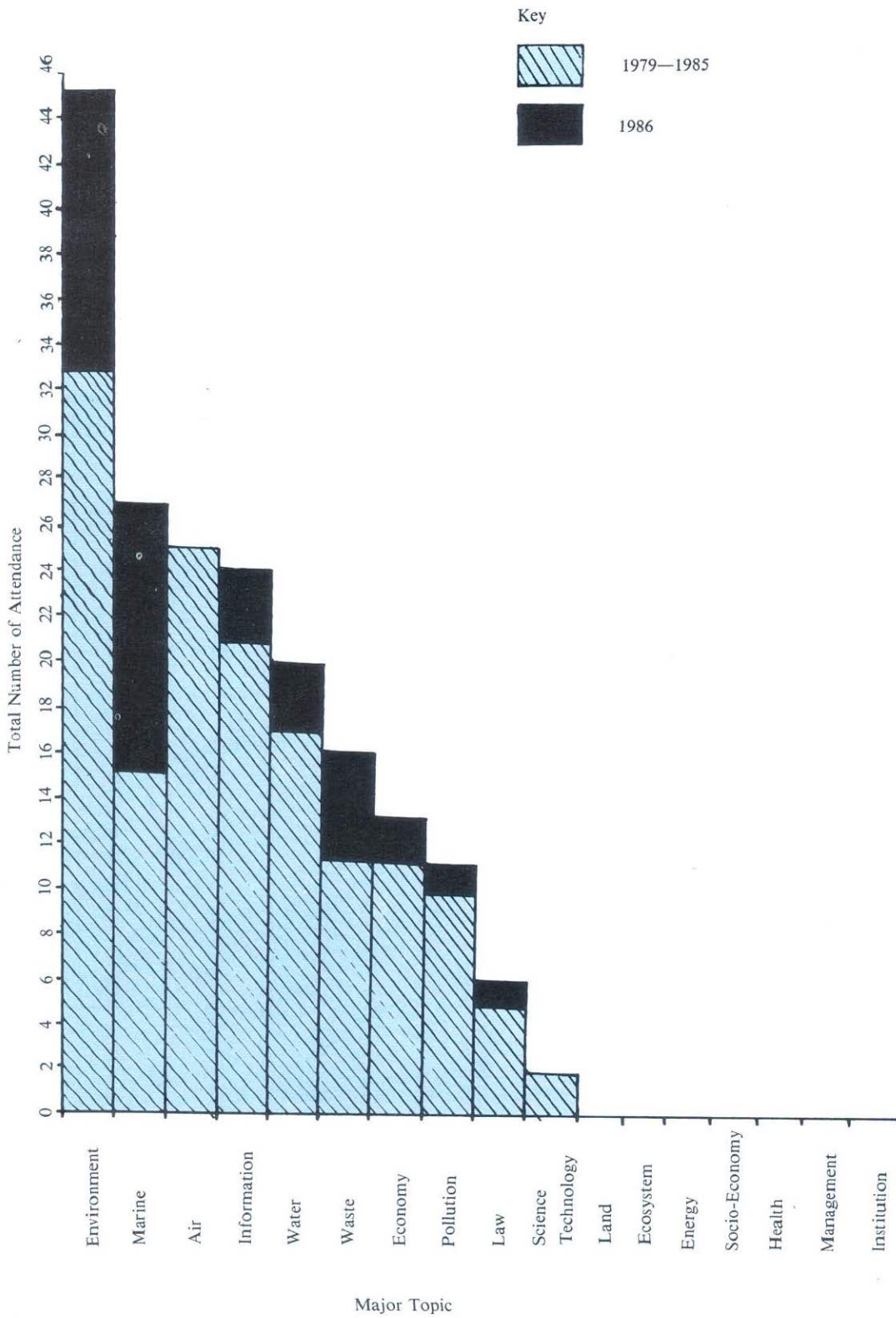


Figure 37. The Number of Attendance by DOE Staff at Training Courses Overseas by Major Topic, 1979-1986

TABLES

Table 1
Malaysia: List of Working Papers Submitted to the
Environmental Quality Council, 1985—1986

Date of Meeting	Papers Submitted
5 February, 1985	<ol style="list-style-type: none"> 1. Draft Toxic and Hazardous Waste Regulations 2. Minimising Maritime Pollution in Malaysian Waters 3. Vehicles Air Pollution 4. Proposed Amendments to Environmental Quality Act and its Regulations 5. <i>Towards the Formulation of a National Oil Spill Contingency and Response Plan for the South China Sea</i>
11 June, 1985	<ol style="list-style-type: none"> 1. Environmental Quality (Control of Lead Concentration in Motor Gasoline) — Draft Regulations 2. A Decade of Environmental Management and the World Environment Day (Sambutan Satu Dekad Pengurusan Alam Sekitar dan Hari Alam Sekitar Sedunia 1985)
22 October, 1985	<ol style="list-style-type: none"> 1. A Review of Environmental Issues Raised by Environmental Quality Council at its 28th Meeting 2. Proposed Objectives for Air Quality Monitoring Programmes in Malaysia 3. Work of the World Commission on Environment and Development: Environmental Perspective to the Year 2000 and Beyond 4. Report on Seminar on the State of the Environmental Quality
26 March, 1986	<ol style="list-style-type: none"> 1. Environmental Issues: Feedback of the Review of Environmental Issues Raised by the Environmental Quality Council at its 28th Meeting 2. Motor Vehicle Noise Regulations 3. Environmental Impact Assessment Order, 1986 4. Co-operation between the Ministry of Science Technology and the Environment and the State Government: Environmental Management Strategy and Policy
2 October, 1986	<ol style="list-style-type: none"> 1. Environmental Quality (Control of Emissions from Diesel Engines) Regulations, 1986 2. Environmental Perspective to the Year 2000 and Beyond
5 November, 1986	<ol style="list-style-type: none"> 1. An Analysis of the Nature and Extent of Working Papers Submitted Before the Environmental Quality Council (EQC), 1977—1986

Table 2
Malaysia: Status of Air Quality. Total Suspended Particulate
by Location, 1985—1986

Location	1985						1986					
	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard, 750 μ g/m ³ (Per Cent)	Number of observations	Minimum	Maximum	Mean	Observations exceeding standard, 75 μ g/m ³ (Per Cent)		
		ug/m ³					ug/m ³					
Pulau Pinang	31	19.0	450.0	118.0	61.3	103	13.0	485.0	90.0	70.6		
Seberang Prai	110	8.0	447.0	104.0	72.3	114	25.0	543.0	117.0	58.7		
Kuala Lumpur/Petaling Jaya, Selangor	215	10.0	609.0	182.0	95.8	165	9.0	507.0	130.0	82.2		
Shah Alam, Selangor						18	31.0	551.0	91.0	27.8		
Klang, Selangor						15	67.0	252.0	118.0	86.7		
Melaka Tengah, Melaka						25	13.0	608.0	122.0	72.0		
Pasir Gudang, Johor						14	33.0	283.0	105.0	57.1		
Kuantan, Pahang	61	20.0	172.0	73.0	54.0							
Kemaman, Terengganu	54	8.0	129.0	50.0	7.5							
Kuala Terengganu, Terengganu	31	20.0	226.0	69.0	45.2	136	2.0	211.0	86.0	61.0		
Inaman, Kota Kinabalu						37	64.0	217.9	130.5	97.3		
Lembaga Pelabuhan Birtulu, Sarawak	9	32.0	295.0	95.0	33.3	34	9.0	119.0	30.0	5.9		

Table 3
Peninsular Malaysia: Status of Air Quality Ambient Lead
Level by Location, 1985—1986

Location	Year										
	1985					1986					
	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard, 2.00 ug/m ³ (Per Cent)	Number of observations	Minimum	Maximum	Mean	Observations exceeding standard, 2.00 ug/m ³ (Per Cent)	
Pulau Pinang	30	0.20	4.34	0.97	6.70	87	0.00	1.55	0.48	0.00	
Seberang Prai	86	0.04	1.32	0.04	0.00	55	0.05	0.33	0.11	0.00	
Kuala Lumpur/Petaling Jaya, Selangor	204	0.10	5.60	2.29	67.20	188	0.05	5.50	1.27	34.00	
Shah Alam						19	0.20	4.40	0.87	10.50	
Melaka Tengah, Melaka	58	0.10	5.00	0.37	4.30	27	0.05	3.00	0.26	3.70	

Table 4
Peninsular Malaysia: Status of River Water Quality, 1985

NAME OF RIVER	BOD @ 20°C (mg/l)					Ammoniacal Nitrogen (mg/l)					Suspended Solids (mg/l)				
	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 1.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 1.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 50.0 mg/l (Per Cent)
PERLIS	20	1.0	3	1.4	0.0	20	0.01	1.24	0.38	10.00	20	10	555	112	70.0
KEDAH	35	1.0	6	1.7	2.8	35	0.03	1.02	0.27	22.80	35	13	420	74	40.0
MUDA	33	1.0	5	1.5	0.0	34	0.01	0.94	0.19	0.00	34	10	590	44	17.6
PERAI	46	1.0	5	1.6	0.0	46	0.01	2.95	0.57	13.00	46	10	140	42	21.7
JURU	38	1.0	142	28.8	0.0	39	1.07	19.9	7.08	100.00	40	15	175	60	57.5
PERAK	73	0.2	13	2.4	10.9	54	0.05	35.0	2.57	22.20	91	2	1100	172	56.0
BERNANM	13	0.2	5	1.5	4.0	4	0.10	0.33	0.20	0.00	15	2	160	55	53.3
SELANGOR	35	0.4	12	1.6	5.7	30	0.02	0.23	0.08	0.00	33	4	638	135	66.6
KELANG	122	0.5	40	6.1	36.2	119	0.12	16.0	3.72	76.40	119	5	3030	282	69.7
LANGAT	38	0.3	18	3.3	10.5	38	0.03	3.90	0.48	7.80	36	7	895	213	77.7
LINGGI	64	0.1	18	3.2	10.9	63	0.02	5.90	0.99	25.30	64	4	975	140	14.0
MELAKA	47	0.6	8	2.5	6.3	47	0.07	3.90	0.77	21.70	44	12	284	61	43.1
MUAR	80	0.1	15	1.4	2.5	80	0.05	5.00	0.30	6.20	80	5	196	43	75.0
BAHU PAHAT	60	0.1	4	0.9	0.0	60	0.04	3.60	3.60	0.17	60	5	218	37	21.6
JOHOR	68	0.2	29	2.6	0.0	68	0.02	9.60	0.59	0.17	68	4	123	41	26.4
ENDAU	40	0.1	4	1.2	0.0	39	0.02	3.60	0.53	12.80	40	5	137	38	27.5
ROMPIN	86	0.1	42	1.1	1.1	91	0.01	0.42	0.13	0.00	92	2	110	28	9.7
PAHANG	117	0.1	24	1.6	0.1	116	0.01	.00	0.25	4.30	118	5	662	55	28.8
KEMAMAN	48	0.1	14	2.3	4.2	40	0.07	3.40	0.31	2.50	48	8	455	72	41.6
TERENGGANU	28	0.3	4	1.6	0.0	21	0.06	0.65	0.21	0.00	29	8	117	45	24.1
KELANTAN	74	0.1	7	1.4	1.3	58	0.06	0.40	0.13	0.00	73	10	343	83	58.9

Table 5
Sabah and Sarawak: Status of River Water Quality, 1985

NAME OF RIVER	BOD @ 20°C (mg/l)				Ammoniacal Nitrogen (mg/l)				Suspended Solids (mg/l)						
	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 5.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 1.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 50.0 mg/l (Per Cent)
SABAH															
Padas	26	0.2	6.0	1.9	3.8	41	0.01	0.06	0.02	0.0	50	2	458	66	29
Sugut	29	0.2	7.3	1.6	3.4	18	0.01	0.05	0.02	0.0	46	4	184	40	30
Labok	15	0.2	15.0	2.8	20.0	9	0.01	0.04	0.02	0.0	24	2	773	144	37
Kinabatangan	19	0.7	5.0	2.4	0.0	10	0.01	0.50	0.07	0.0	21	15	352	118	57
Segama	3	1.5	3.1	2.0	0.0	1	0.01	—	0.01	0.0	4	14	184	107	75
SARAWAK															
Sarawak/ Samarahan	82	0.1	2.2	0.8	0.0	52	0.01	0.21	0.04	0.0	82	1	356	56	40
Btg. Lupar	30	0.2	8.3	1.0	3.3	16	0.01	0.18	0.04	0.0	30	2	660	56	27
Btg. Rajang	37	0.1	1.9	0.7	0.0	19	0.01	0.20	0.05	0.0	37	5	190	63	57
Btg. Kemena	4	0.2	0.7	0.4	0.0	2	0.02	0.02	0.02	0.0	4	10	60	36	25
Miri/Lutong	5	0.3	1.7	0.8	0.0	2	0.02	0.03	0.03	0.0	5	15	73	48	60
Btg. Baram	4	0.2	1.3	0.8	0.0	4	0.01	0.07	0.04	0.0	4	5	65	29	25
Limbang	1	0.3	—	0.3	0.0	—	—	—	—	0.0	—	—	168	168	100

Table 6
Peninsular Malaysia: Status of River Water Quality, 1986

NAME OF RIVER	BOD5 @ 20°C (mg/l)					Ammoniacal Nitrogen (mg/l)					Suspended Solids (mg/l)				
	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 5.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 1.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 50.0 mg/l (Per Cent)
PERLIS	24	1.0	3.0	1.5	0.0	24	0.11	0.78	0.28	0.00	24	10	40	55	42.0
KEDAH	42	1.0	6.0	1.5	2.3	42	0.01	1.55	0.31	4.76	41	10	155	45	49.0
MUDA	42	1.0	4.0	1.1	0.0	42	0.02	0.52	0.61	0.00	42	10	100	45	43.0
PERAI	63	1.0	9.0	2.1	4.7	64	0.05	10.90	1.00	20.30	64	5	190	48	28.1
JURU	56	2.0	61.0	16.2	13.8	54	0.12	16.60	5.57	92.60	56	5	315	55	34.5
PERAK	91	0.1	8.5	2.0	9.9	81	0.02	7.80	0.69	19.75	96	11	944	106	58.3
BERNAMB	11	0.3	2.2	1.1	0.0	8	0.01	0.13	0.06	0.00	12	17	907	214	83.0
SELANGOR	26	0.1	1.6	0.5	0.0	26	0.03	0.29	0.14	0.00	26	11	87	35	26.9
KELANG	219	0.3	61.0	7.1	37.4	216	0.14	15.00	3.66	78.20	214	8	1950	156	39.0
LANGAT	30	0.4	4.5	2.0	0.0	30	0.05	0.97	0.34	0.00	29	11	541	147	65.5
LINGGI	44	0.2	13.0	2.7	6.8	44	0.18	3.50	0.77	22.70	43	11	433	137	83.7
MELAKA	24	0.8	4.1	1.8	0.0	23	0.15	3.50	0.62	13.00	24	13	528	84	46.0
MUAR	68	0.1	3.5	1.0	0.0	60	0.04	0.86	0.20	0.00	60	5	211	38	25.0
BATU PAHAT	42	0.2	3.1	1.0	0.0	42	0.05	0.86	0.30	0.00	42	9	103	36	19.0
JOHOR	67	0.2	14.0	2.4	8.9	68	0.04	9.60	1.01	27.90	68	5	108	43	30.8
ENDAU	52	0.1	10.0	1.7	3.8	43	0.02	4.80	0.49	13.90	52	5	330	38	24.5
ROMPIN	79	0.1	3.4	1.1	0.0	80	0.02	0.30	0.08	0.00	78	2	55	17	3.80
PAHANG	206	0.1	15.1	1.5	4.8	204	0.02	6.00	0.29	4.40	206	5	305	39	23.3
KEMAMAN	69	0.1	28.2	1.5	2.9	54	0.04	18.40	1.27	16.70	69	2	534	58	32.0
TERENGGANU	38	0.2	7.1	1.3	2.6	33	0.02	0.92	0.24	0.00	37	4	140	41	29.7
KELANTAN	101	0.2	3.6	1.0	0.0	74	0.02	0.80	0.17	0.00	102	2	737	89	42.1

Table 7
Sabah and Sarawak: Status of River Water Quality, 1986

NAME OF RIVER	BOD @ 20 °C (mg/l)				Ammoniacal Nitrogen (mg/l)				Suspended Solids (mg/l)						
	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 5.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 1.0 mg/l (Per Cent)	Number of Samples	Minimum	Maximum	Mean	Samples Exceeding 50.0 mg/l (Per Cent)
SABAH															
Padas	7	0.2	0.8	0.4	0.0	18	0.01	0.06	0.02	0	24	4	168	50	25.0
Sugut	5	0.4	6.1	1.7	20.0	12	0.01	0.02	0.02	0	18	3	217	60	22.2
Labok	3	0.2	0.8	0.5	0.0	7	0.01	0.02	0.02	0	12	6	326	88	33.3
Kinabatangan	3	0.4	0.6	0.5	0.0	6	0.20	0.02	0.02	0	6	71	137	103	100.0
Segama	3	0.2	1.0	0.5	0.0	4	0.02	0.04	0.03	0	4	104	152	122	100.0
SARAWAK															
Sarawak/ Samarahan	45	0.1	7.0	0.80	2.2	33	0.02	0.90	0.14	0	51	1	445	56	29.4
Btg. Lupar	16	0.1	2.9	1.00	0.0	16	0.02	0.29	0.08	0	22	4	656	123	27.3
Btg. Rajang	26	0.4	2.6	1.34	0.0	26	0.03	0.30	0.07	0	36	5	142	62	52.7
Btg. Kemena	4	0.1	1.4	0.65	0.0	2	0.05	0.10	0.08	0	4	23	93	60	75
Miri/Lutong	7	0.1	23.9	5.81	28.6	7	0.05	1.89	0.65	28.6	8	2	19	12	0
Btg. Baram	2	0.2	0.5	0.35	0.0	2	0.14	0.43	0.29	0	2	119	202	161	100

Table 8
Peninsular Malaysia: Heavy Metal in Selected Rivers, 1985—1986

		River Name							
		Merbok	Perai	Juru	Perak	Kelang	Langat	Muar	Bt. Pahat
Pb	Number of Samples	42	20	26	50	188	21	35	25
	Samples Exceeding Standard (%)	97.6	95	100	10	34	38	8.6	12
	(Recommended Standard: 0.014 mg/l)								
	Minimum	0.010	0.005*	0.03	0.005*	0.005*	0.005*	0.005	0.005*
	Maximum	0.400	0.400	0.20	0.050	0.580	0.390	0.090	0.040
	Mean	0.109	0.149	0.09	0.008	0.025	0.035	0.008	0.011
Hg	Number of Samples	40	20	27	49	173			
	Samples Exceeding Standard (%)	27.5	60	37	6.12	2.3			
	(Recommended Standard: 0.014 mg/l)								
	Minimum	0.002	0.001	0.001*	0.001*	0.001*			
	Maximum	0.460	0.028	0.048	0.020	0.005			
	Mean	0.006	0.006	0.007	0.002	0.001			
Cd	Number of Samples	42	20	26	—	192	—	32	20
	Samples Exceeding Standard (%)	27.5	55	23	—	1	—	3.1	100
	(Recommended Standard: 0.014 mg/l)								
	Minimum	0.004	0.007	0.003	—	0.010*	—	0.010	0.010
	Maximum	0.110	0.080	0.052	—	0.030	—	0.050	0.010
	Mean	0.016	0.025	0.012	—	0.010	—	0.011	0.010

*Below Limit of Detection

		RIVER NAME							
		Merbok	Perai	Juru	Perak	Kelang	Langat	Muar	Bt. Pahat
Cu	Number of Samples	2	—	—	—	11	—	8	9
	Samples Exceeding Standard (%)	100	—	—	—	36.3	—	25	0.10* 33.3
	(Recommended Standard: 0.014 mg/l)								
	Minimum	0.00	—	—	—	0.01*	—	0.01	0.01
	Maximum	0.02	—	—	—	0.30	—	0.08	0.08
Mean	0.02	—	—	—	0.04	—	0.03	0.03	
Zn	Number of Samples	—	—	—	—	145	—	—	—
	Samples Exceeding Standard (%)	—	—	—	—	2.8	—	—	—
	(Recommended Standard: 0.014 mg/l)								
	Minimum	—	—	—	—	0.01*	—	—	—
	Maximum	—	—	—	—	0.69	—	—	—
Mean	—	—	—	—	0.08	—	—	—	
As	Number of Samples	—	—	49	—	—	—	—	—
	Samples Exceeding Standard (%)	—	—	4	—	—	—	—	—
	(Recommended Standard: 0.014 mg/l)								
	Minimum	—	—	—	0.001*	—	—	—	—
	Maximum	—	—	—	0.800	—	—	—	—
Mean	—	—	—	—	—	—	—	—	

*Below Limit of Detection

Table 9
Malaysia: Coastal Water Quality.
Faecal Contamination, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	123	2	25,000	3,609
Kedah	92	0	1,800,000	26,642
Kelantan	13	0	9,000	880
Melaka	18	0	350,000	52,448
Negri Sembilan	87	0	170,000	8,014
Pahang	73	0	9,000	510
Perak	51	0	180	58
Perlis	15	0	25,000	1,239
Pulau Pinang	110	0	78,000	15,795
Selangor	58	0	1,600,000	13,315
Terengganu	30	0	18,000	1,973
Sabah	107	0	1,800	208
Sarawak	15	18	18	18

Table 10
Malaysia: Coastal Water Quality.
Total Suspended Solids, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	163	1.0	88	10
Kedah	93	2.3	2,005	201
Kelantan	40	14.0	474	144
Melaka	18	0.0	211	81
Negri Sembilan	95	15.0	150	46
Pahang	85	1.0	1	815
Perak	57	20.0	7,100	386
Perlis	18	50.0	970	460
Pulau Pinang	113	10.0	690	109
Selangor	61	15.0	234	58
Terengganu	77	10.0	685	153
Sabah	136	12.0	15,600	2,582
Sarawak	15	2.0	62	44

Table 11
Malaysia: Coastal Water Quality. Oil and Grease,
1985

State	Number of Observation	mg/l			Observation Exceeding Standard, 0 mg/l (Per Cent)
		Minimum	Maximum	Mean	
Johor	62	0	10.0	1.4	34
Kedah	27	0	0.0	0.0	0
Kelantan	20	1	4.0	2.0	100
Melaka	4	0	3.0	1.3	50
Negeri Sembilan	33	0	4.0	1.0	39
Pahang	33	0	55.0	9.1	57
Perak	29	0	5.8	1.6	76
Perlis	6	0	0.0	0.0	0
Pulau Pinang	23	0	0.0	0.0	0
Selangor	15	0	8.0	0.8	47
Terengganu	36	1	11.0	2.7	100
Sabah	71	2	78.0	21.9	100

Table 12
**Malaysia: Coastal Water Quality, Oil and Grease,
 1986**

State	Number of Observation	Minimum	Maximum	Mean		Observation Exceeding Standard 0 mg/l (Per Cent)
				mg/l		
Johor	126	0	8	1.8		46
Kedah	30	0	5	0.4		17
Kelantan	20	1	4	2.2		100
Melaka	12	0	4	0.7		33
Negeri Sembilan	61	0	5	0.7		47
Pahang	23	0	14	3.5		39
Perak	24	0	51	3.8		33
Perlis	6	0	4	1.2		33
Pulau Pinang	63	0	0	0.0		0
Selangor	46	0	5	0.9		56
Terengganu	44	0	8	2.9		91
Sabah	72	2	27	9.4		100
Sarawak	20	0	6	1.2		30

Table 13
Malaysia: Coastal Water Quality. Arsenic, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	159	0.000	0.000	0.000
Kedah	60	0.001	0.000	0.003
Kelantan	40	0.000	0.008	0.000
Melaka	18	0.000	0.000	0.000
Negeri Sembilan	96	0.000	0.005	0.000
Pahang	44	0.000	0.000	0.000
Perak	59	0.000	0.050	0.003
Perlis	5	0.001	0.040	0.007
Pulau Pinang	83	0.001	0.005	0.002
Selangor	61	0.000	0.015	0.001
Terengganu	78	0.000	0.000	0.000
Sabah	—	—	—	—
Sarawak	—	—	—	—

Table 14
Malaysia: Coastal Water Quality. Cadmium,
1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	159	0.000	0.010	0.000
Kedah	53	0.007	0.060	0.042
Kelantan	40	0.000	0.520	0.018
Melaka	18	0.001	0.006	0.002
Negeri Sembilan	97	0.000	0.004	0.000
Pahang	70	0.000	4.000	0.118
Perak	61	0.000	0.180	0.083
Perlis	6	0.038	0.057	0.047
Pulau Pinang	82	0.030	0.068	0.049
Selangor	61	0.000	0.002	0.000
Terengganu	79	0.000	0.400	0.026
Sabah	136	0.020	0.100	0.051
Sarawak	—	—	—	—

Table 15
Malaysia: Coastal Water Quality. Chromium, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	159	0.000	0.000	0.000
Kedah	53	0.000	0.100	0.053
Kelantan	39	0.000	0.200	0.012
Melaka	18	0.000	0.012	0.003
Negeri Sembilan	97	0.000	0.015	0.001
Pahang	80	0.000	0.230	0.062
Perak	61	0.000	0.400	0.077
Perlis	6	0.040	0.080	0.063
Pulau Pinang	82	0.020	0.070	0.049
Selangor	61	0.000	0.012	0.001
Terengganu	79	0.000	0.200	0.029
Sabah	136	0.010	0.080	0.035
Sarawak	—	—	—	—

Table 16
Malaysia: Coastal Water Quality. Copper, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	159	0.000	0.310	0.005
Kedah	20	0.020	0.040	0.027
Kelantan	9	0.000	0.120	0.042
Melaka	18	0.002	0.108	0.014
Negeri Sembilan	91	0.000	0.037	0.008
Pahang	82	0.000	0.180	0.063
Perak	63	0.000	0.700	0.091
Perlis	—	—	—	—
Pulau Pinang	50	0.020	0.040	0.025
Selangor	61	0.000	0.070	0.015
Terengganu	34	0.000	0.150	0.033
Sabah	137	0.010	0.400	0.059
Sarawak	—	—	—	—

Table 17
Malaysia: Coastal Water Quality. Mercury, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	159	0.000	0.001	0.000
Kedah	45	0.001	0.020	0.004
Kelantan	40	0.000	0.000	0.000
Melaka	18	0.000	0.005	0.001
Negeri Sembilan	97	0.000	0.022	0.001
Pahang	36	0.000	0.190	0.014
Perak	61	0.000	0.050	0.009
Perlis	4	0.002	0.006	0.003
Pulau Pinang	82	0.003	0.008	0.005
Selangor	61	0.000	0.005	0.000
Terengganu	79	0.000	0.000	0.000
Sabah	125	0.000	0.000	0.000
Sarawak	—	—	—	—

Table 18
Malaysia: Coastal Water Quality. Lead, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	4	0.000	0.480	0.005
Kedah	41	0.150	0.260	0.207
Kelantan	40	0.000	0.200	0.005
Melaka	18	0.000	0.028	0.010
Negeri Sembilan	97	0.000	0.065	0.012
Pahang	82	0.000	1.310	0.423
Perak	60	0.002	0.700	0.250
Perlis	4	0.180	0.200	0.196
Pulau Pinang	82	0.020	0.260	0.206
Selangor	61	0.000	0.170	0.014
Terengganu	79	0.000	0.240	0.011
Sabah	125	0.050	0.750	0.307
Sarawak	—	—	—	—

Table 19
Malaysia: Coastal Water Quality. Nickel, 1985—1986

State	Number of Observation	Minimum	Maximum	Mean
		mg/l		
Johor	—	—	—	—
Kedah	40	0.025	0.340	0.208
Kelantan	40	0.000	0.350	0.027
Melaka	18	0.002	0.359	0.025
Negeri Sembilan	97	0.000	0.031	0.007
Pahang	54	0.000	0.520	0.180
Perak	60	0.000	0.850	0.209
Perlis	3	0.170	0.190	0.185
Pulau Pinang	83	0.060	0.380	0.240
Selangor	62	0.000	0.035	0.032
Terengganu	62	0.000	0.400	0.065
Sabah	77	0.030	0.800	0.271
Sarawak	—	—	—	—

Table 20
Malaysia: Forest and Major Crops.
Area by Type, 1986

Types of Vegetation	Area (Million Hectare)	Total Land (Per Cent)
Forest	20.6	62.4
Rubber	2.1	6.4
Oil Palm	1.1	3.3
Padi	0.7	2.1
Coconut	0.4	1.2
Others	0.1	0.3
Total	25.0	75.5

Note:

Total land area is 33.01 Million Hectare

Source: Forestry Department, Malaysia

Table 21
Malaysia: Distribution and Extent of Major
Forest Type. Area by Region

Region	Forest Type (Million Hectare)			
	Dipterocarp	Freshwater Swamp	Mangrove	Total
Peninsular Malaysia	5.62	0.46	0.11	6.19
Sabah	3.97	0.17*	0.32	4.46
Sarawak	7.78	1.47	0.17	9.42
Total	17.37	2.10	0.60	20.07

*Estimated

Source: Forestry Department, Malaysia, 1986

Table 22
Malaysia: Proposed Permanent Forest
Estates. Area by Region

Region	Protective Forest (Million Hectare)	Productive Forest	Total
Peninsular Malaysia	1.90	2.85	4.75
Sabah	0.35	3.00	3.35
Sarawak*	2.42	3.24	4.64
Total	3.65	9.09	12.74

*Estimated

Source: Forestry Department, Malaysia, 1986

Table 23
Malaysia: Sanitation Facilities.
Population Served by Type, 1986

Type of Facility	Population Served (Per Cent)		
	1970 Census	1980 Census	1985 Census
Central Sewerage System	3.4	4.0	5.3
Flush Toilets Connected to Septic Tanks or Communal Treatment Plants	16.0	21.8	30.6
Pour Flush Latrine	2.6	30.3	39.2
Bucket Latrine	17.1	1.1	3.4
Pit Latrine	27.8	15.3	8.5
Hanging Latrine	33.1	4.5	2.8
No Facility	—	16.4	10.2

Source: Local Government Division,
 Ministry of Housing and
 Local Government, 1986

Table 24
Malaysia: Enforcement of Motor Vehicles (Control of Smoke and Gas Emission)
Rules 1977. Vehicles Tested and Summoned by State, 1985—1986

State	Year					
	1985			1986		
	Number of Vehicles		Compliance (Per Cent)	Number of Vehicles		Compliance (Per Cent)
	Stopped for Inspection	Summoned		Stopped for Inspection	Summoned	
Perlis	140	13	91	218	35	84
Kedah	1340	294	79	1104	200	91
Pulau Pinang	1937	431	78	1210	181	85
Perak	762	210	72	740	110	85
Selangor	1007	202	80	2153	482	78
Wilayah Persekutuan Kuala Lumpur	3812	382	90	5481	1524	73
Negeri Sembilan	1398	161	88	434	102	76
Melaka	1421	260	82	1074	339	68
Johor	466	78	83	4923	461	91
Pahang	416	56	87	3587	363	90
Terengganu	121	24	80	425	80	81
Kelantan	391	48	88	483	94	81
Sabah			Education Campaigns Only			
Sarawak			Education Campaigns Only			
Total	13211	2059	84	22932	3971	83

Table 25
Malaysia: Enforcement of Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977. Vehicles Tested, Summoned and Compound Fees Collected, 1985—1986

Subject	Year	
	1985	1986
Number of Enforcement Campaigns	123	206
Number of Vehicles Stopped for Inspection	13,211	22,932
Number of Vehicles Tested with Meter	2,059	3,971
Number of Vehicles Summoned	2,059	3,971
Percentage Compliance	84	83
Compound Collected (M\$)	46,760.00	23,615.00
Total Number of Diesel Vehicles Registered	250,631	260,423

Table 26
Malaysia: Oil Spill Sighting and Recovered Cleaning Up Cost by Location, 1985—1986

Location	Number of Sightings		Cost (M\$)	
	1985	1986	1985	1986
1. Port				
1.1 Johor Bahru	6	4	13374.10	4839.83
1.2 Kuantan	—	4	—	1800.00
1.3 Kelang	—	1	—	
2. Straits of Malacca				
2.1 At sea	—	6	—	—
2.2 Oil Depots/Installations	—	2	—	—
3. South China Sea				
3.1 At sea	—	5	—	—
3.2 Oil Depots/ Installations	—	2	—	—
4. Inland River				
4.1 Sarawak	—	1	—	13209.70
TOTAL	6	25	13374.10	19849.50

Table 27
Malaysia: Oil Spill Incident.
Number of Sources, 1985—1986

Source	Number of Cases	
	1985	1986
1. Bilge/bunkering	3	7
2. Vessel breakdown/accidents	—	3
3. Load transfer	3	6
4. Tank Cleaning/Ballasting	—	3
5. Not known	—	6
TOTAL	6	25

Table 28
Malaysia: Contravention Licence Applications Under
Section 22(1) Environmental Quality Act, 1974.
Number by Applicant, 1984—1986

Applicant	Year		
	1984	1985	1986
Woodbased Industries	17	16	26
Palm Oil Mills	1	3	1
Government Departments	3	2	4
Project Developers	—	2	1
Others	3	3	5
TOTAL	24	26	37

Table 29
Malaysia: Contravention Licence
Applications Under Section 22(1), Environmental
Quality Act, 1974. Number by Type, 1984—1986

Type of Contravention	Year		
	1984	1985	1986
Open Burning of Wastes	16	13	24
Operation of Incinerator not of Approved Design	4	4	10
Emission of dark smoke	3	2	2
Emission of particulates	1	1	—
Non-use of Best practicable Means	—	2	—
Emission of Unburnt ash	—	4	1
TOTAL	24	26	37

Table 30
Malaysia: Contravention Licence Applications Under Section 25(1),
Environmental Quality Act, 1974. Number by Industry, 1984—1986

Industry	Year		
	1984	1985	1986
Beverage	11	8	17
Chemical	4	0	6
Electrical Goods	2	1	2
Food	20	6	19
Paper	5	2	2
Palm Oil Refineries	17	13	20
Textile	14	7	16
Others	12	4	17
TOTAL	85	41	99

Table 31
Malaysia: Contravention Licence Applications Under Section 25(1),
Environmental Quality Act, 1974. Number by Justification, 1986

Justification	Number
Lack of land	19
Financial constraint	4
Upgrading of treatment plant	11
Construction of treatment plant	23
Treatment technology	5
Discharge into Central Sewerage Plant	13
Others	19
TOTAL	99

Table 32
Malaysia: Enforcement Actions Under the Environmental
Quality Act, 1974. Number by Action, 1984—1986

Action	Year		
	1984	1985	1986
Warnings/directives	197	206	899
Compounds	87	199	182
Prosecutions	98	32	41

Table 33
Malaysia: Offences Compounded Under the Environmental
Quality Act (Clean Air) Regulations 1978. Number by
Type, 1984—1986

Regulation	Type of offence	Year		
		1984	1985	1986
7	Using incinerator of approved design	—	3	1
8	Installation of incinerator without approval	3	7	16
11	Open burning of wastes	50	140	157
15	Emission of dark smoke	9	11	25
36	Installation of fuel burning equipment without approval	14	15	41
38	Erection of chimney without approval	10	19	36
40	Operation of facilities without control equipment	1	3	3
41	Failure to install and operate control equipment	—	1	3
	Total	87	199	282

Table 34
Malaysia: Offences Prosecuted Under The Environmental
Quality Act, 1974. Number by Type, 1984—1986

Section	Type of Offence	Year		
		1984	1985	1986
16	Failure to comply with conditions of licence	6	1	15
18	Operation and use of prescribed premises without licence	—	1	1
25	Emission of wastes into any inland waters without licence	10	5	5
31	Failure to comply with notice	2	2	—
37	Failure to furnish information	3	5	6
	Total	21	14	27

Table 35
Malaysia: Offences Prosecuted Under the Environmental
Quality Act, (Clean Air) Regulations, 1978. Number
by Type, 1984—1986

Section	Type of Offence	Year		
		1984	1985	1986
6	New installations in residential areas without approval	1	—	—
11	Open burning of wastes	57	14	6
15	Emission of dark smoke	12	1	1
36	Installation of fuel burning equipment without approval	2	1	1
38	Erection of chimney without approval	2	1	1
40	Operation of facilities without control equipment	3	1	1
	Total	77	18	11

Table 36
Malaysia: Offences Prosecuted Under the Environmental
Quality (Prescribed Premises) (Raw Natural Rubber)
Regulations, 1978. Number by Type 1984-1986

Regulation	Type of Offence	Year		
		1984	1985	1986
6	Alteration of quality of effluent without approval	—	—	2
	Total	—	—	2

Table 37
Malaysia: Offences Prosecuted Under the Environmental
Quality (Sewage and Industrial Effluents) Regulations, 1979.
Number by Type, 1984—1986

Regulation	Type of Offence	Year		
		1984	1985	1986
4	Alteration of new existing sources of effluent discharge without approval	—	—	1
	Total	—	—	1

Table 38
Malaysia: Distribution of Air Quality Monitoring
Station. Number by State, 1986

State	Type of Station	
	Dust Deposit Gauge	High Volume Sampler
Perlis	7	—
Kedah	13	—
Pulau Pinang	20	5
Perak	5	—
Selangor	10	5
Wilayah Persekutuan Kuala Lumpur	3	4
Negeri Sembilan	5	—
Melaka	7	3
Johor	20	1
Pahang	27	2
Terengganu	41	1
Kelantan	20	—
Sabah	21	1
Sarawak	20	—
Total	219	22

Table 39
Malaysia: Air Pollution Complaints
Number by Nature, 1985—1986

Nature of Complaints	Year			
	1985		1986	
	Number	Per Cent	Number	Per Cent
Particulates	132	37	135	
Smoke/Fumes	56	16	72	19
Noise	77	21	67	18
Odour	55	15	51	13
Gas	12	3	8	2
Others	30	8	50	13
Total	362	100	382	100

Table 40
Malaysia: Air Pollution Complaints.
Number by Industry, 1985—1986

Type of Industry	Year			
	1985		1986	
	Number	Per Cent	Number	Per Cent
Wood based Industries	43	15	53	16
Chemical Industries	29	13	19	6
Feedmill and Fishmill Factories	21	7	19	6
Rice Mills	20	7	30	10
Quarries	19	7	19	6
Engineering Workshops	19	7	10	3
Metallurgical Works	16	6	31	10
Concrete and Cement Works	9	3	3	1
Total	284	100	305	100

Table 41
Malaysia: Environmental Impact Assessment Studies.
Number by Status, 1985—1986

Status of Study	Preliminary EIA	Detailed EIA
Completed	7	2
Under Study	6	0
Initiated	5	1
Total	18	3

Note:

The projects indicated above fell into six main categories as shown in Table 42.

Table 42
Malaysia: Environmental Impact Assessment Projects.
Number by Category, 1985—1986

Category of Project	Completed		Under Study		Initiated	
	Preliminary	Detailed EIA	Preliminary	Detailed EIA	Preliminary	Detailed EIA
Water Resource Development	3	0	4	0	1	1
Tourist Development	2	0	0	0	0	0
Industries	0	1	0	0	1	0
Industrial Estates/Housing	0	0	2	0	1	0
Mining	1	0	0	0	1	0
Petroleum Development	1	1	0	0	1	0

Note:

Water resource development project comprised the largest group of projects in which EIAs were carried out. Projects under this category were mainly for hydro-electric power development and water supply.

Table 43
Malaysia: Projects/Plans with Environmental Input.
Number by Category, 1985—1986

Category of Project/Plan	Year	
	1985	1986
Regional/Urban Development	8	6
Natural Resource Management	3	7
Sewerage & Drainage	1	4
Industrial Estate Development		1

Table 44
Local Training Programmes Attended by the Officers of
the Department of Environmental. Number by Type, 1985—1986

Type	Year	
	1985	1986
In-Service technical training courses	4	5
Local short courses	3	21
Local Diploma Degree courses	—	1
Local conferences/seminar/ workshops	12	33

Table 45
Overseas Training Programmes Attended by the Officers of
the Department of Environment. Number by Type, 1985—1986

Type	Year	
	1985	1986
Short — courses	5	6
Diploma/Degree courses	—	2
Conferences/Seminar/Workshop	10	13

APPENDICES

**SUMMARY DESCRIPTION
ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE**

1. AIM To assess the overall impact on the environment of development projects by the public and private sectors.

2. PRELIMINARY ASSESSMENT

Objectives: For prescribed activities:-

 - To examine and select from the project options available.
 - To identify and incorporate into the project plan appropriate abatement and mitigating measures.
 - To identify the significant residual environmental impacts.

Description: — Standard guidelines prescribed in the EIA Handbook.

 - Is initiated at an early stage of project planning.
 - Some form of public participations is required.
 - The matrix may be used as an assessment tool.
 - Environmental data collection may be necessary.
 - A report is required.

3. DETAILED ASSESSMENT

Objectives: For those prescribed activities with potentially significant residual environment impact.

 - To describe the significant residual environmental impacts predicted from the final project plan.
 - To specify mitigating and abatement measures in the final project plan.
 - To identify the costs and benefits of the project to the community.

Description: — Standard guidelines and specific terms of reference for each project are issued.

 - Continues through the course of the detailed study of the project.
 - Some form of public participation may be required.
 - The assessment method is selected according to the nature of the project.
 - Environment data collection is required.
 - A report is required.

4. REVIEW

Objectives: For projects subjected to Detailed Assessment.

 - To critically review the Detailed Assessment report.
 - To evaluate development and environmental costs and benefits in the final project plan.
 - To formulate supported recommendations to the project approving on the implementation of the project.

Description: — The review is conducted by an independent Review Panel.

 - Comment is invited from concerned environment related agencies and from the public.

- Recommendations are forwarded to the approving authority except when the project initiator elects to revise or abandon his project.
- A maximum period of two months is allowed for review.

APPENDIX 2

LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING IN SEMINAR, WORKSHOP, CONFERENCE IN THE COUNTRY, 1985

	Title of Seminar/Workshop/ Conference	Venue	Date
Goh Kiam Seng	1. Seminar on Sectoral Development in the context of the Population Policy.	Johor Baharu	3—6/8/85
Dr. Abu Bakar Jaafar	1. Regional Oil Spill Simulation Exercise.	Kuantan	7—10/10/85
Tan Meng Leng	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Ho Yueh Chuen	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Soo Ah Kan	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Tan Hock Chuan	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Abd. Aziz Abd. Rasol	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Rosnani Ibrahim	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Norhayati Mustapha	1. Regional Oil Spill Simulation Exercise.	Kuantan	7—10/10/85
Hasmah Harun	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Hashim Daud	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Rahani Hussin	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Hor Yin Heng	1. Workshop on Consumer and Environment for Secondary School Teachers. 2. Regional-Workshop on Informal Environmental Education.	University of Malaya, K.L. University of Agriculture Malaysia	27/10/85 18—22/11/85
Abu Hassan Mohd. Isa	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85

Wan Ramlah Wan Ibrahim	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
	2. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Mohd. Subki Abd. Hamid	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Kalsom Abd. Ghani	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Halimah Hassan	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Mohamad Jaafar	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Mohd. Izzuddin Abd. Ghani	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Hassan Mat	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
	2. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Charanpal Singh	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
	2. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Jalaluddin Ismail	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Abd. Razak Manap	1. MAEinar MAE/CETDEM, Seminar on Technology and Environment.	Kuala Lumpur	26—27/10/85
	2. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Pauziah Hanum Abd. Ghani	1. Environmental Management Workshop III.	Port Dickson	17—22/11/85
Raja Rokiah Raja Saigon	1. Air Pollution Control Training	Kuala Lumpur	28—29/11/85
	2. Second Asian Conference on Technology for Rural Development.	Kuala Lumpur	4—7/12/85
	3. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Ahmad Kamarulnajib	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85
	2. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Maraiana Md. Nor	1. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Ruslan Haji Mohamad	1. Air Pollution Control Training Workshop	Kuala Lumpur	28—29/11/85

Mexlien Anak Gombek	1. Seminar on Decanters in a Palm Oil Mill.	Petaling Jaya	10/12/85
Kamalakaran a/l Nadeson	1. ASEAN-US Watershed Project Second Seminar.	University of Agriculture Malaysia	27/10—2/11/85
Norizan Abu Bakar	1. Air Pollution Control Training Workshop. 2. Seminar on Decanters in a Palm Oil Mill.	Kuala Lumpur Petaling Jaya	28—29/11/85 10/12/85
Maketab Mohamad	1. Expanding Opportunities for Aquaculture A.I.A, Investments in Asean. 2. Air Pollution Control Training Workshop.	Kuala Lumpur Kuala Lumpur	5—6/11/85 28—29/11/85
Normadiyah Hussin	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85
Nur Ali Za Omar	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85
Che Ani Hashim	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85
Suhaimi Hanafi	1. Workshop on Consumer and Environment For Secondary School Teacher.	University of Malaya, K.L.	27/10/85
Mohd. Sani Mat Daud	1. Air Pollution Control Training Workshop.	Kuala Lumpur	28—29/11/85
Sukinah Sobi	1. Workshop on Consumer and Environment For Secondary School Teacher. 2. Regional Workshop on Informal Environmental Education.	University of Malaya, K.L. University of Agriculture Malaysia	27/10/85 18—22/11/85
Norriahan Mohd. Nasir	1. Seminar on Occupational Safety and Health in the use of Agro Chemicals.	Petaling Jaya	19/12/85
Aminah Ali	1. Regional Workshop on Informal Environmental Education.	University of Agriculture Malaysia	18—22/11/85

APPENDIX 3

LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT ATTENDING TRAINING SESSION IN THE COUNTRY, 1985

	Title of Training	Venue	Date
Norhayati Mustapha	1. Oil Spill Control Course.	Kuantan	1—5/10/85
Jamaludin Mahmud	1. Course on Computer Acquisition and Evaluation.	INTAN, K.L.	7—12/10/85
Rusli Che Hussin	1. Oil Spill Control Course.	Subang View, Petaling Jaya	14—18/10/85
Zainal Abdullah	1. Oil Spill Control Course.	Kuantan	1—5/10/85
Ruslan Haji Mohamad	1. Training on Structure Query Language on Data System.	Prime Minister's Department, K.L.	7—9/10/85
Muslina Sulaiman	1. Training on Structure Query Language on Data System.	Prime Minister's Department, K.L.	7—9/10/85

**LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING IN
SEMINAR, WORKSHOP, CONFERENCE OVERSEAS 1985**

	Title of Seminar/Workshop/ Conference	Sponsor	Date
Goh Kiam Seng	1. Study visit to Japan Automobile Research Institute (JARI), Japan.	JARI	29/8—7/9/85
Dr. Abu Bakar Jaafar	1. Malaysian representative to UNEP 13th Governing Council in Kenya.	UNEP	14—24/5/85
	2. Committee on Industry Technology, Human Settlement and the Environment (Ninth Session), Indonesia.	UNEP	10—16/9/85
	3. Symposium on Straits of Malacca, Indonesia.	INDONESIA	11—14/11/85
Tan Meng Leng	1. Symposium on Clean Technologies FGR, Germany.		7—18/10/85
	2. International Week of Environment Techniques, Paris.		18—25/10/85
	3. 22nd. Annual Conference on Clean Air Technology & Palmet 85, Hong Kong.	MALAYSIA	2—13/12/85
Ho Yueh Chuen	1. ASEAN EIA Evaluation Workshop, Indonesia.	CDG/UNEP	4—7/3/85
Norhayati Mustapha	1. ASEAN EIA Evaluation Workshop, Indonesia.	CDG/UNEP	4—7/3/85
Tengku Bakry Shah	1. UNEP—Supported Training Workshop on Ecological Chemistry of National Waters, Russia.	UNEP	23—26/10/85
Abu Hassan Mohd. Isa	1. ASEAN/EC Workshop/Seminar on Air Pollution Monitoring, Thailand.	ASEAN/EC	17—25/6/85
Mohd. Subki Abd. Hamid	1. ASEAN/EC Workshop/Seminar on Air Pollution Monitoring, Thailand.	ASEAN/EC	17—25/6/85
Zainal Abdullah	1. International Symposium on Integrated Global Monitoring of the state of the Biosphere, Russia.	ASEAN/EC	13—20/10/85
Mohamad Jaafar	1. ASEAN EIA Evaluation Workshop, Indonesia.	CDG/UNEP	4—7/3/85
Mohd. Izzuddin Abd. Ghani	1. Study visit to Japan Automobile Research Institiut (JARI), Japan.	JARI	29/8—7/9/85

Shariff Mustapha	1. ASEAN/EC Workshop/Seminar on Air Pollution Monitoring, Thailand	ASEAN/EC	17—25/6/85
Mohd. Sanusi Sulaiman	1. ASEAN/EC Workshop/Seminar on Air Pollution Monitoring, Thailand.	ASEAN/EC	17—25/6/85
Habsah Ismail	1. ASEAN/EC Workshop/Seminar on Air Pollution Monitoring, Thailand.	ASEAN/EC	17—25/6/85

**LIST OF OFFICERS IN THE DEPARTMENT OF ENVIRONMENT PARTICIPATING TRAINING
SESSION OVERSEAS IN 1985**

	Title of Training Session	Sponsor	Date
Hasmah Harun	1. Training Program on Air Pollution Monitoring and Control at International Centre for Advanced Technical and Vocational Training, Italy.	ILO	15/4—7/6/85
Lee Heng Keng	1. Training Program on Air Pollution Monitoring and Control at International Centre for Advanced Technical and Vocational Training, Italy.	ILO	15/4—7/6/85
Hor Yin Heng	1. Course on Atmospheric Pollution Session, France.	ACTIM	4—22/3/85
Rahmah Mohd. Tahir	1. Training Course in Preventive Toxicology: AGRO CHEMICALS, Russia.	UNEP	23/9—12/10/85
Lee Choong Min	1. Course on Establishment of Sub-Regional Centre for Shipping Pollution Countermeasures 'Hand on Training Session, Philippines.		28/1—1/2/85
Shamsuddin Abd. Latiff	1. Course on Establishment of Sub-Regional Centre for Shipping Pollution Countermeasures 'Hand on Training Session, Philippines.		28/1—1/2/85
Ibrahim Majid	1. Course on Establishment of Sub-Regional Centre for Shipping Pollution Countermeasures 'Hand on Training Session, Philippines.		28/1—1/2/85
Zainora Nordin	1. Environmental Engineering Water Pollution Control Course, Japan.	JICA	12/9—2/11/85

APPENDIX 6

LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING IN SEMINAR, WORKSHOP, CONFERENCE IN THE COUNTRY, 1986

	Title of Seminar/Workshop/ Conference	Venue	Date
A. Maheswaran	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	2. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86
Goh Kiam Seng	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	2. Seminar on Organisation Management for Senior Level Officers.	Melaka	27/7—1/8/86
Dr. Abu Bakar Jaafar	1. National Seminar on Cooperation in Research and Development.	Kuala Lumpur	21—22/1/86
	2. First ASEAN Science and Technology Week Conference.	Kuala Lumpur	24—27/4/86
	3. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	4. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86
Ghazali Mohd. Nor	1. Colloquim on Islamic Research.	Kuala Lumpur	3—6/2/86
Tan Meng Leng	1. First ASEAN Science and Technology Week Conference.	Kuala Lumpur	24—27/4/86
Hasmah Harun	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	2. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86
Ho Yueh Chuen	1. Environmental Management Facilitators Workshop.	G. Highlands	9—13/3/86
	2. First ASEAN Science and Technology Week Conference.	Kuala Lumpur	24—27/4/86
	3. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	4. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86
Abd. Aziz Abdul Rasol	1. First ASEAN Science and Technology Week Conference	Kuala Lumpur	24—27/4/86
	2. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	3. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86

Hajjah Rosnani Ibrahim	1. First ASEAN Science and Technology Week Conference.	Kuala Lumpur	24—27/4/86
	2. Regional Workshop on Chemical Safety.	Serdang	24—28/11/86
Soo Ah Kan	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
Hashim Daud	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
Norhayati Mustapha	1. Environmental Management Facilitators Workshop.	G. Highlands	9—13/3/86
	2. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
Tan Hock Chuan	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	2. First ASEAN Science and Technology Week Conference.	Kuala Lumpur	24—27/4/86
Lee Heng Keng	1. Seminar on Technical and Economic Constraints Faced by Sabah Industries to Meet Environmental Protection Regulation Imposed by the Federal Government.	Sabah	17/1/86
	2. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
Shamsuddin Abd. Latiff	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
	2. Workshop on Conservation for Development.	INTAN, K.L.	7/5/86
Wong Foon Meng	1. Seminar on Conservation for Development.	INTAN, K.L.	6/5/86
Jamaludin Mahmud Abu Bakar	1. Data Analysis for Sample Surveys Workshop.	UM, K. Lumpur	3—8/2/86
	2. Workshop on Review of Drainage Standard and Procedures for Peninsular Malaysia.	Kuala Lumpur	24—26/3/86
	3. Hewlett-Packard Artificial Intelligence (HPAI) and Computer Programming Seminar.	Kuala Lumpur	23/6/86
	4. Workshop on Data Processing Executive Institute (DPEI).	Kuala Lumpur	9—23/9/86
Mohamed Ishak Thani	1. Seminar An Evaluation of the Rotating Biological Disc System in Biological Nitrification of Waste Water.	SIRIM, Shah Alam	28/3/86
	2. Chemical Engineering 2nd Symposium.	UKM, Bangi	24—25/6/86

Tengku Bakry Shah	1. Executive Management Seminar on Application of Tracing Technology in Industry.	Kuala Lumpur	20—21/1/86
	2. Data Analysis for Sample Surveys Workshop.	UM, K. Lumpur	3—8/2/86
	3. Workshop 'Review Drainage Standard and Procedures for Peninsular Malaysia .	Kuala Lumpur	24—26/3/86
	4. MIM Case Writers Workshop.	Melaka	26—31/5/86
	5. ASEAN-US Watershed Project: Roving to Malaysia.	Serdang	1—3/9/86
Hor Yin Heng	1. Environmental Management Facilitators Workshop.	G. Highlands	9—13/3/86
	2. Typography Seminar and Monotype Exhibition.	Kuala Lumpur	28/8/86
Abu Hassan Mohd. Isa	1. Seminar on Air Pollution Problems and its effect on Agriculture and Horticulture Hortikultura.	UPM, Serdang	17/1/86
	2. Data Analysis for Sample Surveys Workshop.	UM, K. Lumpur	3—8/2/86
	3. Seminar on Electronic Instrumentation Mission.	Kuala Lumpur	28/3/86
Wan Ramlah Wan Ibrahim	1. MIM Case Writers Workshop.	Melaka	26—31/5/86
Rusli Che Hussin	1. Seminar on Remote Sensing and Image Processing.	Kuala Lumpur	26/3/86
	2. Training Seminar on Marine Meteorological Services for RA II & RA IV.	Kuala Lumpur	8—12/12/86
Abd. Rahman Awang	1. Executive Management Seminar on Application of Tracing Technology in Industry.	Kuala Lumpur	20—21/1/86
Mohd. Subki Abd. Hamid	1. Conference on Instrumentation and the Environment.	Kuala Lumpur	2—3/5/86
Zainal Abdullah	1. Seminar Remote Sensing and Image Processing	Kuala Lumpur	26/3/86
	2. Seminar on Electronic Instrumentation Mission.	Kuala Lumpur	28/3/86
	3. MICROBRIAN-An Application Oriented Image Processing System (Seminar).	UPM, Serdang	25/11—2/12/86
Halimah Hassan	1. Environmental Management Facilitators Workshop.	G. Highlands	9—13/3/86
	2. MIM case Writers Workshop.	Melaka	26—31/5/86
	3. Typography Seminar and Monotype Exhibition.	Kuala Lumpur	28/8/86
Rahmah Tahir	1. Environmental Management Facilitators Workshop.	G. Highlands	9—13/3/86

Mohd. Izzuddin Abd. Ghani	1. MIM Case Writers Workshop.	Melaka	26—31/5/86
Zulkifli Abd. Rahman	1. National Seminar on Cooperation in Research and Industrial Development.	Kuala Lumpur	21—22/1/86
Hassan Mat	1. MIM Case Writers Workshop. 2. Chemical Engineering 2nd Symposium.	Melaka UKM, Bangi	26—31/5/86 24—25/6/86
Jalaluddin Ismail	1. ASEAN-US Watershed Project: Roving to Malaysia.	Serdang	1—3/9/86
Abd. Razak Manap	1. Colloquim on Islamic Realisation.	Kuala Lumpur	3—6/2/86
Pauziah Hanum Abd. Ghani	1. ASEAN-US Watershed Project: Roving to Malaysia.	Serdang	1—3/9/86
Raja Rokiah Raja Saigon	1. Workshop on Recent Development in Palm Oil Milling Technology and Pollution Control.	Kuala Lumpur	5—6/8/86
Ahmad Kamarulnajuib	1. Seminar on Environmental Sanitation.	Kuala Lumpur	8—12/12/86
Maraiana Mohd. Nor	1. Water Treatment Seminar. 2. Seminar on 'Polarchem' —The Fireside Treatment of Boiler and Furnaces'.	UTM, K.L. Subang Jaya	4/3/86 16/10/86
Ruslan Haji Mohamed	1. Regional Seminar on Human Exposure to Outdoor and Indoor Air Pollution and Health Effects. 2. Data Processing Executive Institute (DPEI)	Serdang Kuala Lumpur	23—27/6/86 9—12/9/86
Mexlien Anak Gombek	1. Water Treatment Seminar. 2. Workshop on Review of Drainage Standard and Procedures of Peninsular Malaysia.	UTM, K. Lumpur Kuala Lumpur	4/3/86 24—26/3/86
Kamalakaran a/l Nadeson	1. Seminar Remote Sensing and Image Processing. 2. Seminar An Evaluation of the Rotating Biological Disc System in Biological Nitrification of Waste Water. 3. Seminar SIRIM-ENAA Pilot Plant for Light Weight Building Material from Rice Husk Ash. 4. Workshop on Recent Development in Palm Oil Milling Technology and Pollution Control. 5. Seminar on Energy Saving/ Conservation.	Kuala Lumpur SIRIM, Shah Alam SIRIM, Shah Alam Kuala Lumpur Bangi	26/3/86 28/3/86 18/4/86 5—6/8/86 30/9/86

Norizan Abu Bakar	1. Colloquim on Islamic Realisation. 2. Seminar on Gas Chlorinators (A) and Ferrosand Regeneration Techniques (B).	Kuala Lumpur Kuala Lumpur	3—6/2/86 17/11/86
Muslina Sulaiman	1. Data Analysis for Sample Surveys Workshop. 2. Hewlett-Packard Artificial Intelligence (HPAI) and Computer System Programming Seminar. 3. National Workshop on Environmental Monitoring and Assessment: Tropical Urban Applications.	UM, K. Lumpur Kuala Lumpur UKM, Bangi	3—8/2/86 23/6/86 24—29/11/86
Maketab Mohamad	1. National Seminar on Cooperation in Research and Industrial Development. 2. MICROBRIAN — An Application Oriented Image Processing System (Seminar)	Kuala Lumpur UPM, Serdang	21—22/1/86 25/11—2/12/86
Ismail Ithnin	1. Colloquim on Islamic Realisation. 2. Workshop on Data Processing Executive Institute (DPEI).	Kuala Lumpur Kuala Lumpur	3—6/2/86 9—12/9/86
Ahmad Ibrahim Mohamad	1. Seminar on Gas Chlorinators (A) and Ferrosand Regeneration Techniques (B).	Kuala Lumpur	17/11/86
Che Asmah Ibrahim	1. Seminar on Gas Chlorinators (A) and Ferrosand Regeneration Techniques (B).	Kuala Lumpur	17/11/86
Jorlin Jaafar	1. Workshop on Management of International Conference and Protocol.	Kuala Lumpur	23—28/6/86
okthar Abd. Majid	1. Seminar on Electronic Instrumentation Mission.	Kuala Lumpur	28/3/86
Jhammad Saberi d. Hamid	1. Workshop on Disciplinary Action Procedure. 2. Workshop on Control of Drinking Water Quality in the State of Pahang Darul Makmur.	Terengganu Kuantan	9—11/9/86 27—31/10/86
him Shafeii	1. Seminar on 'Hypalon'. 2. Workshop on Computer Simulation for the Management of Solid Waste.	Kuala Lumpur Kuala Lumpur	29/9/86 1—6/12/86
aluddin Sulaiman	1. Seminar on Gas Chlorinators (A) and Ferrosand Regeneration Techniques (B). 2. Third Technological Symposium.	Kuala Lumpur Kuala Lumpur	17/11/86 25/11/86
Zainuldin Yacob	1. Seminar on 'Polarchem' — The	Subang Jaya	16/10/86

Fireside Treatment of Boilers and Furnaces.

Raja Aminah Raja Bakar	1. Third Technological Symposium.	Kuala Lumpur	25/11/86
Wan Hassan Wan Nawang	1. National Workshop on Environmental Monitoring and Assessment: Tropical Urban Applications.	UKM, Bangi	24—29/11/86
Zamrudah Yeop	1. Seminar on Electronic Instrumentations Mission.	Kuala Lumpur	28/3/86
Suhaimi Hanafi	1. Typography Seminar and Monotype Exhibition. 2. Audio Visual Aid Workshop.	Kuala Lumpur INTAN, K.L.	28/8/86 27/10—1/11/86
Mohd. Shukri Ahmad Marzuki	1. National Workshop on Environmental Monitoring and Assessment: Tropical Urban Applications.	UKM, Bangi	24—29/11/86
Sukinah Sobi	1. Data Analysis for Sample Surveys Workshop. 2. Audio Visual Aid Workshop.	UM, K. Lumpur INTAN, K.L.	3—8/2/86 14—19/4/86
Norizan Mohd. Nazir	1. Third Technological Symposium.	Kuala Lumpur	25/11/86
Amer Othman	1. National Seminar on Management and Application of Solid Wastes.	Serdang	30/9—1/10/86
Norazian Abd. Hamid	1. Third Technological Symposium.	Kuala Lumpur	25/11/86
Razali Yaakob	1. Seminar on 'Polarchem' — The Fireside Treatment of Boilers and Furnaces.	Subang Jaya	16/10/86
Safieei Tahar	1. Seminar on Environmental Sanitation.	Kuala Lumpur	8—12/12/86

APPENDIX 7

LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING IN TRAINING SESSION IN THE COUNTRY, 1986

	Title of Training Session	Venue	Date
Tan Meng Leng	1. Course on Time and Management.	INTAN, K.L.	8—10/12/86
Hashim Daud	1. Course on Public Administration for 1986.	INTAN, K.L.	17/2—1/3/86
	2. Basic Course on Account Management.	INTAN, K.L.	17—28/11/86
Norhayati Mustapha	1. Course on Public Administration for 1986.	INTAN, K.L.	14—26/4/86
Wong Foon Meng	1. Course on Introduction to Analysis of Public Policy.	INTAN, K.L.	20—28/1/86
Rahani Hussin	1. International Training Methodology Course.	INTAN, K.L.	10/3—26/4/86
Noralshuridin Mohd. Salleh	1. Attachment Training at British Malaysia Industry and Trade Association (BMITA).	APMC, K.L.	17/2/86— 14/2/87
Omar Mohd. Zain	1. Diplomatic Course in Management Science.	INTAN, K.L.	31/3/86— 28/2/87
Mohd. Sayuti Sepeai	1. Basic Course in Account Management.	INTAN, K.L.	1—13/9/86
Mohd. Subki Abd. Hamid	1. Course on Aquisition Management and/supply.	INTAN, K.L.	14/7—14/10/86
Kalsom Abd. Ghani	1. Course on Planning Analysis and Project Management.	INTAN, K.L.	13—25/1/86
	2. Attachment Training at British Malaysia Industry and Trade Association (BMITA).	Beecham, P.J.	17/2/86— 14/2/87
Jalaluddin Ismail	1. Basic Course on Assessment of Water Quality (KAPSA).	UTM, K.L.	30/6—5/7/86
Zubaidah Abdullah	1. Course Data and Management of National Energy.	Kajang	15/9—3/10/86
Mexlien Anak Gombek	1. International Training Course on Industrial Development (Agro Based) 1986.	INTAN, K.L.	8/9—15/11/86

Maktab Mohamad	1. Basic Course on Assessment of Water Quality (KAPSA).	UTM, K. Lumpur	30/6—5/7/86
Ismail Ithnin	1. Training Course on Analysis and Application of Population Census.	Kuala Lumpur	24/2—21/3/86
Muhammad Saberi Abd. Hamid	1. Course on Leadership and Human Relationships.	Kota Bharu	11—13/8/86
Robert Lim Hock Kee	1. Course on Court Precedure.	INTAN, K.L.	20—31/10/86
Shaari Che Lah	1. Supervision Management Course.	INTAN, K.L.	29/9—11/10/86
Na'Emah Hj. Abd. Jamil	1. Course Introduction to Computer II/86.	INTAN, K.L.	25—30/8/86
Zamrudah Yeop	1. Course on Hydrological Data Collection.	Kuala Lumpur	9—19/9/86
Johari Bakar	1. Course on Macro and Micro Economic Analysis.	INTAN, K.L.	21/4—3/5/86
Chan Yuet Wah	1. Course on Office Administration. 2. Training Course on Computer for Management.	INTAN, K.L. INTAN K.L.	23/6—12/7/86 18—23/8/86
Yusof Abas	1. Course for Clerk (Incharge of Dept's Record).	Kuala Lumpur	13—18/10/86

**LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING IN
SEMINAR, WORKSHOP, CONFERENCE OVERSEAS, 1986**

	Title of Seminar/Workshop/ Conference	Sponsor	Date
A. Maheswaran	1. Joint Oil Spill Combating Exercise Indonesia/Singapore/Malaysia, Indonesia.	RFC	9—12/4/86
Goh Kiam Seng	1. ASEAN-UNEP-CDG Workshop on Developing Policies and Strategic Guidelines for Managing Hazardous Waste, Singapore.	CDG	7—9/5/86
	2. Study Visit to French and Danish Environment Agency.	Govt. of France & Denmark	8—15/10/86
Dr. Abu Bakar Jaafar	1. UNEP Workshop on Cleaning up of Urban River, Singapore.	UNEP	14—16/1/86
	2. Conference on Conservation and Development Implementing the World Conservation Strategy, Canada.	WWF	31/5—6/6/86
	3. Seminar Level Asian Regional Workshop on the Application of Economic Analysis to Degradation and Rehabilitation of Dry Lands India.	UNEP	25—29/8/86
	4. ASEAN-CANADA Seminar on Women in Development, Bangkok.	ASEAN-CANADA	22—25/11/86
Ghazali Mohd. Nor	1. Joint Oil Spill Combating Exercise Indonesia/Singapore/Malaysia, Indonesia.	RFC	9—12/4/86
Tan Meng Leng	1. Joint Oil Spill Combating Exercise Indonesia/Singapore/Malaysia, Indonesia.	RFC	9—12/4/86
Ho Yueh Chuen	1. Symposium on Project Management Approach for Environmental Protection, Thailand.	CDG	24—28/2/86
Abd. Aziz Abdul Rasol	1. Workshop on Roles of Government and Industry in Environmental and Natural Resource Management, Thailand.	World Resource Institute	8—10/1/86
Hajjah Rosnani Ibrahim	1. Regional Workshop on	UNEP	15—17/1/86

	Environmental Toxicity and Carcinogenesis, Thailand.		
	2. ASEAN-UNEP-CDG Workshop on Development Policies and Strategic Guidelines for Managing Hazardous Waste, Singapore.	CDG	7—9/5/86
Wan Ramlah Wan Ibrahim	1. Environmental Assessment and Management Aspect of Air and Water Pollution Industries, Belgium.	UNIDO	4/8—12/9/86
Rusli Che Hussin	1. Workshop RAS/81/057 Strengthening of Network for Oil Spill Countermeasures in Lombok/ Makasar Straits and Sulawesi Sea, Australia.	UNDP	22—25/7/86
Abd. Rahman Awang	1. ASEAN-UNEP-CDG Workshop on Developing Policies and Strategic Guidelines for Managing Hazardous Waste, Singapore.	CDG	7—9/5/86
Zainal Abdullah	1. Regional Seminar on the Application of Remote Sensing Techniques to Coastal Zone Management and Environmental Monitoring, Bangladesh.	ESCAP	18—26/11/86
Rahmah Tahir	1. Seventh International Seminar on Environmental Impact Assessment, Scotland.	UNEP & Kerajaan Malaysia	6—19/7/86

**LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT ATTENDING TRAINING
SESSION OVERSEAS IN 1986**

	Title of Training Session	Sponsored	Date
Abd. Aziz Abdul Rasol	1. ASEAN Regional Training Course on Water Quality Management in Tropical Region, Thailand.	UNEP	25/6—10/7/86
Norhayati Mustapha	1. Training Course for on Scene Commanders and others Involved in Oil Spill Control Operation, Denmark.	IMO	8/9—3/10/86
Shamsuddin Abd. Latiff	1. Environmental Engineering Course (Master's) Degree, AIT Bangkok.	ASEAN-USAID	8/9/86—23/3/88
Lee Choong Min	1. Training Course for on Scene Commanders and others Involved in Oil Spill Control Operations, Denmark.	IMO	8/9—3/10/86
Choong Mei Chun	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Mohd. Sayuti Sepeai	1. ASEAN Regional Training Course on Water Quality Management in Tropical Region, Thailand.	UNEP	25/6—10/7/86
Mohamad Jaafar	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Abd. Pahim Shahid	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Zulkifli Abd. Rahman	1. Survey on Sources and Oil Pollution Monitoring, Thailand.	UNEP	21—27/8/86
Hassan Mat	1. Master Engineering Science in Coastal Zone System Management, Australia.	ASEAN-AUSTRALIA	8/9/86—23/3/88
Charanpal Singh	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Jalaluddin Ismail	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86

Abd. Razak Manap	1. Master Engineering Science in Coastal Zone System Management, Australia.	ASEAN-AUSTRALIA	8/9/86— 23/3/88
Pauziah Hanum Abd. Ghani	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Ahmad Kamarulnajib	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Maraiana Mohd. Nor	1. AIT Training Course on Environmental Impact Assessment, Thailand.	ASEAN-USAID	3—28/11/86
Muslina Sulaiman	1. Training Course on Oceanographic Data Management, Japan.	UNDP	8—20/9/86
Rohani Jusoh	1. Training Award under the Friendship Programme for the 21st. Century for Malaysian Officials, Japan.	Government of Japan	29/6—29/7/86

**LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT ATTENDING
OFFICIAL MEETINGS ABROAD, 1985**

	Meetings	Sponsor	Date
A. Maheswaran	1. Official visit to the Quality Oil Main Company, Singapore.		21—22/1/85
	2. Official visit Thames River Rehabilitation Authority, London.		25—26/3/85
	3. Official visit to Chicago, U.S.A.		27—29/3/85
	4. Official visit to Singapore to study ways in river clean-up, Singapore.		10/4/85
	5. 5th. Meeting of the Straits of Malacca Revolving Fund Committee, Indonesia.		17—18/5/85
	6. Asean Expert Group and Cobsea Meeting, Philippines.		17—23/4/85
Ghazali Mohd. Nor	1. 5th. Meeting of the Straits of Malacca Revolving Fund Committee, Indonesia.		17—18/5/85
	2. Interim Meeting on Oil and Oil Toxicity Testing Project, Australia.		13—26/11/85
	3. Malaysian Representative on the Straits of Malacca Revolving Fund Committee Meeting for Preparation of a Joint Oil Spill Training between Indonesia, Malaysia and Singapura, Singapore.		26—28/12/85
Ho Yueh Chuen	1. Water Quality Network Mid-Term Review Meeting, Thailand.		30/10—1/11/85
Wong Foon Meng	1. Asean Meeting on Pollution Control and Monitoring from Organic Waste Industry, Thailand.		3—4/10/85
Halimah Hassan	1. Meeting to Develop Programme of Action for Environmental Education and Training as well as Public Awareness, Thailand.		11—14/11/85

**LIST OF OFFICERS FROM THE DEPARTMENT OF ENVIRONMENT PARTICIPATING
OFFICIAL MEETINGS OVERSEAS, 1986**

	Meetings	Sponsored	Date
A. Maheswaran	1. 9th. ASEAN Expert Group Meeting on the Environment (AEGE), Singapore.	Malaysian Government	22—24/4/86
	2. COBSEA Meeting, Singapore.	Malaysian Government	25—26/4/86
	3. 6th. Meeting on the Straits of Malacca Revolving Fund Committee, Indonesia.	RFC	26—27/6/86
	4. ESCAP High Level Consultative Meeting, Bangkok.	ESCAP	27—30/11/86
Goh Kiam Seng	1. 9th. ASEAN Expert Group Meeting on the Environment (AEGE), Singapore.	Malaysian Government	22—24/4/86
	2. COBSEA Meeting, Singapore.	Malaysian Government	25—26/4/86
	3. Negotiations Meetings for Klang Valley Environmental Improvement Technical Assistance — ADB, Manila.	ADB	28—30/5/86
Dr. Abu Bakar Jaafar	1. ASEAN-Canada Cooperative Programme on Marine Science: Study Tour.	ASEAN-CANADA	6—28/6/86
	2. UNEP Meeting of Environmental Scientists and Scientific Institutions to Review the East Asia Seas Action Plan, Bangkok.	UNEP	8—12/12/86
Ghazali Mohd. Nor	1. Straits of Malacca Revolving Fund Committee.	RFC	5—8/5/86
	2. 6th. Meeting on the Straits of Malacca Revolving Fund Committee.	RFC	26—27/6/86
Abd. Aziz Abdul Rasol	1. ASEAN-UNEP Consultation Meeting on Information and Data Exchange on the Seas of East Asia, Indonesia.	UNEP	17—19/3/86
Tan Hock Chuan	1. Meeting on Preparation of Projects Proposal under ASEAN Expert Group on Environment and COBSEA, Thailand.	Malaysian Government	7—17/4/86
	2. 9th. ASEAN Expert Group Meeting on the Environment (AEGE), Singapore.	Malaysian Government	22—24/4/86

Zainal Abdullah	1. Regional Meeting of Expert on Space Technology Application in the Indian Ocean, Sri Lanka.	UNDP	15—19/9/86
Muslina Sulaiman	1. ASEAN-UNEP Consultation Meeting on Information and Data Exchange on the Seas of East Asia, Indonesia.	UNEP	17—19/3/86
Saari Gusti	1. Straits of Malacca Revolving Fund Committee.	RFC	5—8/5/86
	2. 6th. Meeting on the Straits of Malacca Revolving Fund Committee, Indonesia.	RFC	26—27/6/86

