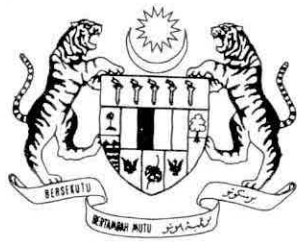
MALAYSIA

ENVIRONMENTAL QUALITY REPORT, 1987

Department of Environment

Ministry of Science, Technology and Environment



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FORWARD

The 1987 Environmental Quality Report has been published as a single volume by the Department of Environment (DOE) to fulfill the responsibility of the Director General of Environmental Quality under Section 3, (1) (i) of the Environmental Quality Act 1974. The Report follows the format of the previous Report (Environmental Quality Report 1985-1986) quite closely.

Before being printed in its final form, the 1987 Report was presented in the form of an executive summary to the 28th. Meeting of the Environmental Quality Council in November 1988 and to the First Meeting of the Ministers and State Executive Council Members incharge of environmental matters in January 1989 where it was well received.

When using the Report, readers are cautioned against using environmental quality data to generalise the environmental situation in the whole country owing to limitations in terms of sampling points and the frequency of sampling. When interpreting the data, DOE should be consulted.

While maintaining the same format, the 1988 Report will contain highlights on the tate of environment in each of the thirteen states and the Federal Territory of Kuala Lumpur, giving examples of environmental issues as well as environmental sound sustainable development.

Acting Director General of Envionmental Quality,
Malaysia

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ENVIRONMENTAL POLICIES AND STRATEGIES

Introduction

Malaysia's rapid economic development has drawn heavily on its resource base ranging from forestry, land and water to fossil fuels and minerals. Air and water pollution, noise pollution and solid and hazardous wastes are of serious concern in certain areas of the country. In order to sustain economic growth, the Government through the Department of Environment (DOE) and other environment-related agencies has adopted environmental policy objectives and environmental management strategy and programmes which are comprehensive yet pragmatic in its continuing efforts to strike a balance between the goals of economic development on the one hand and the environmental objectives on the other.

National Environmental Policy Objectives

The Third Malaysia Plan (1976-1980) and the Fifth Malaysia Plan (1986-1990) embrace the following environmental policy objectives :

(i) "... to maintain a clean and healthy environment...";

(ii) "... to maintain the quality of the environment relative to the needs of the growing population...";

(iii) to minimise "(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 ...";

(iv) to balance "... 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 ... ";

(v) "... to place 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;

(vi) "... to incorporate an environmental dimension in project planning and implementation ..." inter alia by determining "... the implication of the proposed projects ... and the costs of the required environmental mitigation measures through the conduct of Environmental Impact Assessment" studies; and

(vii) to promote "(greater) co-operation and increased co-ordination among relevant federal and state authorities ..." as well as "...(among) the ASEAN Governments ...".

The ultimate aim of the Federal Government working in close co-operation with the State Governments is to ensure as far as possible that all man's activities are in balance with his environment. To this end, in recognizing that the environment transcends national boundaries, the Governments will also co-operate with Foreign Governments either directly or through competent regional and international organisations.

New Strategies In Environmental Management

In order to meet the national environmental objectives set out above, a three pronged environmental management strategy has been adopted; namely, a strategy based on pollution prevention, comprehensive land-use planning, and integrated project planning.

Pollution Prevention

In the pollution prevention approach, 10 pollution control regulations have been formulated under the Environmental Quality Act 1974 and enforced. In addition, two oil spill contingency plans - one for the Straits of Malacca and another for the South China Sea have been prepared in order to combat oil pollution resulting from oil spills.

Land-use Planning

In the comprehensive land-use planning approach, environmental considerations are incorporated into land-use plans such as regional plans, master plans, structure plans, local plans or development plans. This is the time to apply good conservation and natural resources management principles. A checklist of environmental considerations for comprehensive land-use planning include the following:

(i) Noise zones surrounding roads and airstrips;

(ii) Nature conservation areas or areas where development is prohibited because of the protection of historical buildings;

(iii) Distribution of various forms of land use to be based on conservation strategies and other

environment;

(iv) Outdoor recreational and vacation areas, green belts etc., in the immediate surroundings of built-up areas;

(v) Protection of coastal areas including those set aside as recreational areas, national parks, nature reserves and fishing areas by keeping away polluting industries, sewerage treatment works, ports and harbours and sand dredging activities;

(vi) Protection of hilly and mountain areas from development which might cause severe soil erosion;

(vii) Protection of rivers, lakes and sea for various beneficial uses such as water supply, recreation, water way transport, fishing, hydroelectric power and recipient of sewage and industrial effluents;

(viii) Protection of residential areas from environmental pollution using DOE siting and zoning guidelines;

(ix) Air pollution control zones in densely populated areas; and

(x) Waste disposal areas for domestic sewage, domestic refuse and toxic and hazardous wastes; and proper location of sewage treatment plants, incinerators, and toxic and hazardous waste treatment facilities.

In this connection, the Department of Environment has drawn up a list of land-use planning guidelines for use by planning agencies.

Integrated Project Planning

In the integrated project planning approach, environmental considerations are integrated into project planning and implementation. The Environmental Quality (Amendment) Act 1985, requires anyone who intends to carry out a prescribed activity to first conduct a study to assess the environmental impacts that arise from the prescribed activity as well as the mitigating measures to overcome them. The report should be approved by the Director General, Department of Environment before the project could be implemented. On 5 November 1987, the Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order, 1987 was gazzetted for enforcement on 1 April 1988. The Order specified some 19 categories of activities requiring environmental impact assessment.

The above three-pronged strategy has been translated into corresponding environmental management programmes namely pollution control, environmental impact assessment, and comprehensive land-use planning. These programmes are in turn supported by other environmental programmes such as environmental monitoring; environmental education, information and training, environmental research and development; inter-agency, federal-state co-operation and co-ordination; as well as bilateral, regional and international co-operation.

Promotion of Sustainable Development

The implementation of the above environmental management strategy and programmes is very much in line with the principle of sustainable development which has been adopted by the United Nations General Assembly on 11 December 1987 and by the ASEAN Heads of Government at the Third ASEAN Summit on 14-15 December, 1987.

Indeed, the principle of sustainable development also calls for the commitment by sectoral development agencies to ensure that their policies, strategies and programmes incorporate environmental dimensions. In this respect, the setting up of Environmental Committees at the Federal and State levels and the enforcement of all the environmentally related legislations in parallel with the Environmental Quality Act, 1974/(Amendment), 1985, will in no small way contribute to the sustainability of our development efforts for generations to come.

CHAPTER 2
ENVIRONMENTAL QUALITY COUNCIL

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Introduction

The Environmental Quality Council (EQC) established under Section 4(1) of the Environmental Quality Act 1974, is a body to advise the Minister on matters pertaining to the Act and also on any matter referred to it by the Minister. In addition, the Council has also provided guidance to the Department in the formulation of policies and strategies related to environmental protection and management.

Membership

The members of the Environmental Quality Council in 1987 were as follows :

Name and Designation

1. Y.B. Tan Sri Datuk Dr.Hamzah bin Sendut. (Chairman) — 1.12.1984-30.11.1987, 1.12.1987-30.11.1989

2. Encik Mohd Noordin bin Hassan
   Secretary General,
   Ministry of Science,
   Technology and Environment

3. Encik Haron bin Siraj -
   Director, Industry Division,
   Ministry of Trade and Industry

   Alternate:

   Encik Ithnin bin Hj. Hassan -
   Principal Assistant Director,
   Industry Division,
   Ministry of Trade and Industry

4. Ir. Tuan Haji Shahrizaila bin Abdullah -
   Director General,
   Department of Drainage and Irrigation,
   Ministry of Agriculture

5. Ir. Tuan Haji Abdul Jalil bin Mahmud -
   Director General,
   Department of Factories and Machinery,
   Ministry of Labour

6. Cik Norminshah bt. Sabirin
   Deputy Secretary General (I),
   Ministry of Transport

   Alternate:

   Encik Abdul Whahid bin Selamat
   Under Secretary, Land Division,
   Ministry of Transport

7. Ir. Lum Weng Kee
   Director, Engineering Services Division, Ministry of Health

8. Encik Charles G.Edmund @ Charles Labunda — 15.8.1986-31.12.1988
   Permanent Secretary, Ministry of Tourism and Environmental Development, Sabah

   Alternate:

   Encik Yeo Boon Hai
   Senior Environmental Officer,
   Ministry of Tourism and Environmental Development,
   Sabah

9. Encik William Tang — 15.8.1986-31.12.1988
   Permanent Secretary, Ministry of Environment and Tourism,
   Sarawak

   Alternate:

   Encik Darrell Tsen
   Principal Assistant Secretary,
   Local Government Division,
   Ministry of Environment and Tourism, Sarawak

10. Encik Ismail bin Ahmad — 22.9.1986-31.12.1988
    Head of Environment and Pollution Control Division,
    PETRONAS

11. Ir. Lim Kang Hoe — till 26.7.1987
    Representative of the Malaysian Oil Palm Growers Council

    Ir. Teoh Guan Eng — since 27.7.1987
    Representative of the

Malaysian Oil Palm Growers Council

12. Encik A.S. Machado — 26.7.1984-25.7.1990
Representative of The Federation of Malaysian Manufacturers (FMM)

Alternate:

Encik G. Krishnan
The Federation of Malaysian Manufacturers (FMM)

13. Encik Bien Hock Nien — 15.8.1986-31.12.1988
Representative of The Malaysian Rubber Producers Council

Alternate:

Prof. Haji Dr. Badri bin Muhammad
Malaysian Rubber Producers Council

14. Prof. Dr. Sham bin Sani — 1.1.1987-31.12.1988
Department of Geography, Universiti Kebangsaan Malaysia

Alternate:

Dr. Ahmad Badri bin Mohamad
Head, Department of Botany, Universiti Kebangsaan Malaysia

15. Ir. Gurmit Singh K.S — 15.8.1986-31.12.1988
Environmental Protection Society of Malaysia (EPSM)

16. Dr. Ristina bt Hj. Abdul Majid — 15.8.1986-31.12.1988
Malaysian Professional Centre

17. Director General of Environment — -
Department of Environment
(Secretary)

Activities

In 1987, the Council had met three times. The meeting were held at the Department Head Office on 3 March, 2 July and 2 December 1987. Among the important agend tabled in the meetings included draft regulations on Envi ronmental Impact Assessment and on Scheduled Wastes Klang Valley Environmental Improvement Project, State Environmental Committees, World Environment Da Celebrations, Water Quality Criteria and Standards, Mon treal Protocol, and Status of Water Quality in Malaysia The Interim National Water Quality Standards and Criteri proposed for six classes of water usage was agreed by th Council, subjected to verification by further studies.

The draft Environmental Quality (Motor Vehicl Noise) Regulations, 1987 tabled to the Council, was sub sequently gazzetted on 16 July, 1987.

The Klang Valley Environmental Improvemer Project costing US$440,000, financed in part (US$350,00 by the Asian Development Bank, the first major compre hensive environmental planning project carried out in th country, was also tabled to the Council during the yea The main objective of the study was to assist the Goverr ment in the establishment of a framework to undertak regional environmental improvement and management c the Klang Valley.

With regards to the management of toxic and hazarc ous waste, two sets of regulations and an order was drafte by the Department of Environment and tabled to the Cour cil for refinement before being gazzetted.

The proposed Environmental Quality (Prescribe Activities)(Environmental Impact Assessment) Order 198 and its Guidelines tabled to the Council, was subsequentl gazzetted on 5 November,1987. A Handbook of Enviro mental Impact Assessment Guidelines was also publishe to assist project initiators in the preparation of Enviro mental Impact Assessment reports. The Handbook w launched by the Ministry on 30 November, 1987.

The Council was also informed on the strategies the Department of Environment on problems and issues ozone layer depletion in Malaysia and its recommend follow-up actions needed before the Montreal Protoc come into force on 1 January, 1989.

The detailed list of all the working papers submitted to the council in 1987 are given in Table 2.1.

Since 1977, 35 meetings were held and 72 working papers on legal, programme, and other environment- related matters were tabled and discussed. Of the 72 working papers listed, 21 (29 per cent) were recognised as legal matters, 35 (49 per cent) as programme matters, and the remaining 16 (22 per cent) on other issues as shown in Table 2.2.

Table 2.1

Working Papers Submitted to the Environmental Quality Council, 1987

Meeting	Date	Title	Subject
1.	3 March, 1987	1. Water Quality Criteria and Standards for Malaysia. The Status of River Water Quality in Peninsular Malaysia 1978-1986 and Water Quality Status in Sabah and Sarawak 1985.	Standards, Water Quality Monitoring
		2. Motor Vehicle Noise Regulations, 1987	Regulations, Motor Vehicle Noise
		3. Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order, 1987.	Regulations, EIA .
2.	29 July, 1987	1. World Environment Day Celebrations, 1987	Programme, World Environment Day.
		2. Klang Valley Environmental Improvement Project.	Programme, Klang Valley.
		3. Environmental Quality (Prescribed Premises (Scheduled Wastes) Order, 1987; Environmental Quality (Prescribed Premises)(Scheduled Wastes) Regulations, 1987; Environmental Quality (Scheduled Wastes) Regulations, 1987.	Regulations, Waste,Toxic and Hazardous .
		4. Feasibility Study on Treatment and Disposal of Toxic and Hazardous Wastes in Malaysia.	Programme, Waste, Toxic and Hazardous .
3.	2 Dec, 1987	1. Implementation of Toxic and Hazardous Waste Treatment and Disposal Facilities.	Programme, Waste, Toxic and Hazardous .
		2. Report on The Status of Environmental Education Programme.	Programme, Environmental Education.
		3. Paper on The Status of Environmental Action Committee.	Programme, Coordination.
		4. Montreal Protocol on Substances that Deplete the Ozone Layer and its Implications.	Issue, Ozone Layer.

Table 2.2

The Nature and Extent of Working Papers
Submitted to the Environmental Quality Council
by Subject Matter, 1977-1987

Subject Matter		Working Paper (Number)	Percentage (%)
1. Legal			
1.1 Regulations			
Clean Air		3	
Crude Palm Oil		2	
Raw Natural Rubber		2	
EIA		1	
Lead in Petrol		1	
Motor Vehicle Noise		2	
Sewage & Industrial Effluents		1	
Waste, Toxic & Hazardous		2	
Emissions from Diesel Engines		1	
1.2 Standards			
Palm Oil		2	
Rubber		1	
Water Quality		1	
1.3 Legislation			
Amendments		2	
	Sub Total	21	29
2. Programme			
2.1 Planning			
World Environment Day		5	
EIA		3	
Guidelines (Toxic and Hazardous Wastes)		5	
Klang Valley		1	
Seminar		2	
Environmental Education		2	
Environmental Perspective		1	
2.2 Operations			
Contingency Plan		3	
Marine, Oil Spills		1	
Air Quality Monitoring		1	
Water Quality Monitoring		1	
Enforcement		1	
Clean Air		1	
EQA		1	
EQC		1	
Motor Vehicle		1	
Palm Oil		1	
Rubber		1	
Sewage & Industrial Effluents		3	
	Sub Total	35	49

Continued ..... Table 2.2

Subject Matter		Working Paper (Number)	Percentage (%)
3. Issues			
	Environmental Issues	3	
	Marine Pollution	2	
	Piggery Waste	2	
	Pollution Complaints	2	
	Annual Report	1	
	Noise	1	
	Sewage	1	
	Vehicle Air Pollution	1	
	Ozone Layer	1	
	Waste, Municipal	1	
	Water Pollution	1	
	Sub Total	16	22
	Total	72	100

CHAPTER 3
ADMINISTRATION

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Organisational Structure

The Department of Environment is headed by the Director General who is appointed by virtue of section 3(1) of the Environmental Quality Act, 1974. The Department is structured into three main Divisions namely, Planning and Development, Operation, and Administration and eight Regional Offices located at Butterworth, Ipoh, Kuala Lumpur, Johor Bahru, Kuantan, Kuala Terengganu, Kuching, and Kota Kinabalu as shown in Figure 3.1.

Planning and Development Division

The main functions of the Planning and Development Division are to ensure that environmental factors are taken into consideration at all stages of development or project planning, to document pollution control technologies, to increase public awareness and develop a positive attitude towards the environment, to promote regional and international co-operation in the field of environment and also to formulate and review environmental guidelines and regulations. The Division consists of three sections namely Planning, Development, and Programme Formulation. Activities of these sections are as follows:

Evaluation Section

- environmental impact assessment
- environmental input to development planning
- natural resource assessment

Programme Formulation Section

- development of criteria and standards
- formulation of regulations
- development of guidelines
- toxic and hazardous waste management
- chemical risk assessment

Development Section

- environmental education
- regional and international affairs
- presiting evaluation of prescribe premises and that of problematic cases
- written permission
- approval of fuel burning equipment
- environmental technology assessment

Operations Division

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

Monitoring Section

- environmental monitoring
- data management
- instrument and services
- information dissemination
- technical training
- investigation and special studies

Enforcement Section

- source inventory
- licensing
- enforcement and prosecution
- marine pollution control
- progress of compliance
- control of mobile sources and noise

Administration Division

The functions of the Administration Division are to manage and administer matters pertaining to finance, personnel, support services as well as security of the Department. Activities of this Division include :

- manpower planning and training
- general administration and coordination
- personnel administration
- finance administration
- registration of fees collected and licences issued
- support services

Regional Offices

The main functions of Regional Offices are to carry out environmental monitoring and enforcement of various regulations made under Environmental Quality Act, 1974 (Amendment 1985), as well as giving advisory services to the state authority regarding sound environmental planning. Activities of the Regional Offices include:

- air, river, and coastal water quality monitoring
- enforcement
- investigation of complaints
- site investigations

- environmental awareness
- general administration and finance
- state liaison

Finance

Operating Expenditure

The Department's total operating expenditure for 1987 was M$7,255,371. About 57 per cent of the operating expenditure was for staff emolument and related expenditures, while 43 per cent was for services and supplies.

Figure 3.2 shows the Department's operating expenditure for the period 1980-1987. Notable in 1987 was the cut back in operating expenditure by 12.3 per cent from that received for the previous year.

Development Expenditure

The total development allocation for 1987 was M$3.39 million, and a sum of M$214,987 or 6.3 per cent was spent for the purchase of equipment. However, much of the physical work such as the calling of tenders and quotations were completed before the end of the year and in some cases the Tender's Board has approved the purchase of equipment. But the purchase could only be carried out in 1988 as most of the equipment has to be imported from overseas which takes considerable time and therefore, it was not possible for the delivery of the equipment before the end of the year. The Department's development expenditure for the period 1980-1987 is shown in Figure 3.2

Revenue

Revenue collected in1987amounted to M$741,314 which was an increase of 12.4 per cent compared to M$659,362 collected in 1986. Effluent related fees accounted for 82.8 per cent of the total revenue, while compounds and fines collected under the Environmental Quality (Clean Air) Regulations, 1978 amounted to another 16.3 per cent. Other sources of revenue included the sale of reports, regulations, and other documents.

Figure 3.1 Organisation Chart of the Department of Environment, Ministry of Science, Technology and the Environment, 1987.

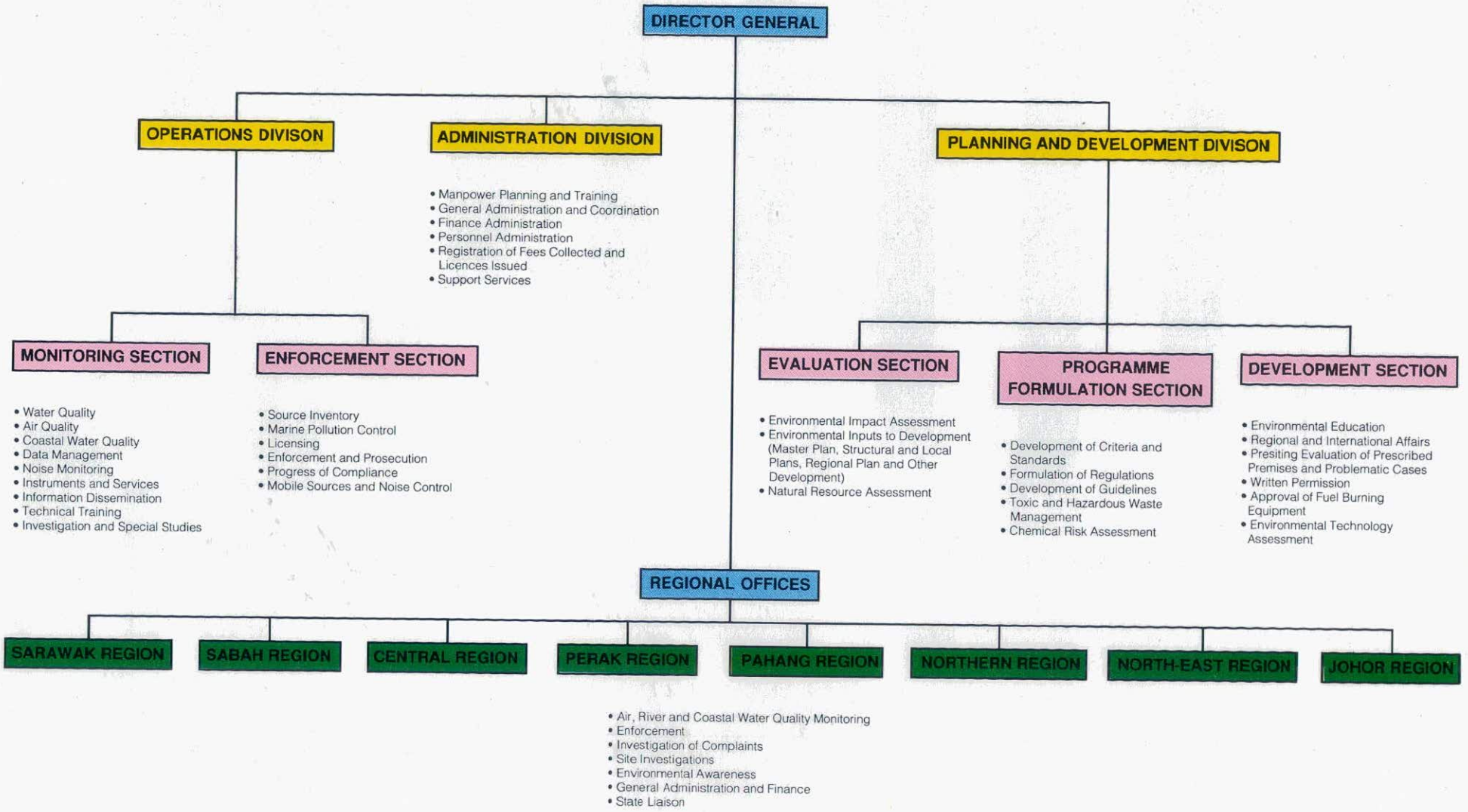

Table 4.1

Peninsular Malaysia: Special Studies Carried Out in 1987.

Type of Study	Description / Findings
1. Structure Plan -	Studies were carried out to supplement existing water quality data to aid in the future land-use planning of each area.
a) Melaka Tengah, Melaka	Sungai Melaka was found to be polluted in terms of BOD, suspended solids and ammoniacal nitrogen below the water intake point right down to the estuary.
b) Pasir Putih/ Jeli Machang/Tanah Merah, Kelantan	Sungai Kelantan and its tributaries were polluted more by suspended solids than by any other pollutants.
c) Pulau Langkawi, Kedah	Inland and coastal waters still remained unpolluted.
d) Petaling, Selangor	Most rivers particularly Sungai Penchala were polluted by sewage and other sources of organic pollution.
2. Baseline Studies	
a) Petrol Vehicles Exhaust Emissions Study	Motor vehicles (petrol) form a major source of air pollution in the country but there is yet a law to control their emissions. The study, carried out in Penang and Ipoh showed that emissions from petrol-driven vehicles in the form of carbon monoxide and non-methane were quite high.
b) Bukit Tinggi Baseline Study	Bukit Tinggi, near Bentong, Pahang was identified as an area for a new township to take the overspill of development from Kuala Lumpur. A baseline study was needed to collect data for future comparative uses which include water quality of the rivers in the area as well as some meteorological and hydrological data. The overall environment has to be maintained and preventive measures must be taken to avoid siltation of rivers due to land clearing for housing development.
c) Sungai Raya (Perak) Study	Several environmental issues were involved in this study (air, noise and landuse) connected with the large amount of applications for quarrying and quarry-related industries centred around Simpang Pulai, near Ipoh. The study confirmed that complaints were justified and the closeness of the quarrying activities to human settlements made them incompatible. Following recommendations of the study, quarrying applications in the area were later frozen by the state authorities.
3. Persisting Pollution Problems and "Ad-Hoc" Studies	
a) Sungai Penchala (Klang Valley) Study	As an urban stream passing through residential and industrial area, Sungai Penchala become the most polluted river in the country. The study was carried out for the whole river system to ascertain sources of pollution. Sewage was still the main culprit although the factories in the vicinity come in as a close second.
b) Batu 9, Cheras (Selangor) Study	Irate home-owners continued to complain about an illegal charcoal factory which used wood chips and shavings as raw materials. At night, smoke from the kiln enveloped the whole area, assisted by local inversions. The study carried out during various time periods (midnight, early morning,late morning, afternoon and evening) found that the residents complaints were true. The factory is still in operation and will be moving to a more suitable location in Semenyih soon.

CHAPTER 4
ENVIRONMENTAL QUALITY MONITORING AND SURVEILLANCE

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Air Quality

In 1987, Air Quality Monitoring continued for the measurement of dust fall-out, total suspended particulates and atmospheric lead. The air quality monitoring sites were reviewed and emphasis given to those sites located in densely populated areas close to industrial estates.

In total, 1524 samples were taken using the dust deposit gauge (DDG), an increase of over 100 per cent compared to 1986 although monitoring sites were decreased from 219 in 1986 to 162 in 1987.

There was also a significant increase in the number of samples collected using the high volume sampler (HVS). Although only three additional monitoring sites were added in 1987 for a total of 25, 1539 samples were collected representing an increase of 125 per cent over that of last year. The increase was due to the additional frequencies of monitoring programmes.

River Water Quality

Under the 1987 National River Water Quality Monitoring Programme, 95 major rivers throughout the country were monitored. A total of 3111 water samples were collected from 597 monitoring sites. Although the number of monitoring sites remained almost unchanged from 1986, there was a significant increase of 45 per cent in the number of samples collected. This can be attributed to the increase in frequency of sampling of major rivers including Sungai Kelang.

Turbidity, dissolved oxygen, conductivity, salinity, temperature, and pH were parameters measured in-situ whilst other parameters were analysed in the laboratory. These included biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids, total dissolved solids, total solids, ammoniacal nitrogen and nitrates as well as heavy metals, subjected to the characteristics of each sampling site.

Coastal Water Quality

In 1987, a total of 153 sites (an addition of three from 1986) were selected for coastal water quality monitoring. The coastal monitoring sites were chosen to represent areas of major coastal activities and the estuarine sites to indicate river inputs. A minimum of four samples per year were collected at each site. All coastal water samples were collected by wading into the water to waist deep while estuarine water samples were taken from a boat.

In total, 771 samples were collected (an increase of 8 per cent from 1986) and analysed by the Chemistry Department for chemical and biological parameters. In addition, a number of in situ measurements such as salinity, temperature, conductivity, pH as well as light penetration were carried out.

Ground Water Quality

In line with the formulation of regulations to control the disposal of toxic and hazardous wastes, it was imperative that the ground water quality monitoring programme be revived. To achieve this, the Department continued to liaise with the Geological Survey Department to obtain data and information on ground water resources and its utilisation and prospects throughout the country.

Noise

The programme for noise monitoring centred on noise level measurements in conjunction with the preparation of Development and Structure Plans for Jeli, Tanah Merah and Pasir Putih in Kelantan, Langkawi Island in Kedah, Petaling in Selangor and the Central District of Melaka. Noise measurements on an ad hoc basis continued to be carried out following complaints from the public which rose from 67 cases in 1986 to 74 in 1987.

Special Studies

Special study programmes were carried out in 1987 in connection with several factors:-

- the preparation of structure plans
- the collection of baseline data
- persistent pollution problems

The major studies carried out are described in Table 4.1.

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Peninsular Malaysia: Special Studies Carried Out in 1987.

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1. Structure Plan -	Studies were carried out to supplement existing water quality data to aid in the future land-use planning of each area.
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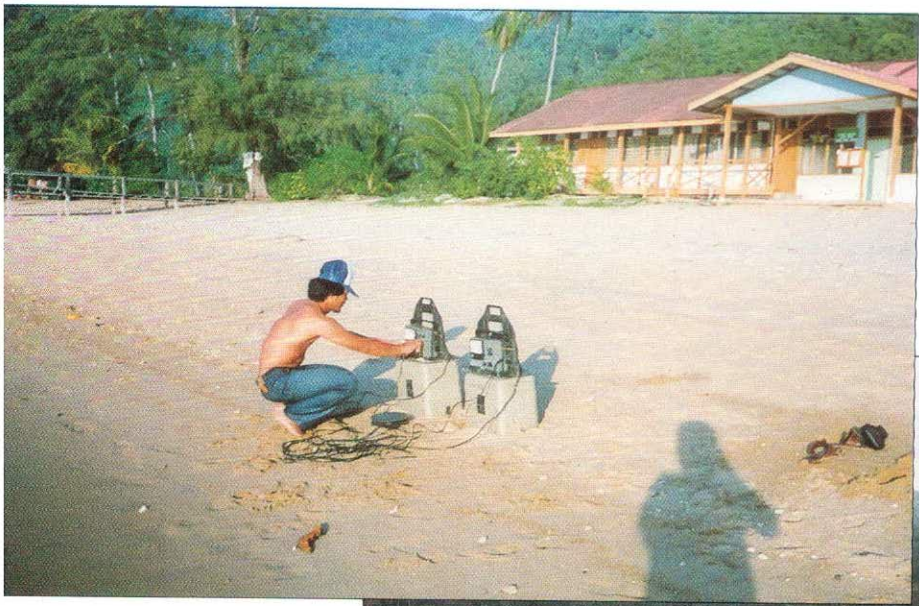
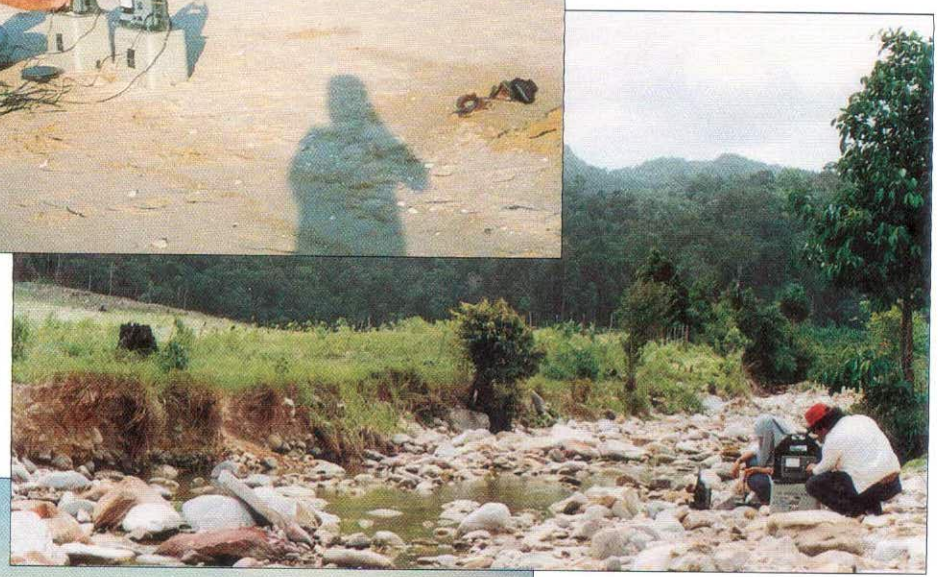
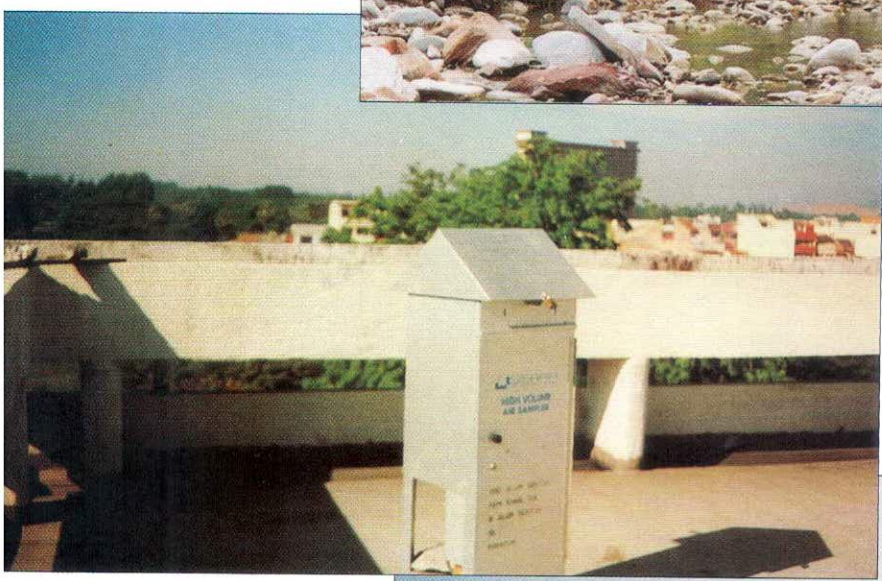
ENVIRONMENTAL MONITORING



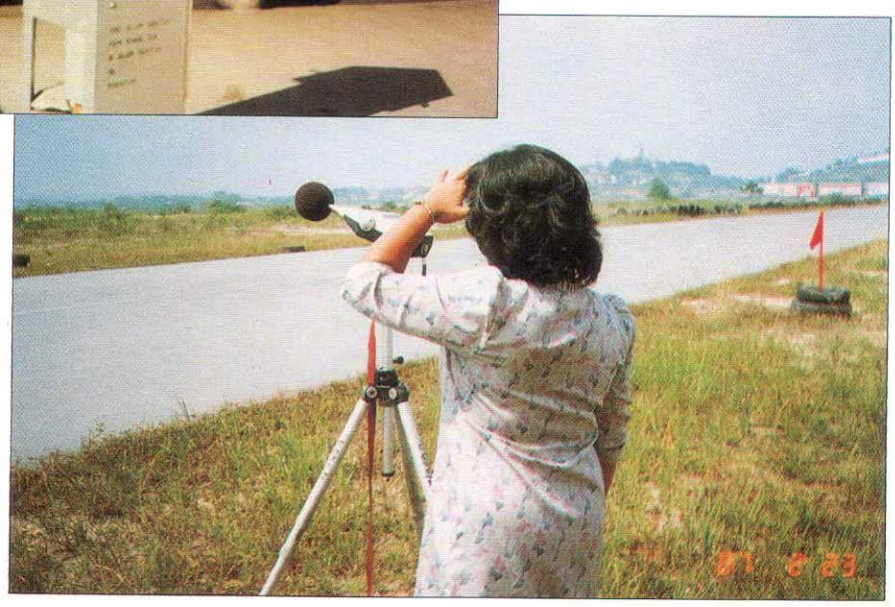
Coastal/marine water quality measurement



River water quality measurement



Measurement of total suspended particulates in air using a high volume sampler



Motor vehicle noise measurement

CHAPTER 5
STATE OF THE ENVIRONMENT

CHAPTER 2
STATE OF THE ENVIRONMENT

STATE OF THE ENVIRONMENT

Introduction

The report of the state of the environment in 1987 focusses on the quality of air, river water as well as coastal and marine waters. With the strengthening of the Department's monitoring programmes and data processing, it is now possible to obtain a more reliable picture of the state of the environment in Malaysia. This information is useful in assessing the effectiveness of short and long term environmental pollution control programmes and in formulating new programmes in environmental management.

Air Quality

Air quality in the mixed urban and industrialised areas of the country remained polluted with dust and total suspended particulates. Lead levels at similar sites had improved at an annual rate of 34 per cent.

Total Suspended Particulates (TSP)

There was no general trend obtained for the annual average TSP concentrations monitored from 1985 to 1987 as represented graphically in Figure 5.1. However, in particular it was observed that levels of total suspended particulates in the highly urbanised area of Kuala Lumpur/Petaling Jaya showed a significant reduction from 1985 to 1986 and further slight reduction in 1987 as shown in Figure 5.2. The situation will be further monitored to determine the actual trend.

In 1987, results showed that air quality for most urban centres (69 per cent) remain unsatisfactory based on the adoption of 75 micrograms per cubic metre (annual mean of 24-hour measurements) as an acceptable proposed standard for urban as well as industrial areas. The larger urban centres of Pulau Pinang, Petaling Jaya, Kuala Lumpur and Johor Bahru recorded annual mean values that ranged from 110.0 to 182.6 ug/m^3, exceeding the acceptable proposed standard. However, these values were comparable to that of a typical urban centre of annual mean values ranging from 60 to 500 ug/m^3. Bukit Merjam, Alor Setar, Ulu Langat, Ipoh, Prai, Gombak and Kuantan recorded annual mean values between 95 to 110 ug/m^3.

Air quality in terms of total suspended particulates were satisfactory in Kuala Terengganu, Kuching, Shah Alam, Ulu Kelang and Kota Kinabalu with recorded annual mean values of 28 to 74 ug/m^3 which were below the acceptable proposed standard. These results are summarised in Table 5.1 and represented graphically in Figure 5.3.

Dust Fall-Out

High levels of dust fall-out were recorded in commercial and industrial areas. In 1987, residential areas in the country recorded annual mean values of 80 to 300 mg/m^2/day as shown in Table 5.2. The annual mean value for industrial and commercial areas recorded were from 90 to 341 mg/m^2/day and 90 to 280 mg/m^2/day respectively (Tables 5.3 and 5.4). Percentage of observations exceeding the acceptable proposed standard of 130 mg/m^2/day for residential areas were within a range of 9 to 70. The percentage of exceedence for commercial areas ranged between 10 to 86 and for industrial areas between 15 to 88 respectively.

Atmospheric Lead

It is noted that air quality in terms of atmospheric lead has improved during the period of 1985 to 1987 as evidenced from the trend represented graphically in Figure 5.4. The trend indicates a general reduction of lead concentration in the air within this period.

The ambient lead levels for urban centres in the country were satisfactory with annual mean levels ranging between 0.04 to 1.40 ug/m^3 as shown in Table 5.5. These values were comparable to that of most European cities with urban annual mean lead levels at sites close to streets within a range of 0.5 to 3.0 ug/m^3.

Kuala Lumpur, Pulau Pinang and Petaling Jaya recorded annual mean lead levels of 0.5 to 1.4 ug/m^3. 92 per cent of the values were within the acceptable limits of 0.5 to 1.0 ug/m^3 (annual mean) recommended by WHO.

The annual lead levels for Shah Alam, Ulu Klang, Gombak, Bukit Mertajam, Alor Setar, Kota Kinabalu, Kuantan, Ipoh and Prai were satisfactory as their recorded mean values of range 0.04 to 0.41 ug/m^3 fell below the WHO recommended limits.

Trace Metals

In 1987, the annual mean cadmium levels of the urban centres in Malaysia ranged from 0.003 to 0.025 ug/m^3 as shown in Table 5.6.

The ferrum levels recorded for urban centres in the country ranged from 0.09 to 1.78 ug/m^3 while the chromium level ranged from 0.01 to 0.06 ug/m^3 (Tables 5.7 and 5.8).

River Water Quality

The quality of the majority of rivers in Malaysia (71 per cent) in 1987 has improved over the previous two years. This was determined by comparing results of river water quality in terms of BOD5, COD, suspended solids, ammoniacal nitrogen and pH.

The appraisal of water quality data collected in 1987 based on the water quality index for five parameters (Table 5.9) for 35 selected major river systems showed that four rivers (12 per cent), namely Sungai Kelang, Sungai Sepang, Sungai Juru and Sungai Raja Hitam remained heavily polluted; whilst 25 (71 per cent) were slightly polluted and facing pollution problems; and the remaining six were clean. All the six clean rivers are in Sabah and Sarawak (Tables 5.10, 5.11 and 5.12).

In terms of relative changes and trends in water quality for the period 1985-1987, 15 rivers out of 24 (62 per cent) in Peninsular Malaysia had an average annual improvement rate of 2.2 per cent. It was heartening to note that Sungai Kelang, though remaining as one of the grossly polluted rivers in Peninsular Malaysia, seemed to indicate improvement at an annual rate of 1.9 per cent. The rest of the nine rivers, Sungai Sepang, Sungai Bernam, Sungai Kemaman, Sungai Raja Hitam, Sungai Muda, Sungai Perai, Sungai Langat, Sungai Pahang and Sungai Melaka deteriorated in water quality at different rates ranging from 0.6 to 7.3 per cent per year.

During the same period, four rivers (67 percent) in Sarawak and all five rivers in Sabah (100 per cent)showed an average annual improvement rate of 2.2 per cent. Sungai Miri/Lutong in Sarawak were found to deteriorate at a rate of not more than 2 per cent per year.

It must be noted that as a follow-up of the previous river quality data evaluation exercise, monitoring data for the three key water quality parameters were retained for data analysis and interpretation: biochemical oxygen demand (BOD5), total suspended solids (SS) and ammoniacal nitrogen (NH3-N). The choice of parameters was based on the types of pollution sources and their effect on the river quality conditions. Water quality was then compared with the proposed interim national water quality standards for Malaysia with respest to Class III use for water supply (extensive water treatment), fishery (economic value) and livestock drinking. This is because the majority of sampling sites (85 per cent) are located downstream of water supply intake points. Tables 5.10, 5.11 and 5.12 respectively summarise the results of the data evaluation exercise and relative conditions and trends of the state of river quality in Malaysia.

Biochemical Oxygen Demand (BOD5):Organic Pollution

River water quality with respect to organic pollution as expressed in terms of the biochemical oxygen demand parameter, is a less serious water pollution problem, with only four rivers (11 per cent) falling under the very polluted category and the majority of 23 rivers (66 per cent) were considered clean. The remaining eight rivers fell within the slightly polluted category. It was observed that the four badly polluted rivers were on the west coast of Peninsular Malaysia namely Sungai Kelang, Sungai Sepang, Sungai Juru and Sungai Raja Hitam. A total of 19 rivers (53 per cent) showed improvement at the rate of 0.1 to 5.2 per cent per year. (Tables 5.10, 5.11 and 5.12).

Figure 5.5 represents the pattern of mean annual concentration of BOD5 in Peninsular Malaysia and indicates that 50 per cent of all the monitoring sites recorded mean annual concentrations less than or equal to 1.45 mg/l. In Sabah and Sarawak, the median values were 0.74 mg/l and 0.95 mg/l respectively (Figures 5.6 and 5.7).

Based on the interim water quality standard of 6 mg/l for BOD5, it was noted that in 1987 water quality of 20 out of the 35 rivers (57 per cent) complied for more than 95 per cent of the time. Sungai Bernam, Sungai Selangor, Sungai Batu Pahat, Sungai Kemaman and Sungai Kelantan in Peninsular Malaysia remained clean. In Sabah and Sarawak, all the rivers monitored complied with the interim standard with the exception of Sungai Miri/Lutong and Sungai Padas (Tables 5.13 and 5.14).

Suspended Solids (SS): Soil Erosion and Sedimentation

A major environmental problem related to the river systems and inland waters which is increasingly causing public concern is soil erosion and resulting river sedimentation and siltation. A total of 17 rivers (49 per cent) fell under the very polluted category, nine rivers (26 per cent) slightly polluted while the remaining nine rivers (25 per cent) are considered clean.

Monitoring results for the period of 1985 to 1987 showed that 20 rivers (57 per cent) improved at a rate of up to 10.0 per cent per year. 15 rivers (43 per cent) deteriorated at a rate not exceeding 7.5 per cent per year. (Tables 5.10, 5.11 and 5.12).

In 1987, 12 rivers in the whole of Malaysia (34 per cent) indicated compliance with the interim standard of 150 mg/l for suspended solids for 95 per cent of the time

(Tables 5.13 and 5.14). However, if the data is compared with the previously used standard of 50 mg/l (Class IIB: Recreational use with body contact), only 11 per cent of the river in the country can be considered suitable for recreational purposes. Figures 5.8, 5.9 and 5.10 show median values of 40 mg/l, 82 mg/l and 50 mg/l for samples taken in Peninsular Malaysia, Sabah and Sarawak respectively.

It was observed that Sungai Kelang, Sungai Langat, Sungai Bernam, Sungai Kemaman and Sungai Selangor which received mine tailings discharge and surface run-offs from mining areas were badly affected. However, the latest monitoring results indicate some prospect for reduction in suspended solids content in rivers but the overall average rate of improvement is not expected to be more than 1 per cent per year.

Ammoniacal-Nitrogen (NH3-N): Pollution by Sewage and Animal Waste

The quality of river waters was less satisfactory measured in terms of ammoniacal-nitrogen concentration. 14 rivers (40 per cent) falling under the very polluted category as the affected rivers continued to receive pollution loadings from partially and untreated domestic sewage and animal wastes. Seven rivers (20 per cent) were found to be slightly polluted while the remaining 14 (40 per cent) were considered clean. Monitoring results for the period between 1985 to 1987 showed that 16 rivers (43 per cent) showed an improvement of up to 40 per cent per year. Furthermore, the rate of improvement for ammoniacal-nitrogen is the highest compared with the other parameters. On the other hand, 17 rivers (49 per cent) were found to deteriorate at various rates not exceeding 30 per cent per year. (Tables 5.10, 5.11 and 5.12).

Monitoring results in 1987 produced a value of 0.26 mg/l as the median in Peninsular Malaysia and 0.01 mg/l and 0.05 mg/l respectively in Sabah and Sarawak. (Figures 5.11, 5.12 and 5.13). The results also showed that in 1987, 17 rivers (49 per cent) complied with the interim standard of 0.9 mg/l for 95 per cent of the time. This indicates a decrease in compliance from 70 per cent in 1985/1986.

Table 5.13 shows that none of the samples taken from Sungai Juru and Sungai Sepang in 1987complied with the interim standard of 0.9 mg/l. However, Sungai Bernam, Sungai Selangor, Sungai Batu Pahat and Sungai Rompin had no problems with ammoniacal nitrogen. In Sabah and Sarawak too, ammoniacal nitrogen was not a problem with the exception of Sungai Miri/Lutong.

Heavy Metals Pollution

The monitoring of heavy metals in rivers continued for the eight selected rivers: Sungai Merbok, Sungai Perak, Sungai Juru, Sungai Perai, Sungai Kelang, Sungai Langat, Sungai Muar, and Sungai Batu Pahat, as in 1985/1986 (Table 5.15). The recorded levels for heavy metals ranged from non-detection to 0.55 mg/l for lead (Pb), 0.005 mg/l for mercury (Hg), 0.060 mg/l for cadmium (Cd), 0.10 mg/l for copper (Cu), 0.440 mg/l for zinc (Zn) and 0.100 mg/l for arsenic (As). Based on the interim standards for fishery, lead emerged as the major heavy metal pollutant only with respect to three rivers, namely Sungai Merbok, Sungai Perai and Sungai Juru where more than 90 per cent of the observations exceeded the interim standard. This marks an improvement from the condition in 1985-1986 when only Sungai Muar recorded satisfactory levels of lead concentration.

Mercury concentrations remained unchanged for the three rivers mentioned above. These rivers together with Sungai Batu Pahat also continued to record similar concentrations of cadmium.

In 1987, the monitoring of copper was carried out for Sungai Perak,Sungai Perai and Sungai Kelang. Sungai Kelang and Sungai Perak recorded high concentrations exceeding the interim standard about 50 per cent of the time. All the three rivers monitored for arsenic and zinc complied with the interim standard, as was the case during the period 1985-1986.

Cadmium concentration in Sungai Batu Pahat remain high as with previous years, whilst in Sungai Merbok, Sungai Klang and Sungai Muar, results indicated general improvement. The concentration in the other rivers complied with the interim standard.

Coastal and Marine Water Quality

The coastal waters of Malaysia on the whole remained polluted especially in terms of suspended solids, feacal coliform and oil and grease. Thus monitoring activities continued to be of worthy concern as evidenced by the results during the years 1986 and 1987. In addition, the marine waters suffered contamination by heavy metals such as cadmium, chromium, copper, lead, mercury and nickel.

The high content of suspended solids in the coastal waters off Kedah, Perak, Negri Sembilan, Johor and Sabah showed some improvement during the period 1986 to 1987, but not in the other states (Table 5.16). Meanwhile, contamination by both human and animal wastes was still

a serious problem in Pulau Pinang, Perak, Johor and Pahang. However, in the other states, the situation has improved. For oil and grease, there was a general improvement in Perak, Pahang, Sabah and Sarawak. However, the situation deteriorated slightly in the other states. In terms of heavy metal, eventhough the marine water quality showed deterioration at a few places for example, Sabah, Johor, Pahang, Kedah and Perlis, the deterioration rate was quite negligible. There was no significant change for the State of Sarawak.

Generally, recreational areas such as Pantai Telok Batik, Pantai Morib, Tanjung Keling and Port Dickson on the west coast of Peninsular Malaysia were considered clean in terms of compliance with the European Economic Community (EEC) Standard for faecal coliform of 100 MPN/100 ml for conservation of marine aquatic resources. This was also true for Pulau Tioman, Pantai Rantau Abang, Pantai Telok Mengkuang, Pantai Cinta Berahi and Pan-tai Irama Bachok on the east coast. In addition, Pantai Usukan in Sabah, Pantai Bako and Pantai Bintulu in Sarawak were also suitable for recreational purposes.

Faecal Contamination

The overall situation, at all the marine monitoring sites showed significant levels of faecal contamination which was attributed to wastes of human and animal origin. The States with the most polluted coastal waters in terms of the degree of faecal contamination most probable number (MPN) of faecal coliform per 100 ml of water sample, listed in descending order, were Penang, Perak, Melaka, Johor and Selangor, while the other States indicated less than fifty (50) per cent of observations exceeding the proposed interim standard for conservation of marine aquatic resources of 100 MPN/100 ml (Figure 5.14).

Total Suspended Solids

The degree of contamination by suspended solids was found to be the most serious compared to the other parameters analysed. Sabah was found to be the most problematic State in terms of total suspended solids followed by the States of Terengganu, Kelantan, Perak, Sarawak, Melaka, Pahang and Selangor, as listed in descending order. Figure 5.15 reflects the overall situation faced by the States in 1987.

Oil and Grease

In 1987, contamination by oil and grease decreased compared to faecal contamination and total suspended solids. Selangor experienced the highest degree of oil and grease contamination, followed by Negri Sembilan, Sabah, Melaka, Terengganu and Kelantan. The remaining States recorded oil and grease contamination less than 50 per cent of the time (Figure 5.16).

Heavy Metals

Heavy metals, namely, cadmium, chromium, copper, lead, mercury and nickel continued to be detected in the inshore waters of Malaysia. Kedah and Perlis recorded the highest contamination by cadmium, copper, lead, mercury and nickel. However, for chromium, Perak and Sabah experienced high levels of contamination. It was noted that all States were free from arsenic contamination. Figures 5.17 to 5.22 show the levels of heavy metal contamination in each State.

Beach Tar

Beach tar sampling was carried out only on selected beaches on the east and west coasts of Peninsular Malaysia.

On the west coast of Peninsular Malaysia, most of the beaches sampled were free from beach tar except for Pantai Morib, Port Dickson and Tanjung Keling. On the other hand, beach tar posed a serious problem to most of the east coast beaches except for the popular tourist resorts; Pulau Tioman, Teluk Chempedak, Kampung Cherating, Kampung Teliput, and Pantai Cinta Berahi.

OUTSTANDING ISSUE: SOIL EROSION AND RIVER SILTATION

A river with high sediment load

Soil erosion due to poor soil management practices

Indiscriminate discharge of sewage and solid waste .....a source of water and marine pollution

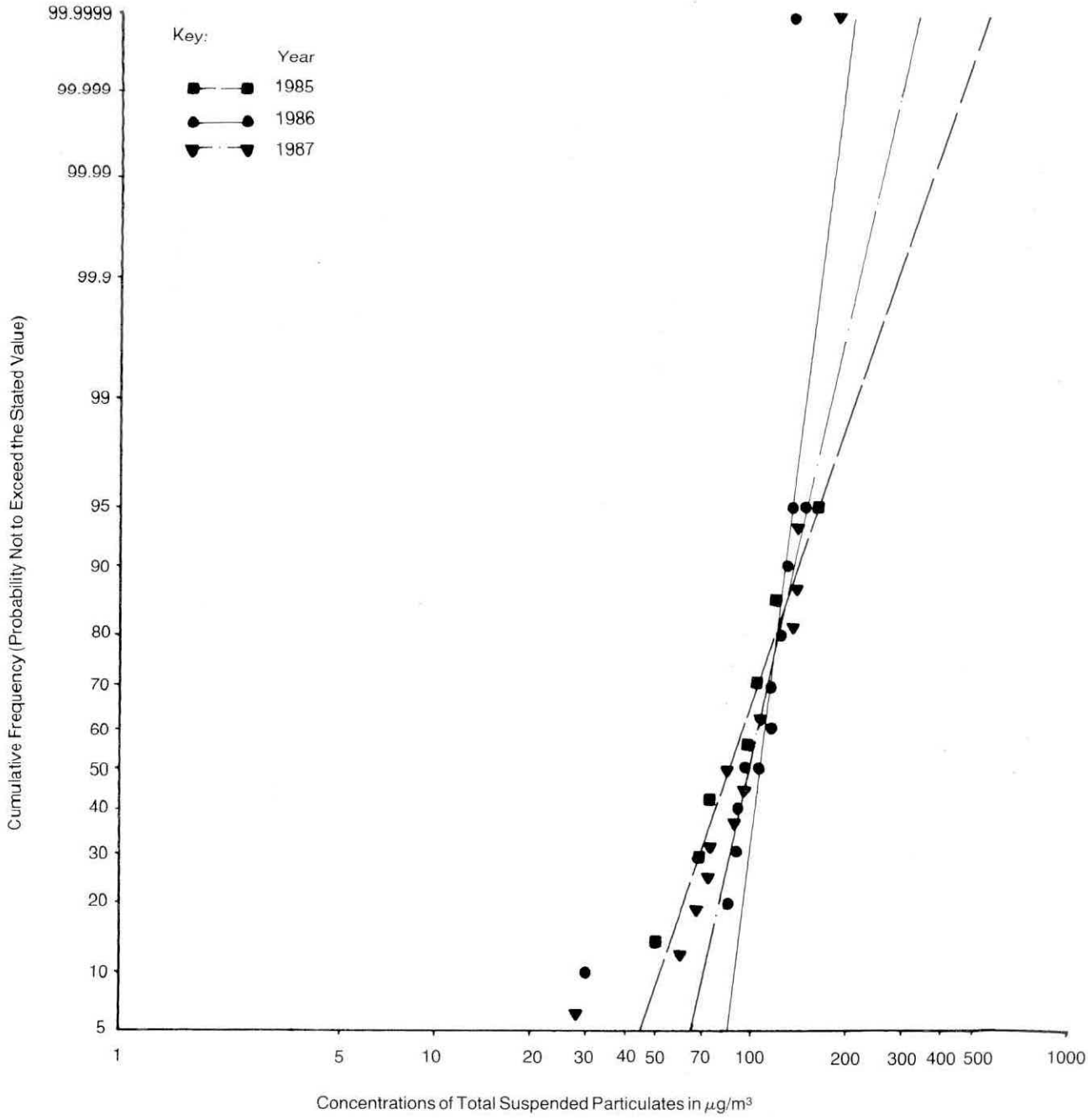


Figure 5.1. Malaysia: Status of Air Quality. Trend for Total Suspended Particulates, 1985 – 1987.

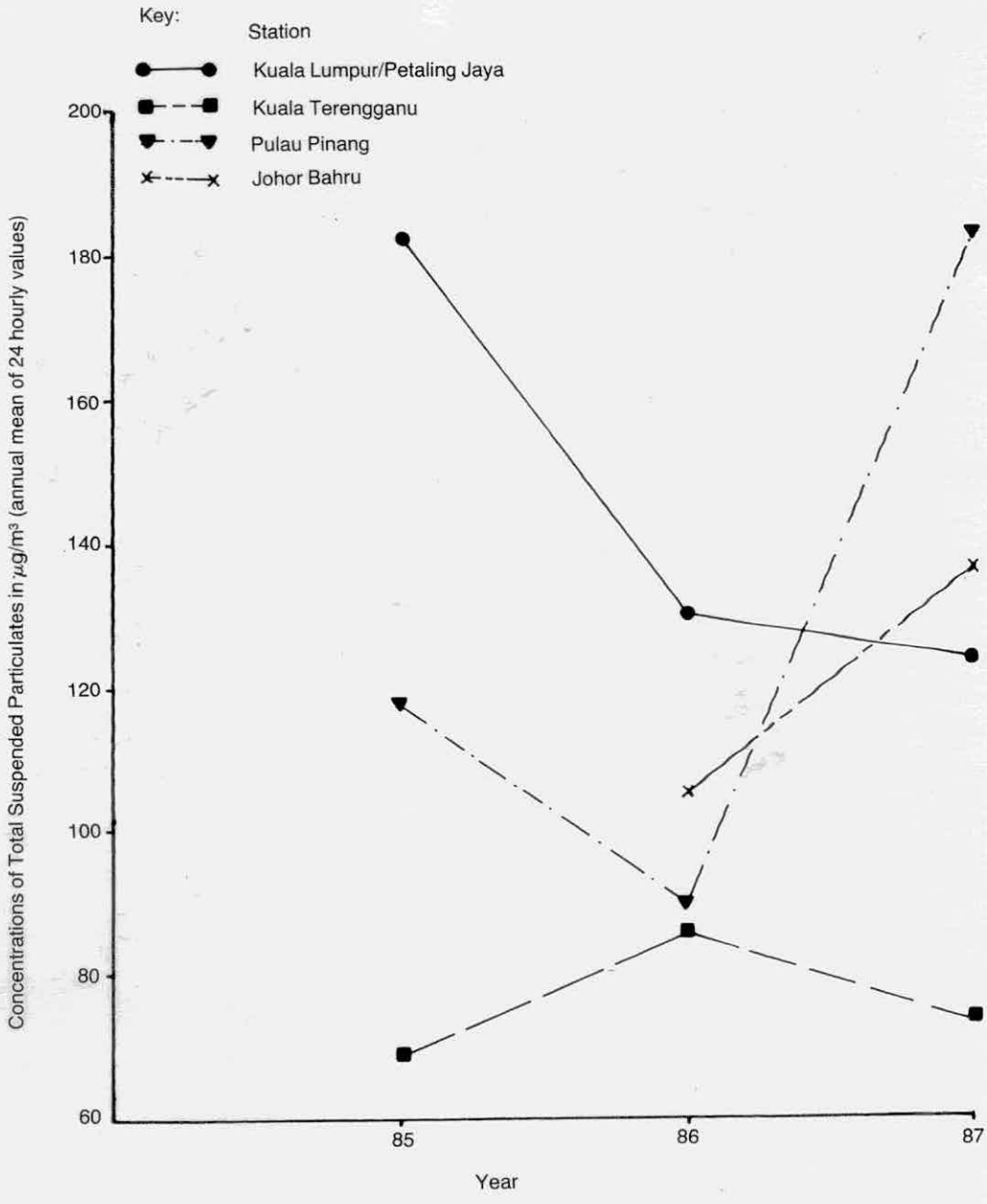


Figure 5.2. Peninsular Malaysia: Status of Air Quality. Trend for Total Suspended Particulates by Station, 1985 – 1987.

Note: The Proposed Interim Standard of Total Suspended Particulates is 75 $\mu g/m^3$ (annual mean of 24 hourly values).

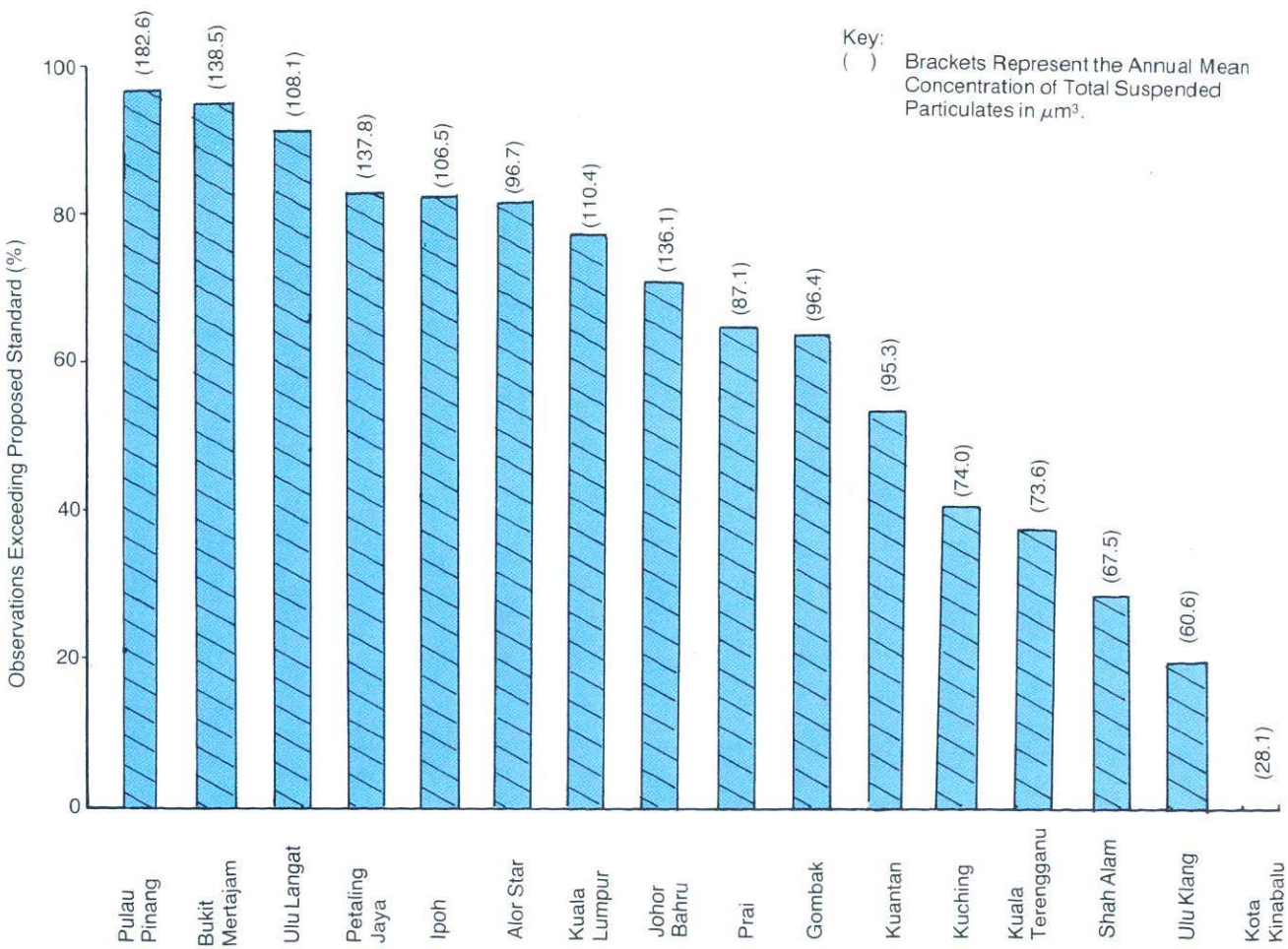


Figure 5.3. Malaysia: Status of Air Quality. Total Suspended Particulates by Location, 1987.

Note: The Proposed Interim Standard of Total Suspended Particulates is 75 $\mu g/m^3$ (24 hours average).

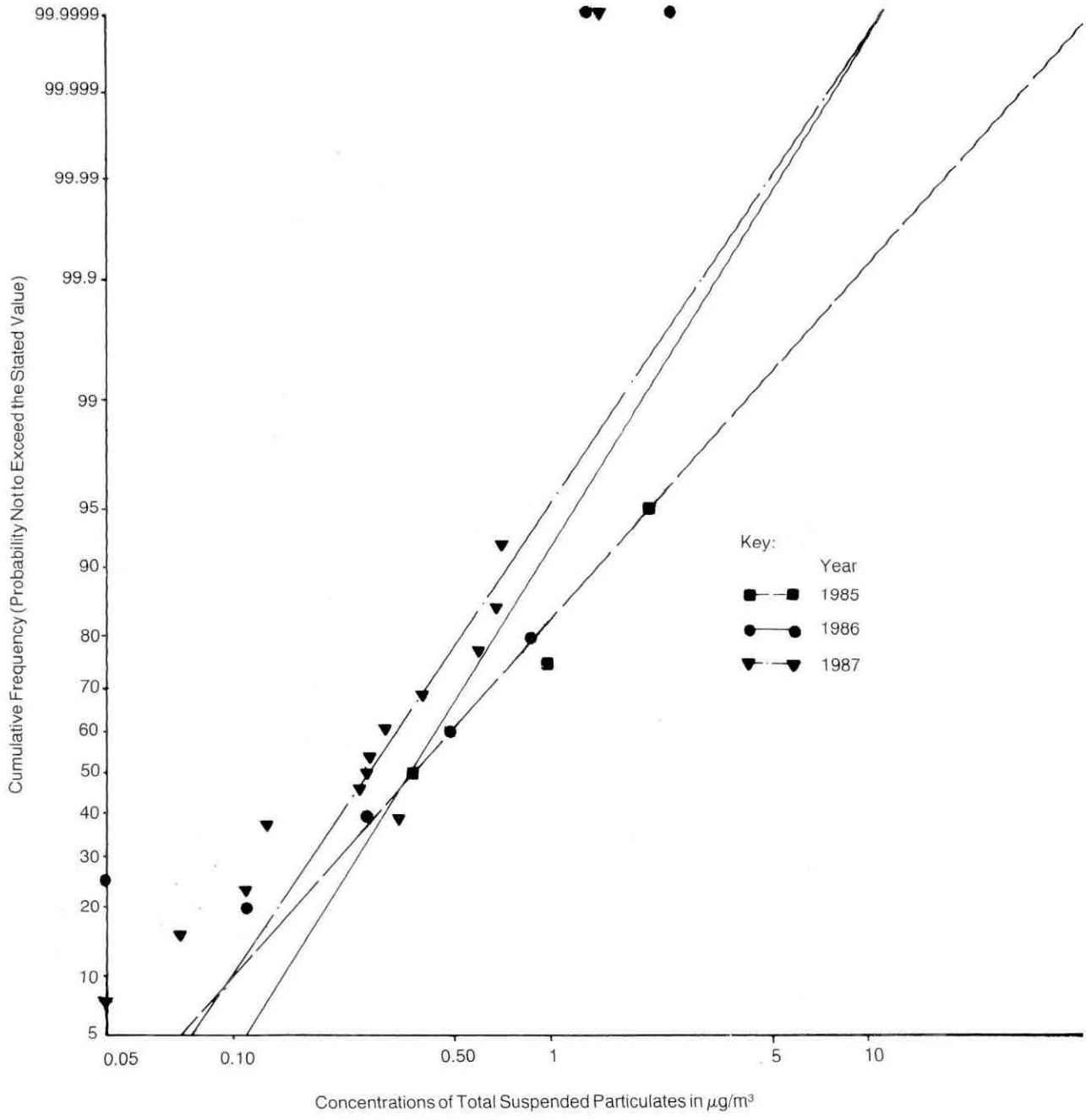


Figure 5.4. Malaysia: Status of Air Quality. Trend for Airborne Lead, 1985 – 1987.

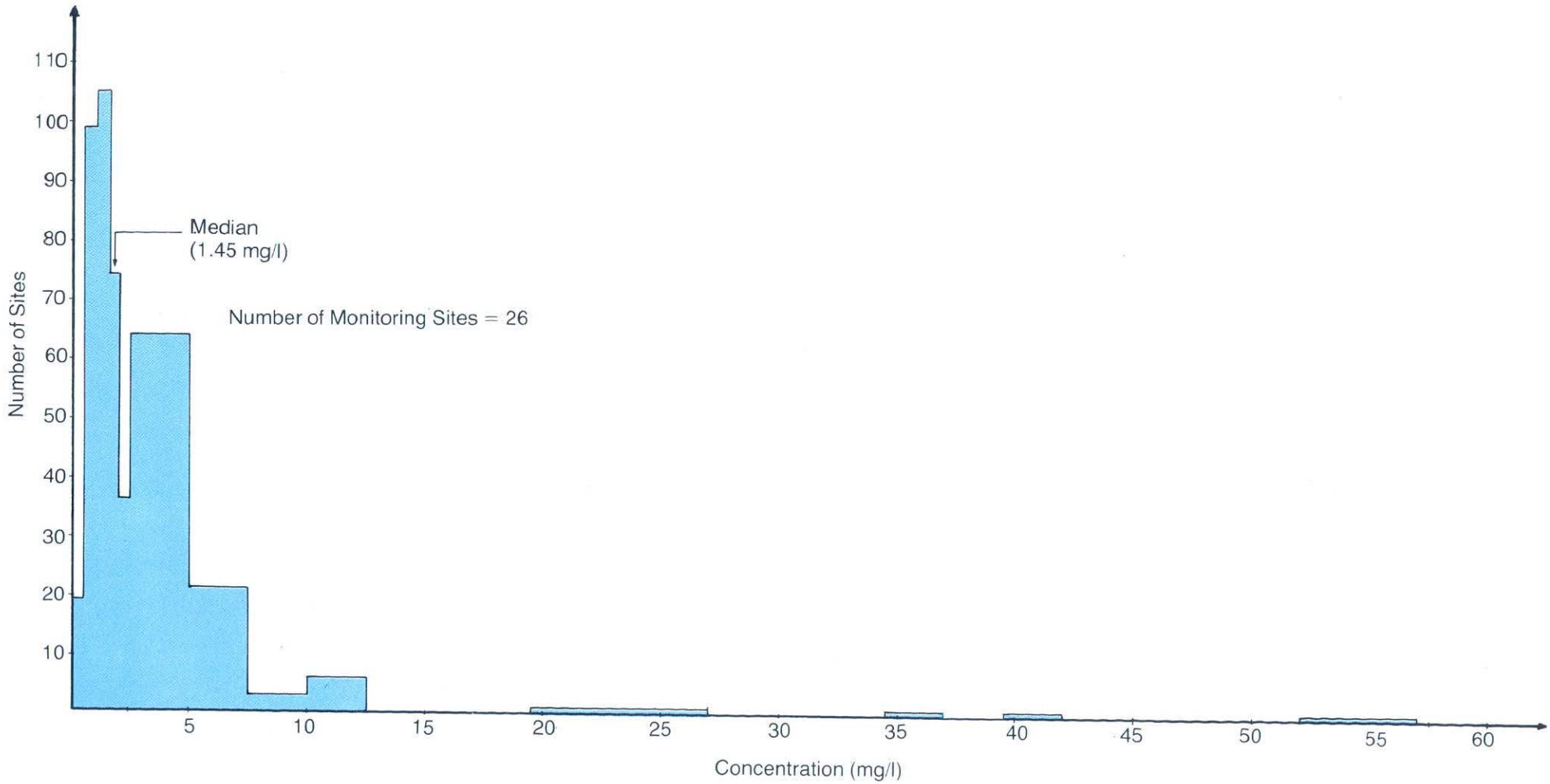


Figure 5.5. Peninsular Malaysia: Distribution of Annual Average Concentration of Biochemical Oxygen Demand (BOD), 1987.

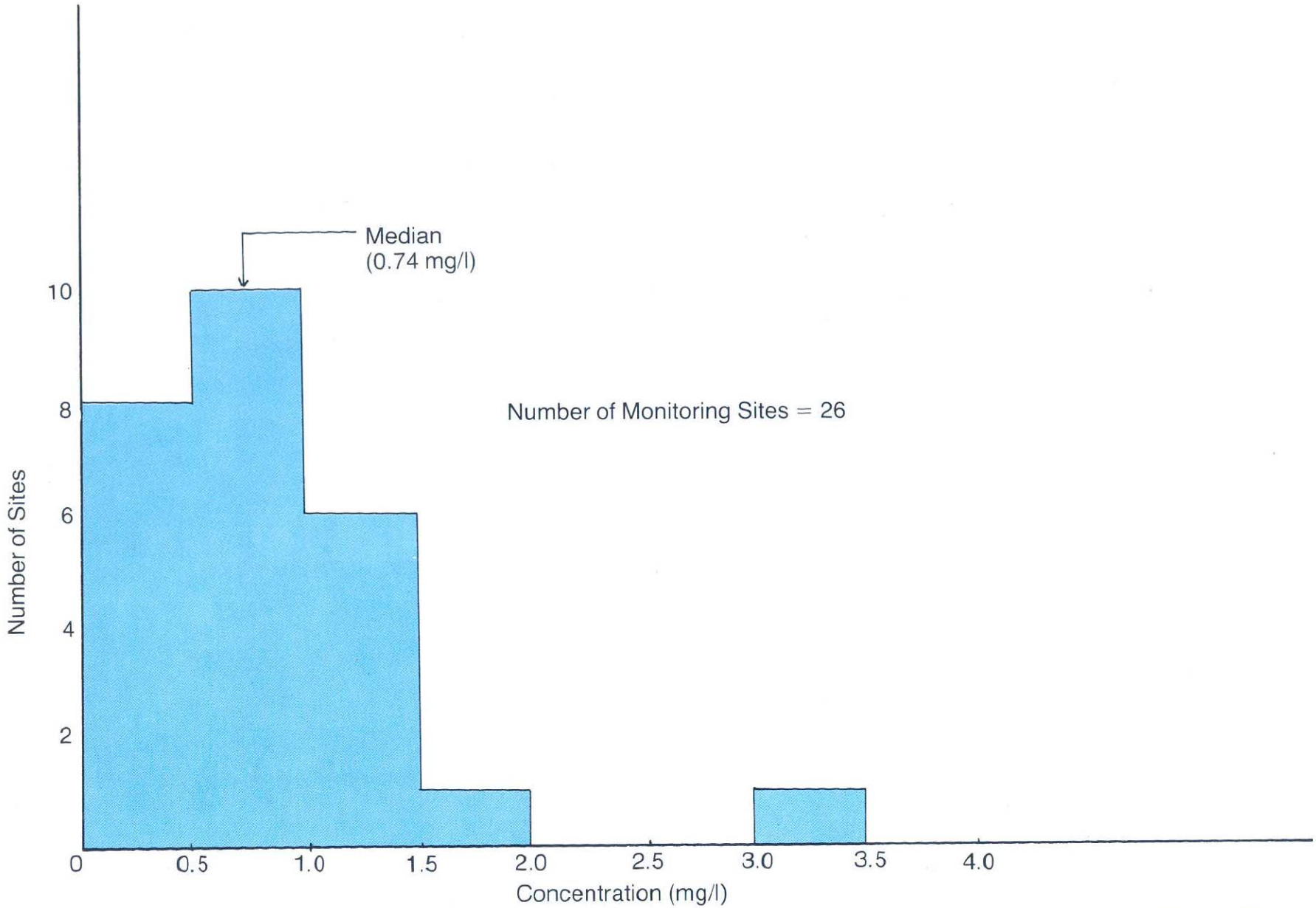


Figure 5.6. Sabah: Distribution of Annual Average Concentration of Biochemical Oxygen Demand (BOD), 1987.

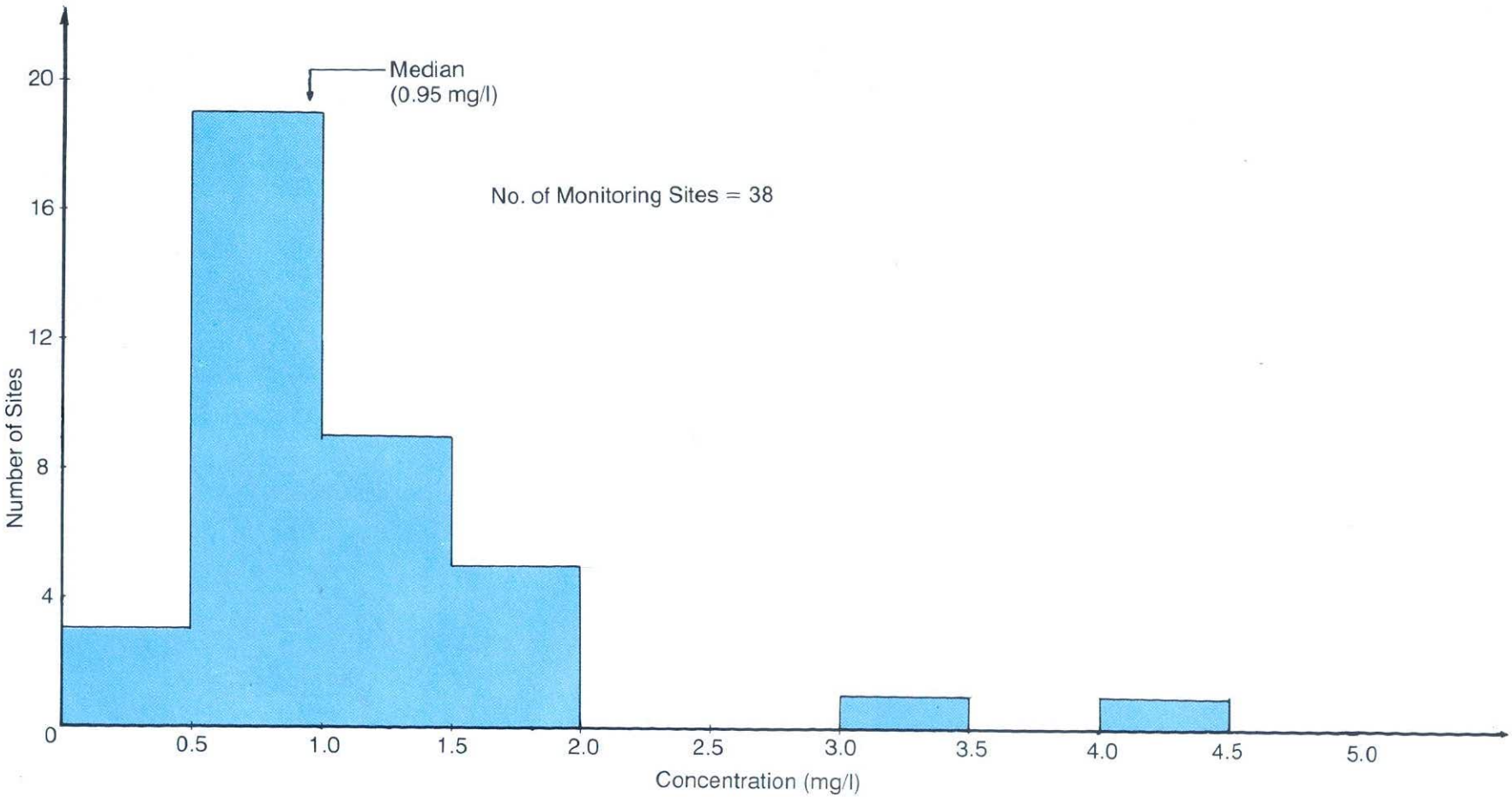


Figure 5.7. Sarawak: Distribution of Annual Average Concentration of Biochemical Oxygen Demand (BOD), 1987.

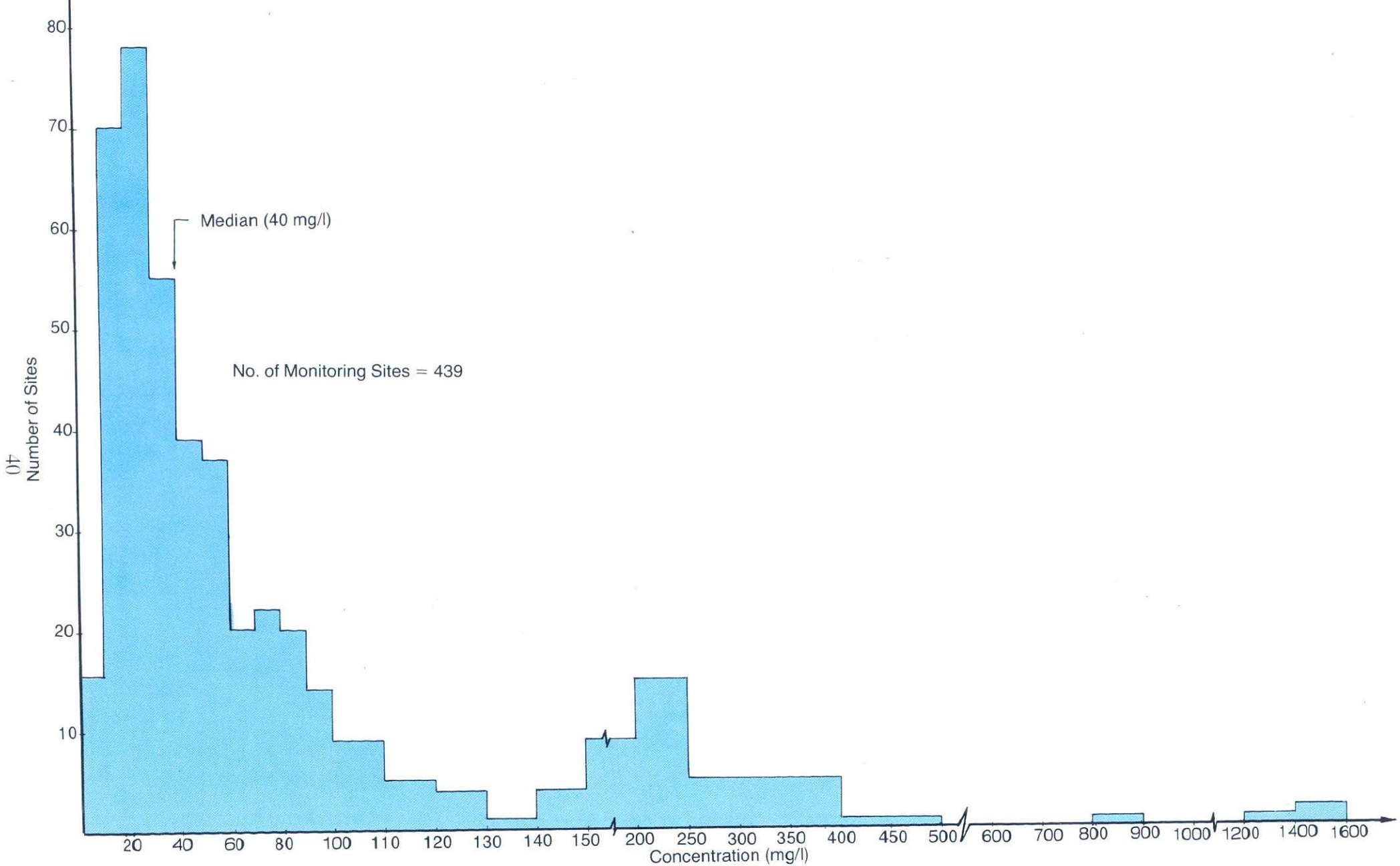


Figure 5.8 Peninsular Malaysia: Distribution of Annual Average Concentration of Suspended Solids (SS), 1987.

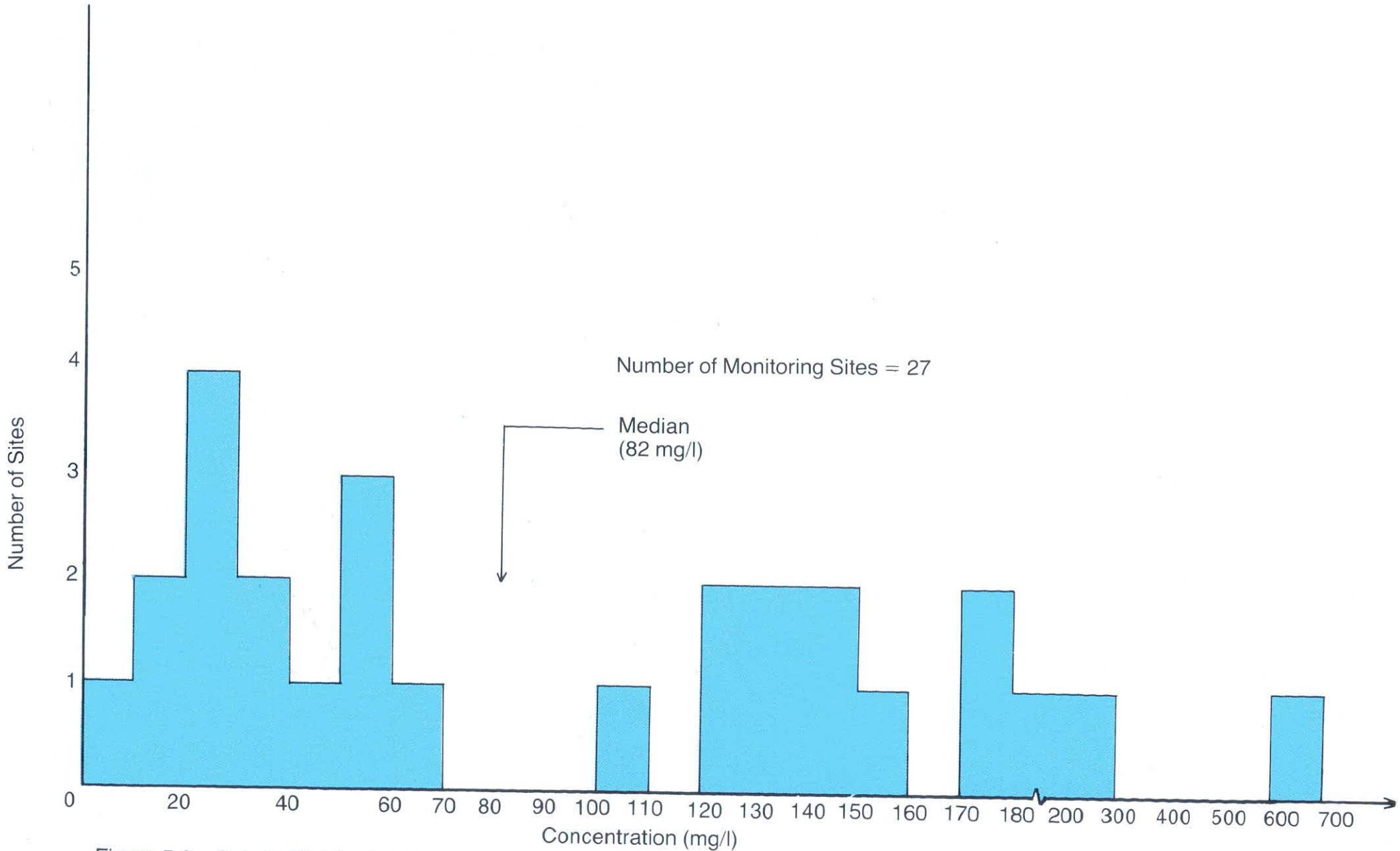


Figure 5.9. Sabah: Distribution of Annual Average Concentration of Suspended Solids (SS), 1987.

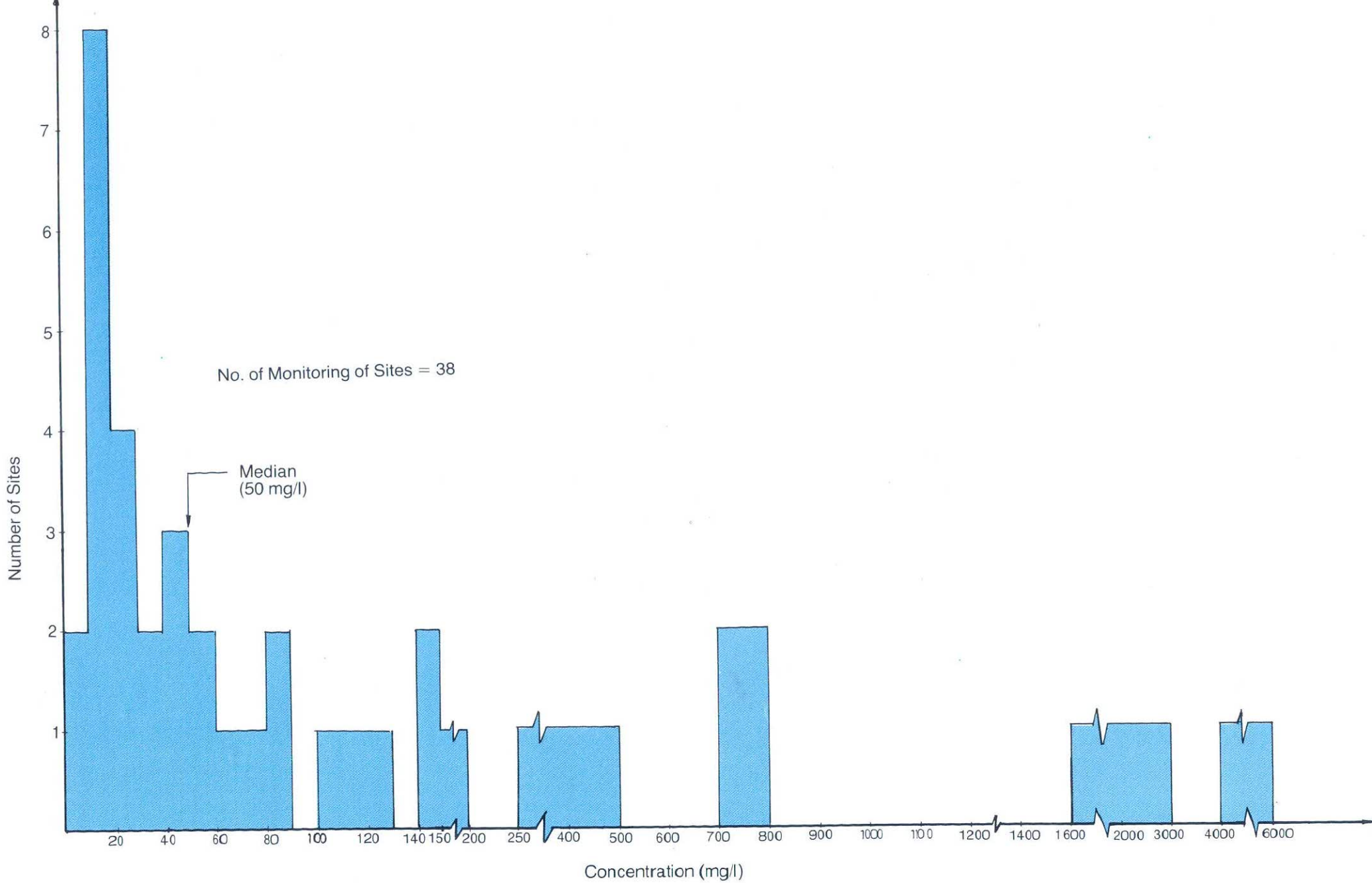


Figure 5-10. Scenario: Distribution of Annual Average Concentration of Suspended Solids (SS), 1987.

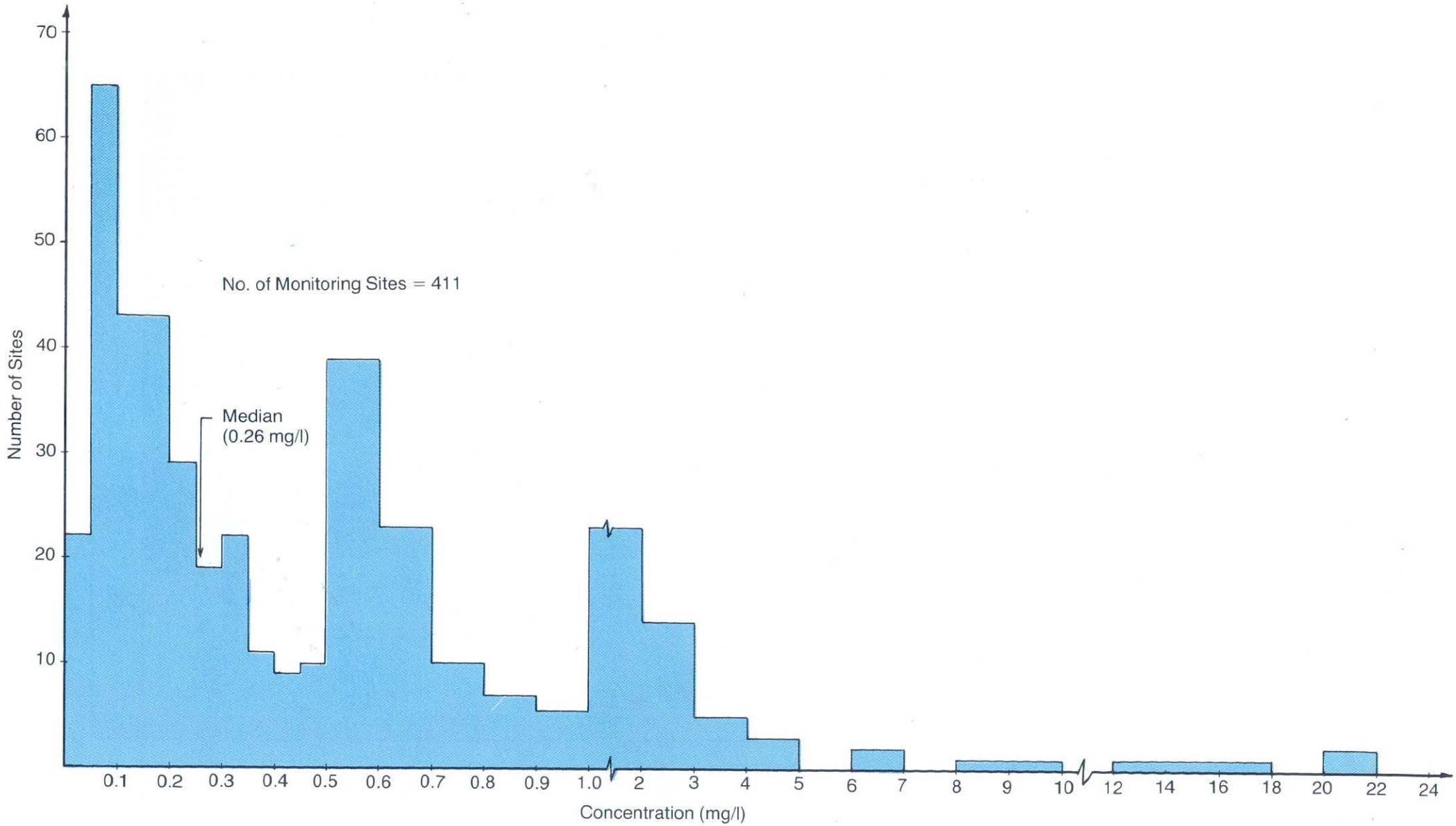


Figure 5.11. Peninsular Malaysia: Distribution of Annual Average Concentration of Ammoniacal Nitrogen (AN), 1987.

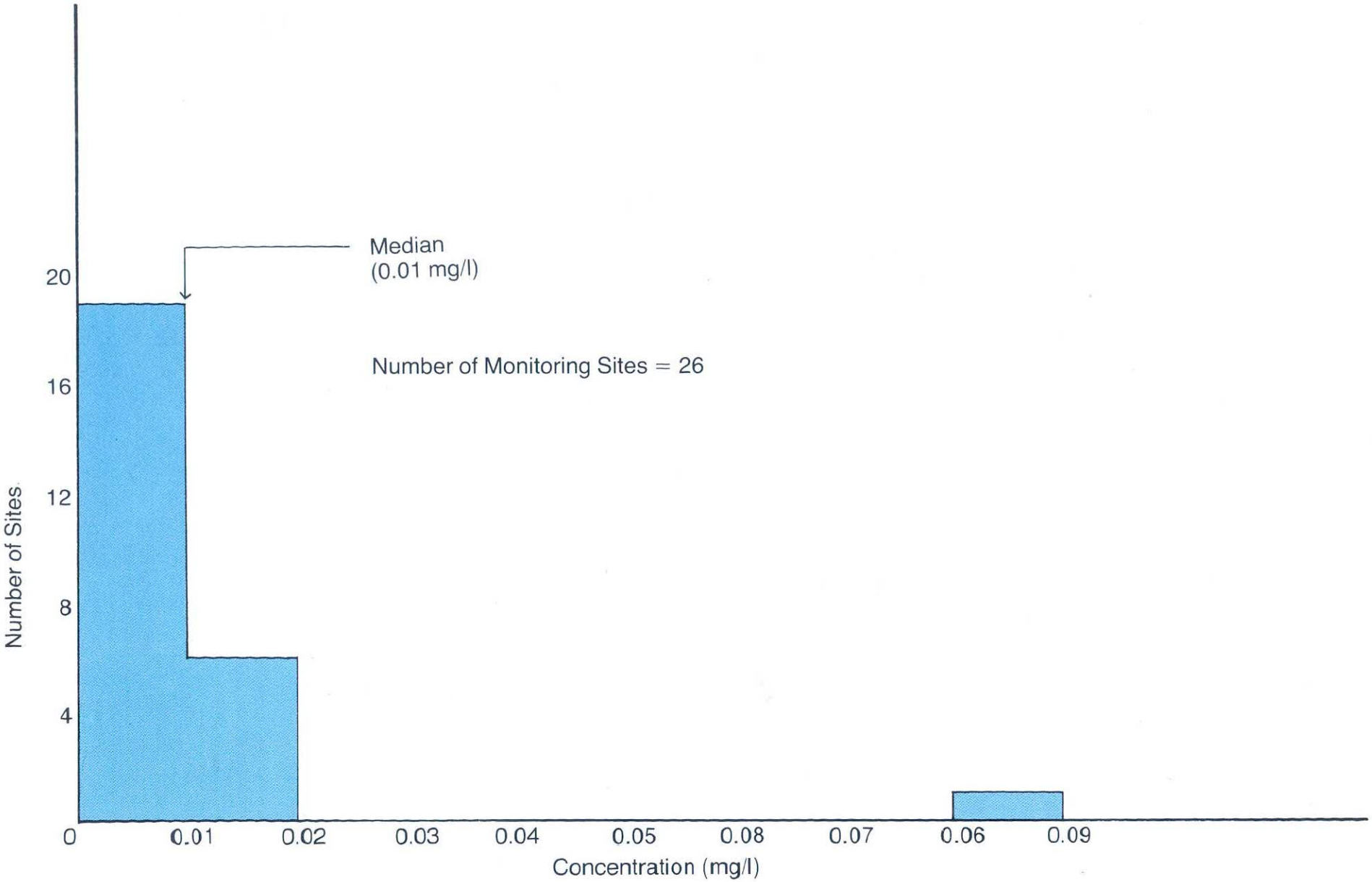


Figure 5.12. Sabah: Distribution of Annual Average Concentration of Ammoniacal Nitrogen (AN), 1987.

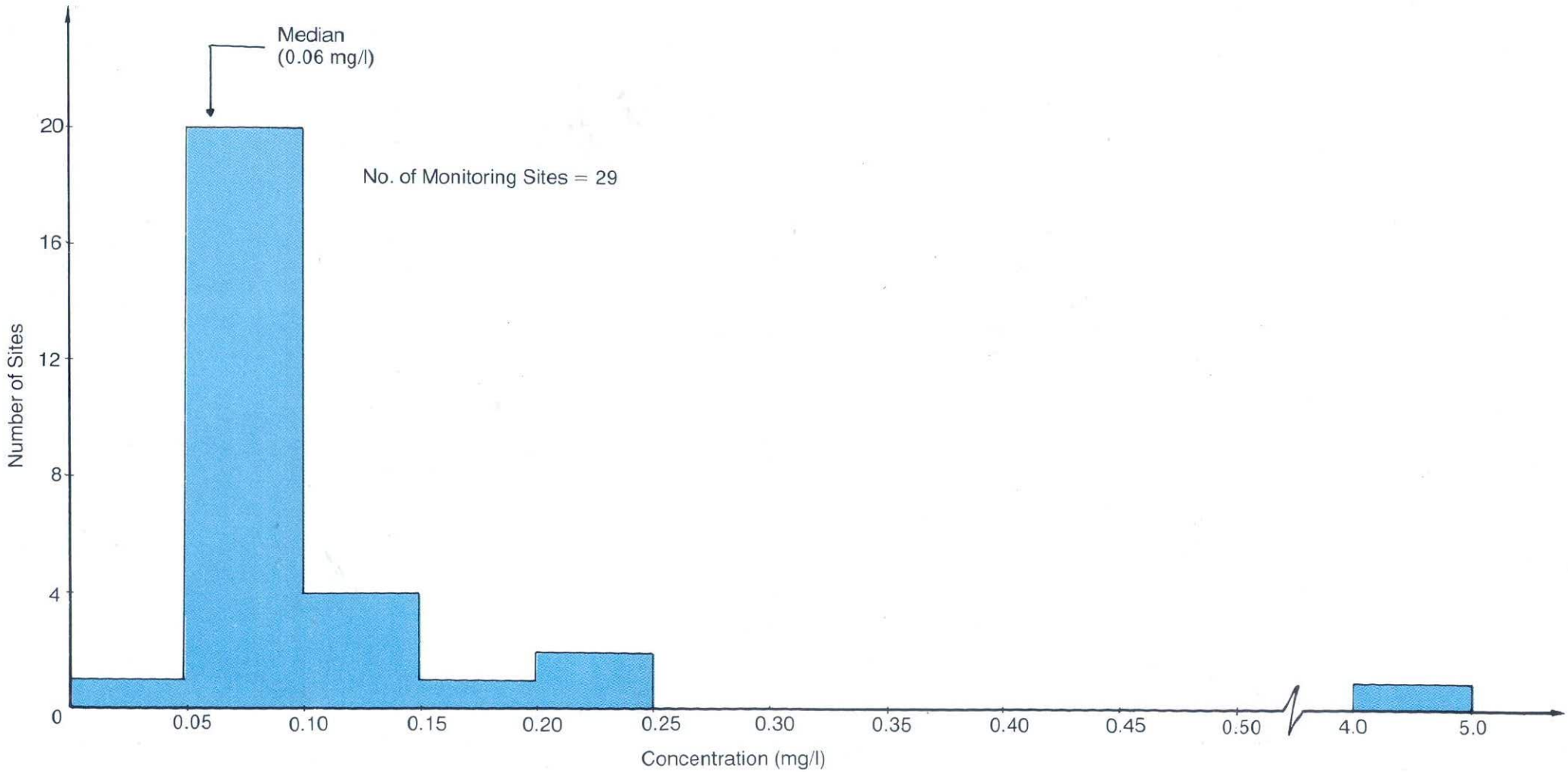


Figure 5.13. Sarawak: Distribution of Annual Average Concentration of Ammoniacal Nitrogen (AN), 1987.

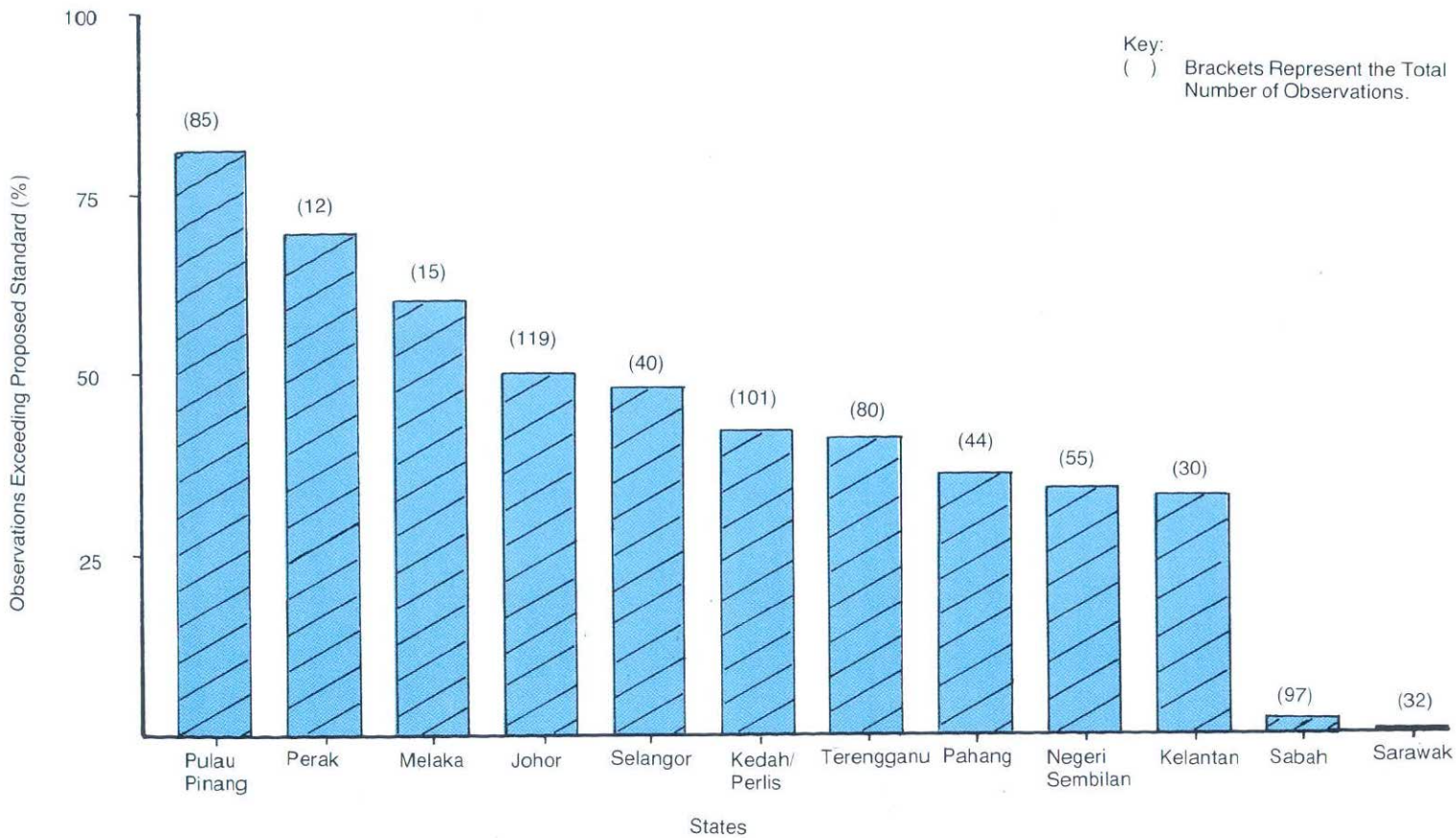


Figure 5.14. Malaysia: Status of Marine Water Quality in Terms of Faecal Contamination by State, 1987.

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

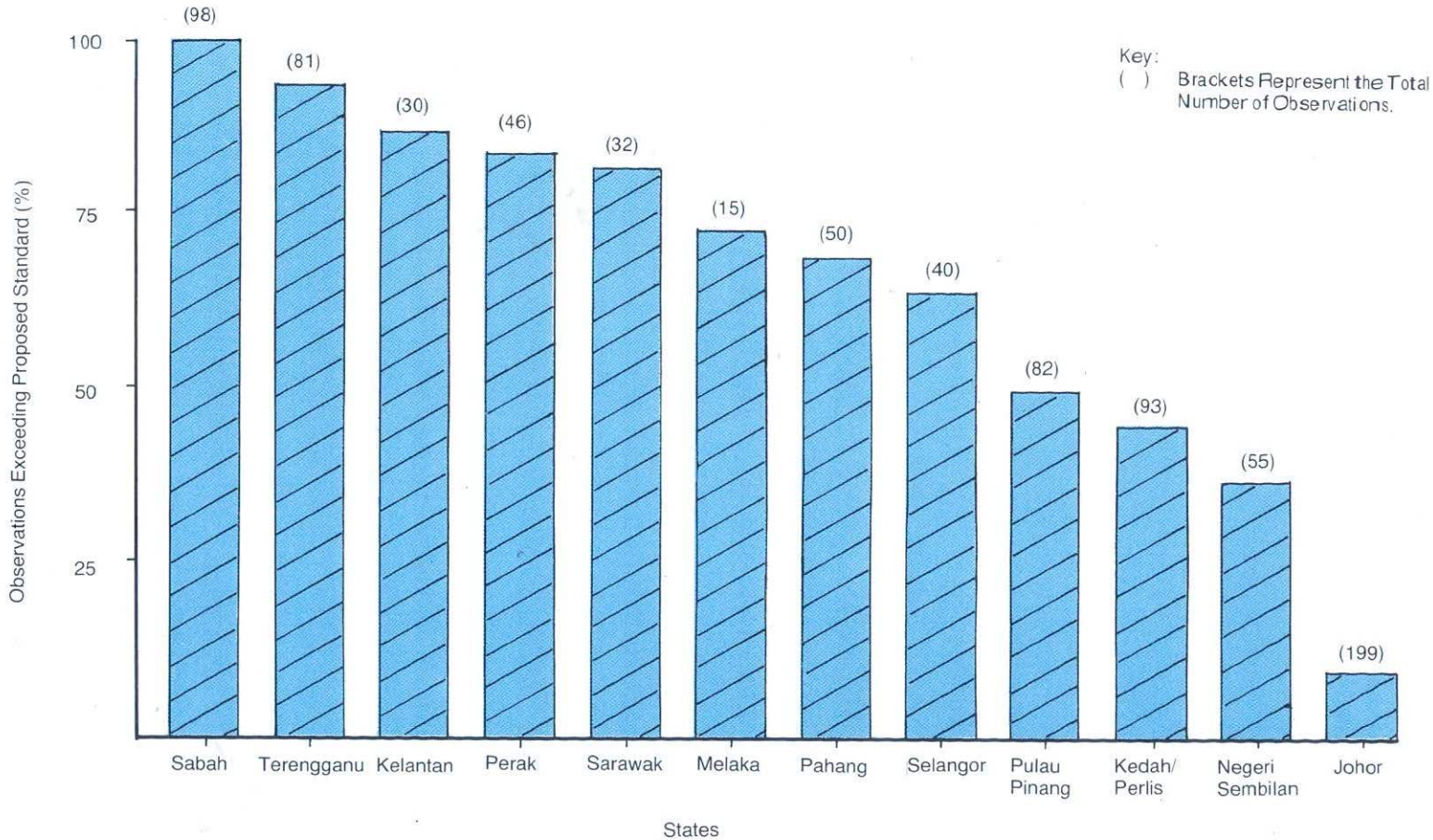


Figure 5.15. Malaysia: Status of Marine Water Quality in Terms of Total Suspended Solids by State, 1987.

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

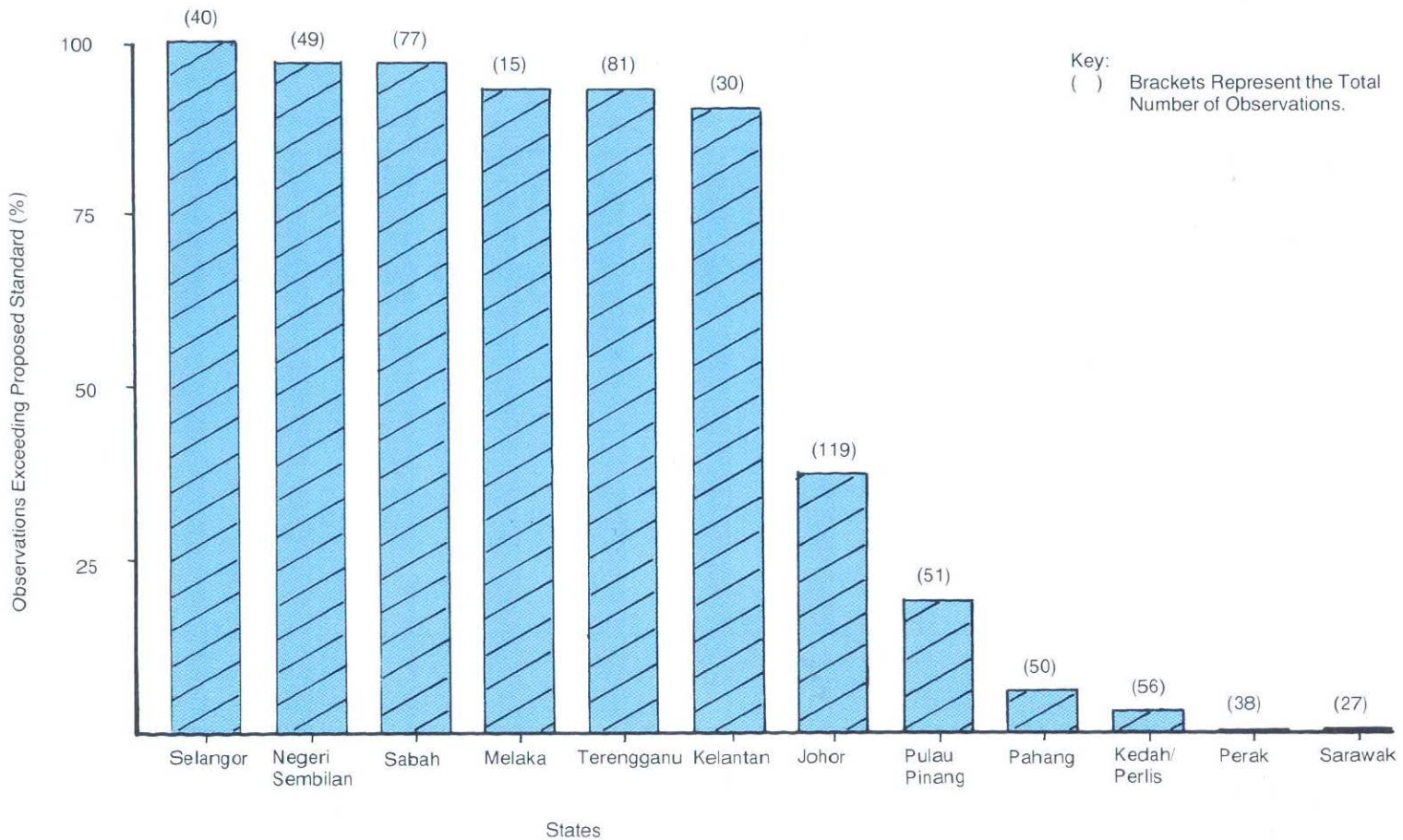


Figure 5.16. Malaysia: Status of Marine Water Quality in terms of Oil and Grease by State, 1987.

Note: The Proposed Interim Standard on Conservation of Marine Aquatic Resources for

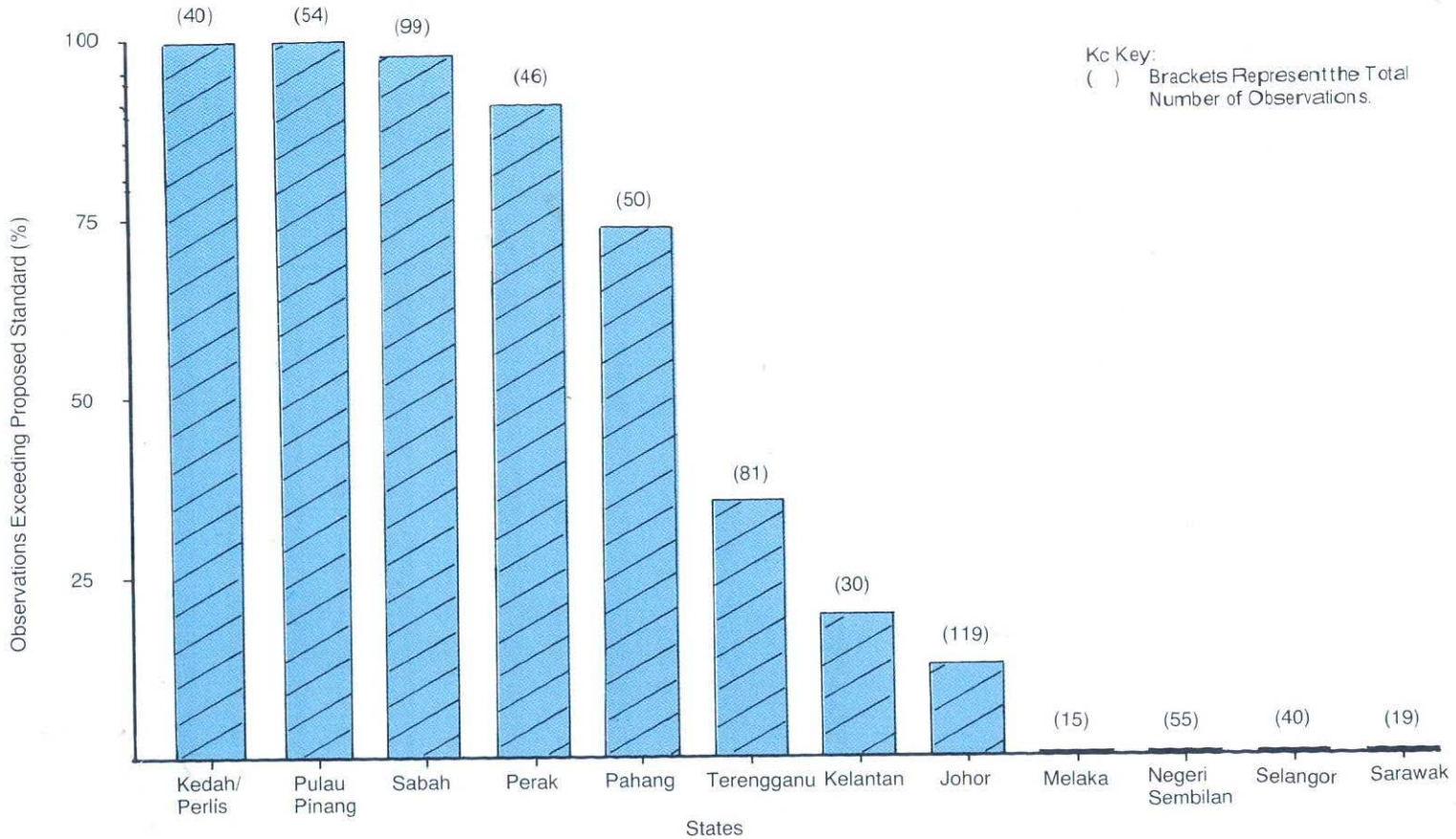


Figure 5.17. Malaysia: Status of Marine Water Quality in Terms of Cadmium by State, 1987.

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

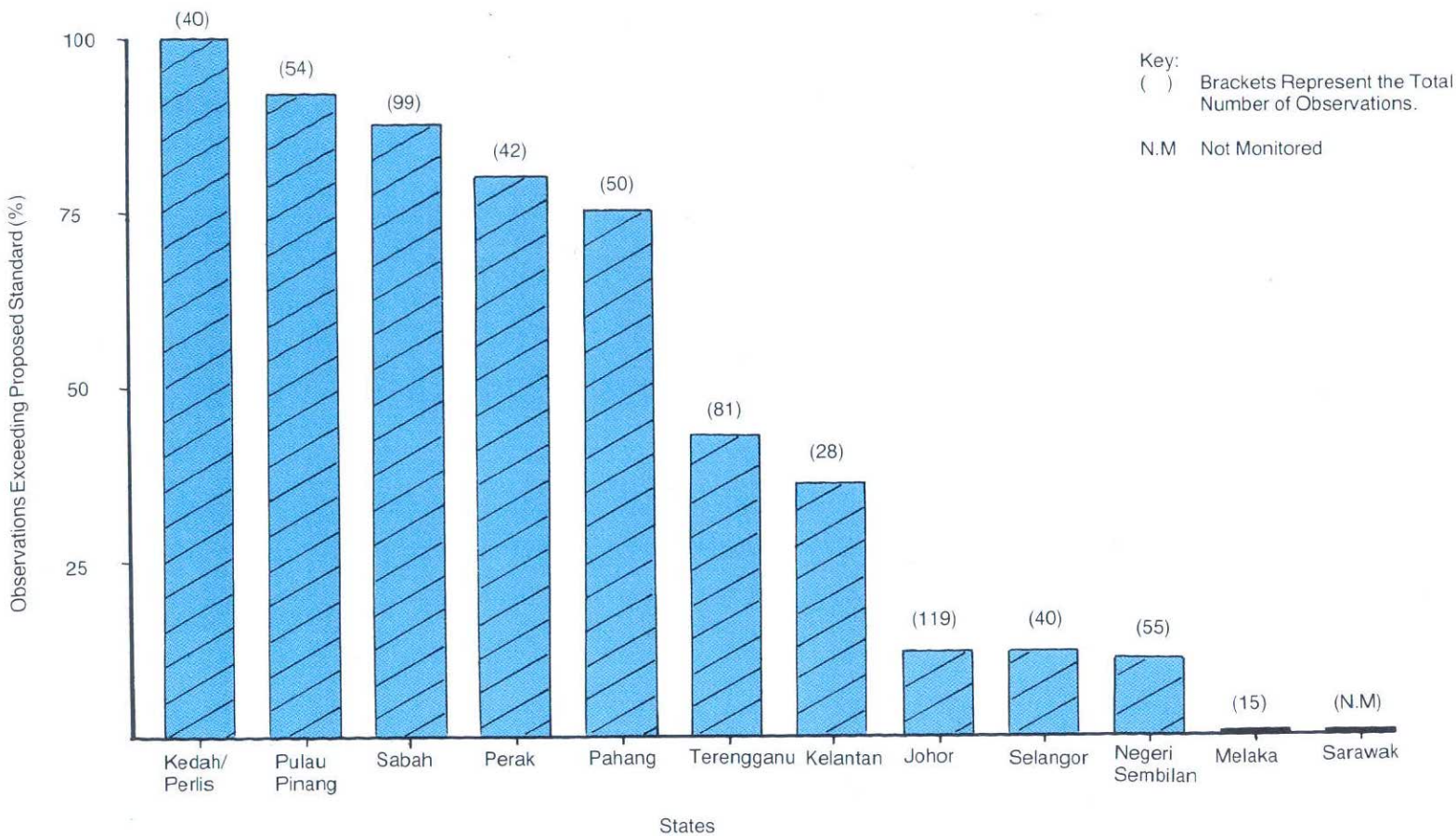


Figure 5.18. Malaysia: Status of Marine Water Quality in Terms of Copper by State, 1987.

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

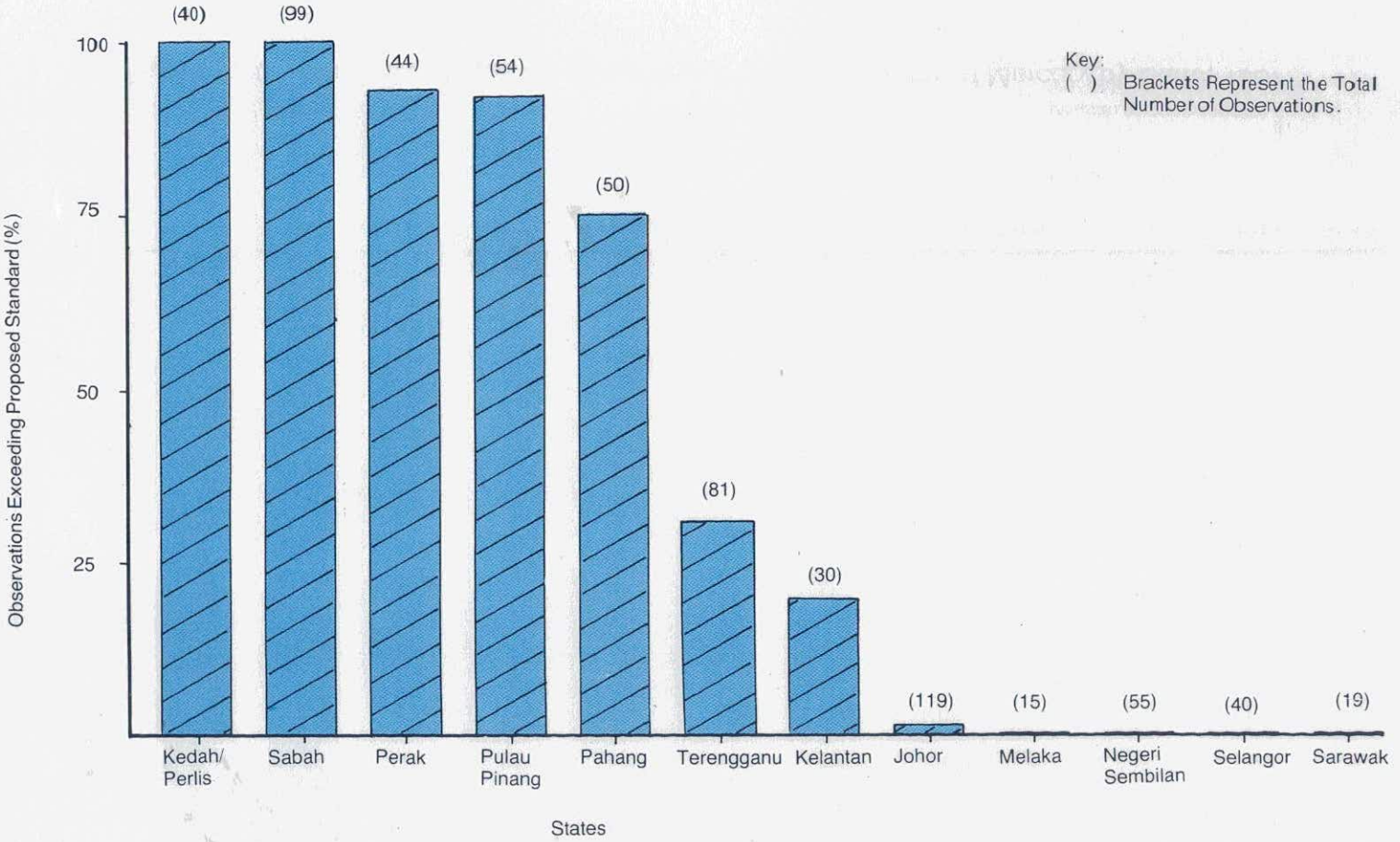


Figure 5.19. Status of Marine Water Quality in Terms of Lead by State, 1987.

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

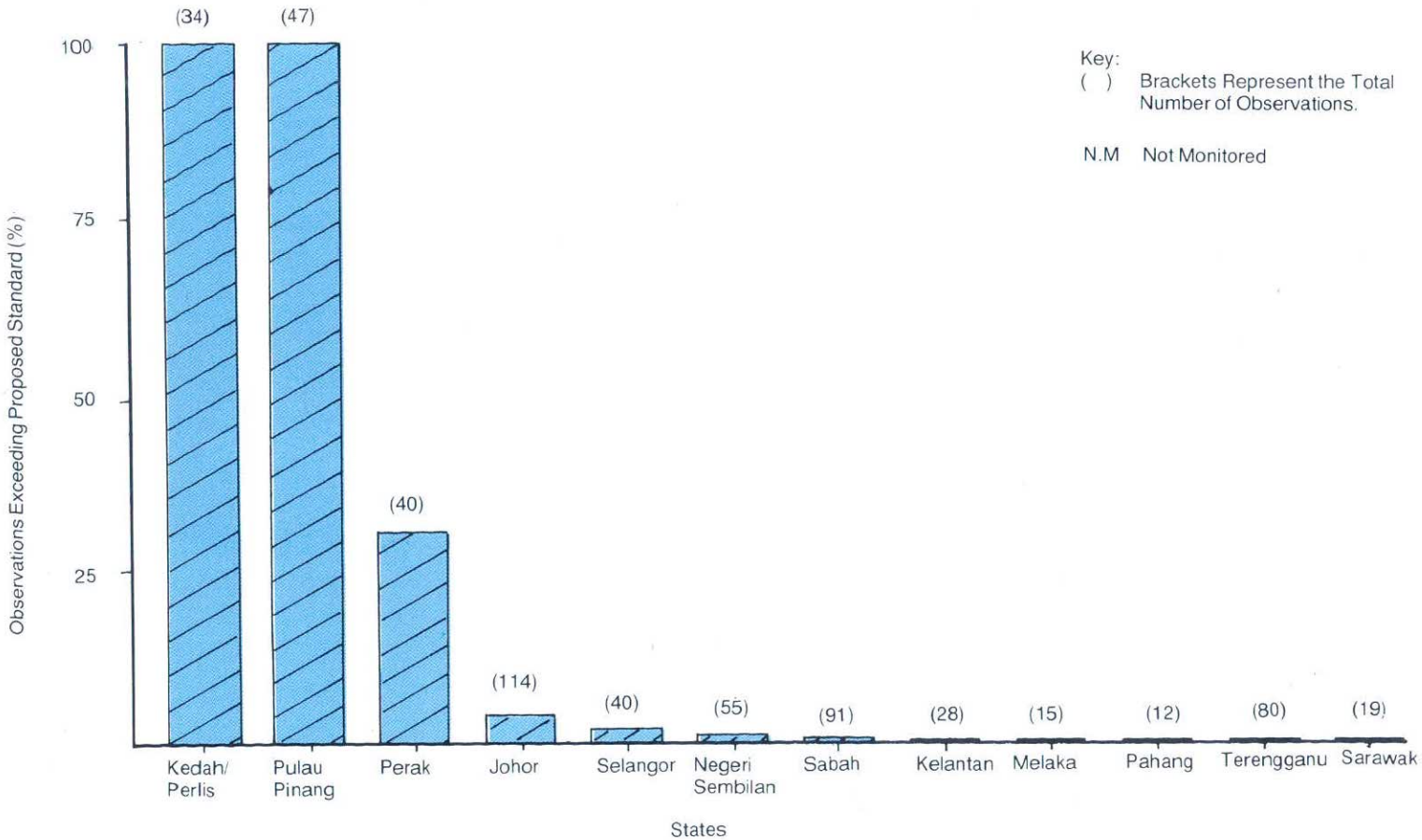


Figure 5.20. Malaysia: Status of Marine Water Quality in Terms of Mercury by State, 1987.

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

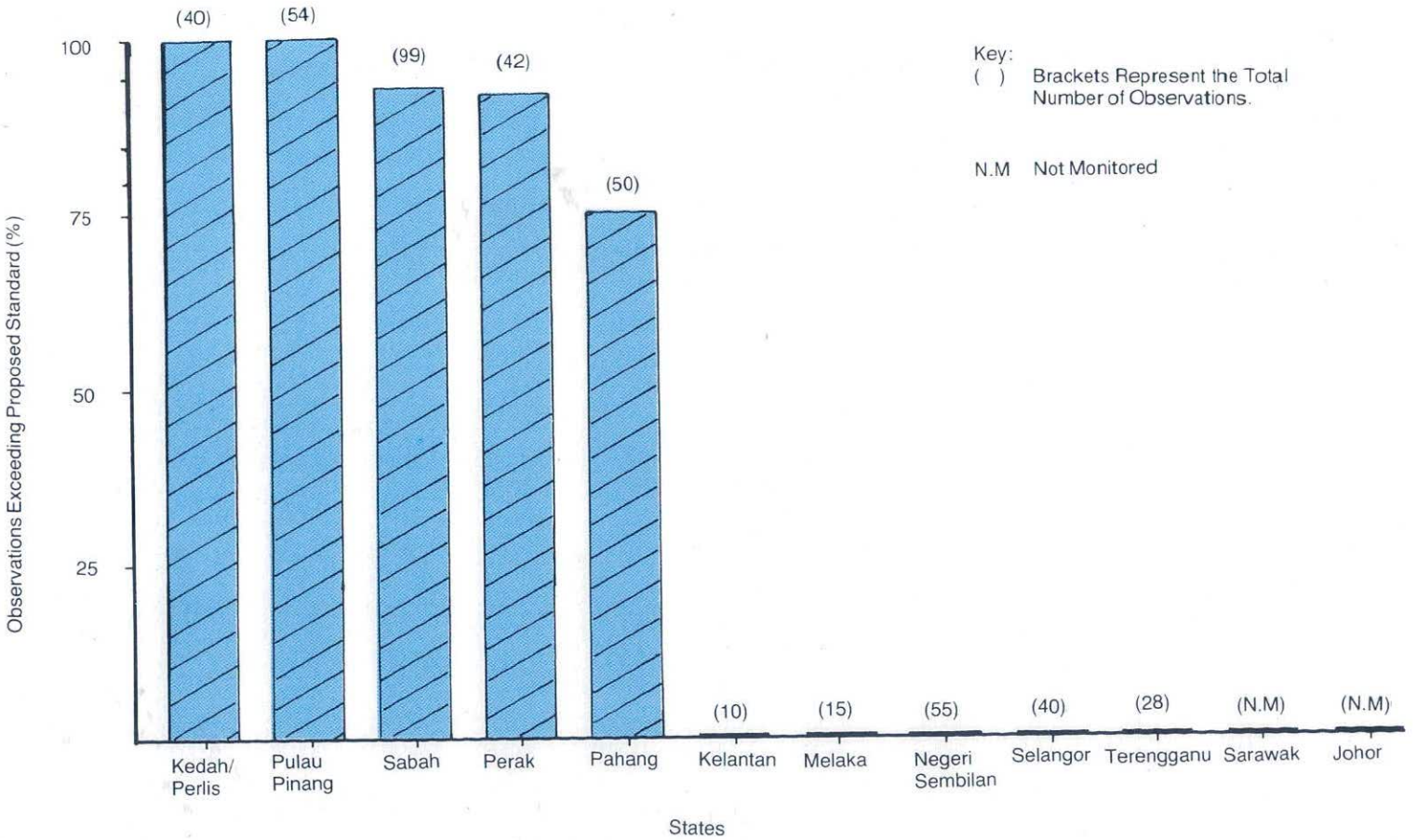


Figure 5.21. Malaysia: Status of Marine Water Quality in Terms of Nickel by State, 1987.

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

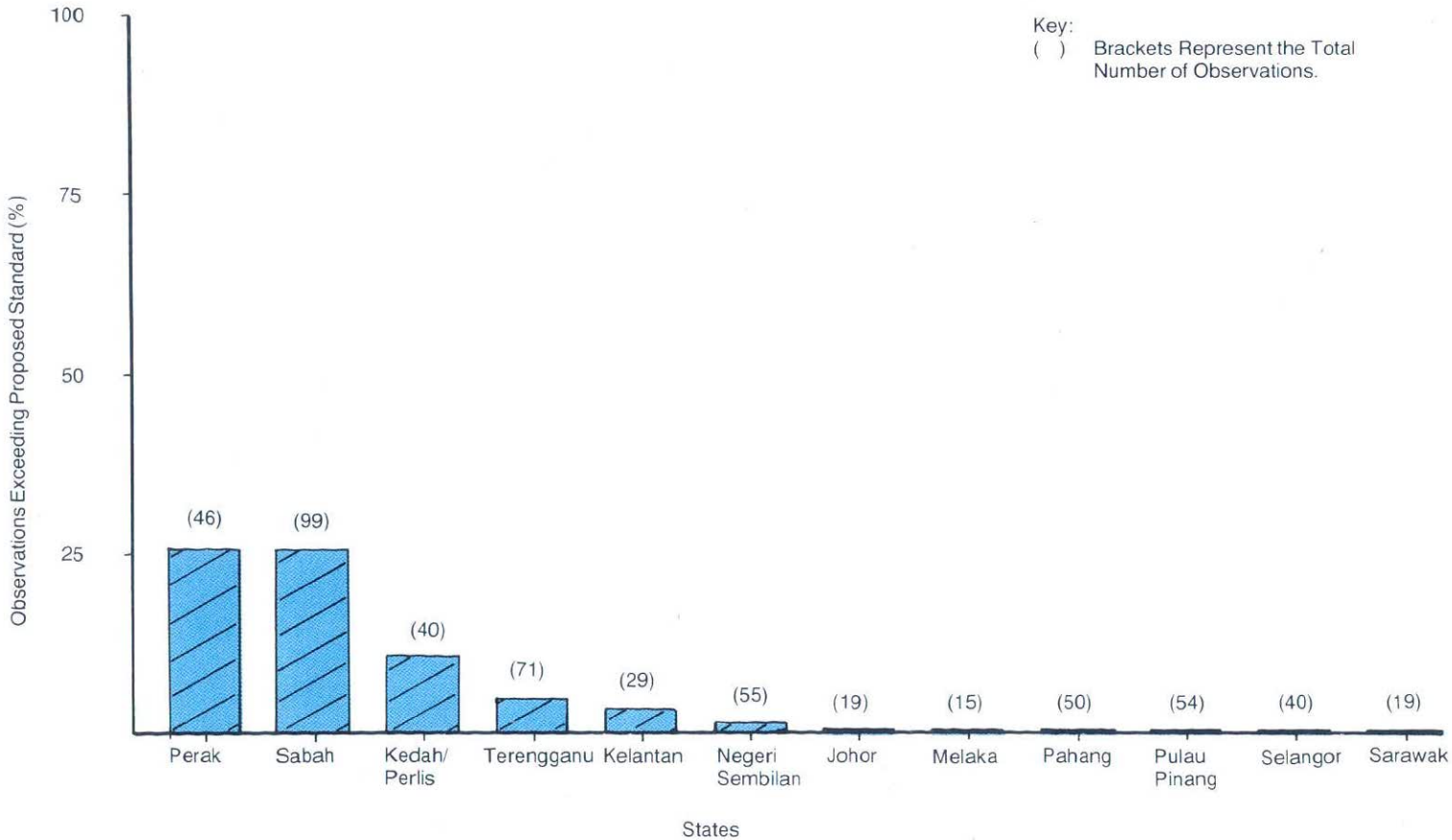


Figure 5.22. Malaysia: Status of Marine Water Quality in Terms of Chromium by State, 1987.

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

Table 5.1

Malaysia: Status of Air Quality. Total Suspended Particulates by Location, 1987

Location	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard 75 ug/m^3 (Per Cent)
		ug/m^3			
Pulau Pinang	39	61.0	599.0	182.6	97.0
Bukit Mertajam	21	30.0	274.0	138.5	95.2
Hulu Langat	71	19.0	196.0	108.1	91.5
Petaling Jaya	70	13.0	329.0	137.8	82.9
Ipoh	17	62.0	210.0	106.5	82.4
Alor Star	16	48.0	176.0	96.7	81.5
Kuala Lumpur	264	14.0	783.0	110.4	77.7
Johor Bahru	79	45.6	608.7	136.1	70.9
Prai	20	26.0	137.0	87.1	65.0
Gombak	33	14.0	171.0	96.4	63.6
Kuantan	99	3.5	299.0	95.3	53.5
Kuching	17	4.9	241.1	74.0	41.2
Kuala Terengganu	81	12.9	97.6	73.6	38.3
Shah Alam	76	8.0	409.0	67.5	28.9
Ulu Klang	76	18.0	142.0	60.0	19.7
Kota Kinabalu	41	5.8	64.9	28.1	0.0

Table 5.2

Malaysia: Status of Air Quality. Dust Fallout in Residential Area by State, 1987

State	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard 130mg/m²/day (Per Cent)
		mg/m²/day			
Johor	56	36.0	573.0	185.7	69.6
Terengganu	46	13.0	635.0	172.8	66.0
Sabah	14	69.0	510.0	240.5	64.3
Pahang	112	34.0	835.0	298.2	50.9
Melaka	12	73.0	158.0	112.2	41.7
Pulau Pinang/ Seberang Prai	70	24.0	367.0	115.4	40.0
Perak	85	56.0	273.0	115.7	34.1
Selangor/Wilayah Persekutuan	95	46.0	223.0	92.7	25.3
Kelantan	17	26.0	332.0	105.9	23.5
Sarawak	36	18.2	422.9	101.4	22.2
Perlis	23	40.0	209.0	101.0	21.7
Kedah	26	11.0	212.0	83.9	15.4
Negri Sembilan	11	53.0	132.0	83.3	9.1

Table 5.3

Malaysia: Status of Air Quality. Dust Fallout in Industrial Area by State, 1987

State	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard 130mg/m²/day (Per Cent)
		mg/m²/day			
Pahang	8	125.0	690.0	340.6	87.5
Johor	89	28.0	650.0	217.2	68.5
Sabah	7	35.0	337.0	172.0	42.9
Negri Sembilan	8	63.0	137.0	92.8	25.0
Selangor/Wilayah Persekutuan	28	58.0	245.0	105.9	25.0
Sarawak	8	29.5	156.5	93.4	25.0
Kedah	24	43.0	305.0	107.1	20.8
Perak	15	68.0	262.0	112.1	20.0
Pulau Pinang/ Seberang Prai	13	54.0	167.0	102.2	15.4

Table 5.4

Malaysia: Status of Air Quality. Dust Fallout in Commercial Area by State, 1987

State	Number of Observations	Minimum	Maximum	Mean	Observations Exceeding Standard 130mg/m²/day (Per Cent)
		mg/m²/day			
Pahang	41	60.0	855.0	254.5	85.4
Kedah	8	87.0	236.0	162.4	62.5
Johor	31	27.0	718.0	179.2	61.3
Pulau Pinang/ Seberang Prai	28	41.0	314.0	278.0	46.4
Sabah	5	17.0	384.0	186.0	40.0
Kelantan	8	52.0	58.0	239.9	37.5
Negri Sembilan	7	69.0	177.0	105.3	28.5
Perak	11	40.0	241.0	91.6	18.2
Melaka	2	92.0	96.0	94.0	0.0

Table 5.5

Malaysia: Status of Air Quality. Atmospheric Lead Levels by Location, 1987

Location	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
		ug/m^3			
Kuala Lumpur	167	0.020	6.510	1.397	0.987
Pulau Pinang	40	0.272	1.709	0.731	0.330
Petaling Jaya	43	0.020	1.630	0.670	0.380
Ulu Langat	36	0.130	1.100	0.590	0.200
Shah Alam	50	0.020	2.850	0.410	0.480
Ulu Klang	45	0.080	1.040	0.310	0.170
Gombak	24	0.110	0.540	0.270	0.095
Bukit Mertajam	21	0.165	0.363	0.245	0.053
Alor Star	16	0.053	0.413	0.229	0.099
Kota Kinabalu	45	0.020	0.530	0.126	0.104
Kuantan	98	0.001	0.410	0.111	0.093
Ipoh	17	0.010	0.190	0.072	0.050
Prai	20	0.016	0.110	0.040	0.025

Table 5.6

Malaysia: Status of Air Quality. Cadmium Levels by Location, 1987

Location	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
		ug/m^3			
Kuala Lumpur	164	0.005	0.100	0.025	0.012
Ulu Klang	45	0.005	0.040	0.008	0.008
Petaling Jaya	43	0.005	0.040	0.007	0.006
Kota Kinabalu	45	0.005	0.050	0.006	0.007
Shah Alam	50	0.005	0.030	0.006	0.005
Ulu Langat	36	0.005	0.030	0.006	0.044
Gombak	24	0.005	0.005	0.005	0.000
Prai	20	0.002	0.005	0.003	0.001

Table 5.7

Malaysia: Status of Air Quality. Ferrum Levels by Location, 1987

Location	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
		ug/m^3			
Gombak	24	0.400	3.300	1.780	1.636
Kuala Lumpur	162	0.010	4.500	1.558	0.760
Petaling Jaya	43	0.100	3.500	1.356	0.844
Ulu Langat	36	0.200	1.900	1.133	0.414
Shah Alam	50	0.100	3.400	0.580	0.547
Kuantan	98	0.001	2.200	0.550	0.454
Ulu Klang	45	0.100	1.800	0.508	0.332
Kota Kinabalu	45	0.005	2.900	0.493	0.509
Prai	20	0.010	0.204	0.094	0.066

Table 5.8

Malaysia: Status of Air Quality. Chromium Levels by Location, 1987

Location	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
		ug/m^3			
Petaling Jaya	43	0.050	0.200	0.060	0.027
Kuala Lumpur	164	0.050	0.800	0.059	0.016
Ulu Langat	36	0.050	0.100	0.052	1.161
Ulu Klang	45	0.050	0.100	0.052	0.010
Shah Alam	50	0.050	0.100	0.050	0.007
Gombak	24	0.050	0.050	0.050	0.000
Kuantan	98	0.000	0.040	0.018	0.010
Kota Kinabalu	45	0.005	0.040	0.010	0.008

Table: 5.9

Water Quality: Classification Based on Water Quality Index

Parameter	Index Range		
	Clean	Slightly Polluted	Very Polluted
Overall	>80	60 - 80	<60
BOD	>90	>80 - <90	<80
AN	>35	>20 - <35	<20
SS	>75	>70 - <75	<70

Table 5.10

Peninsular Malaysia: Summary of Water Quality Condition, 1985 - 1987

Trend (1985 - 1987)				Para-meter	Status (1987)		
Improving	Rate(%/Year)	Deteriorating	No Change		Clean	Slightly Polluted	Very Polluted
Linggi, Juru, Perak, Selangor, Kedah, Merbok	>2.5 - 5.0					Perlis, Melaka, Endau, Muar, Linggi, Langat, Perak, Rompin, Terengganu, Kemaman, Bernam, Johor, Muda, Kedah, Kelantan, Batu Pahat, Perai, Pahang, Merbok, Selangor	Kelang, Sepang, Juru, Raja Hitam
Perlis, Kelang, Endau, Muar, Rompin,Terengganu, Johor, Kelantan, Batu Pahat	>0.2 - 2.5						
	0			Overall			
	-2.5 - <-0.5	Kemaman,Muda,Raja Hitam, Pahang, Langat, Melaka, Perai					
	-5.0 - <-2.5	Bernam					
	-7.5 - <-5.0	Sepang					
Juru	>2.5 - 5.5				Pahang, Rompin, Bernam, Selangor, Batu Pahat, Endau, Kemaman, Muda, Muar, Perak, Terengganu, Kelantan	Langat, Johor, Perai, Linggi, Merbok, Perlis, Kedah, Melaka	Raja Hitam, Juru, Sepang, Kelang
Muar, Perak, Merbok, Batu Pahat, Kelantan, Muda, Johor, Bernam, Selangor, Kemaman	>0.1 - 2.5						
	0		Terengganu, Linggi				
	-2.5 - <-0.5	Perlis, Kelang, Endau, Melaka, Langat, Pahang, Kedah, Rompin		BOD			
	-5.0 - <-2.5	Perai					
	-7.5 - <-5.0						
	-10.0 - <-7.5	Raja Hitam					
	-12.5 - <-10.0	Sepang					

Continued...Table 5.10

Trend (1985 - 1987)				Para-meter	Status (1987) *		
Improving	Rate(%/Year)	Deteriorating	No Change		Clean	Slightly Polluted	Very Polluted
Selangor	>7.5 - 10.0			SS	Pahang, Rompin, Batu Pahat, Johor,Endau, Sepang	Selangor, Muda, Muar, Perlis, Terengganu, Kedah, Melaka	Bernam, Raja Hitam, Langat, Kemaman, Perai, Juru, Linggi, Perak, Merbok, Kelantan, Kelang
Kelang, Linggi	>5.0 - 7.5						
Melaka, Batu Pahat, Kedah, Terengganu, Perlis, Sepang	>2.5 - 5.0						
Pahang, Kelantan, Endau, Juru, Rompin	>0.2 - 2.5						
	0						
	-2.5 - <-0.1	Merbok, Langat, Muar					
	-5.0 - <-2.5	Muda, Johor, Kemaman, Perak					
	-7.5 - <-5.0	Perai,Raja Hitam,Bernam					
Juru	>30 - 40			AN	Pahang, Rompin, Bernam, Selangor	Raja Hitam, Langat, Endau, Muda, Muar, Perak, Perlis	Batu Pahat, Johor, Kemaman, Perai, Juru, Linggi, Sepang, Merbok, Terengganu, Kelantan, Kedah, Kelang, Melaka
Selangor	>20 - 30						
	>10 - 20						
Perlis, Kelang, Endau, Pahang,Kedah,Raja Hitam, Perak	>0.8 - 10						
	0		Rompin				
	-10 - <-0.2	Perai, Melaka, Langat, Batu Pahat, Kelantan, Muda, Johor, Bernam, Terengganu, Muar					
	-20 - <-10	Merbok, Kemaman					
	-30 - <-20	Linggi					

Note: * Classification on the state of river pollution based on DOE's WQI system to indicate the composite effect of BOD, COD, AN, SS and PH.

Table 5.11

Sabah: Summary of Water Quality Condition, 1985 -1987

Trend (1985 - 1987)				Para-meter	Status 1987 *		
Improving	Rate(%/Year)	Deteriorating	No Change		Clean	Slightly Polluted	Very Polluted
Segama Liwagu, Kinabatangan Padas, Sugut	>5.0 - 7.0 >2.5 - 5.0 >0.1 - 2.5 0			Overall	Sugut, Liwagu	Padas, Kinabatangan, Segama	
Sugut, Liwagu, Kinabatangan, Segama	>0.1 - 2.0 0			BOD	Sugut, Liwagu, Padas, Kinabatangan, Segama		
	-0.5 - <-0.1	Padas					
Liwagu Kinabatangan	>5.0 - 10.0 >0 - 5.0 0			SS	Liwagu	Sugut	Padas,Kinabatangan Segama
	-5.0 - <-2.0	Padas, Sugut, Segama					
Padas, Kinabatangan	>0.2 - 2.0 0			AN	Sugut, Liwagu, Padas, Kinabatangan, Segama		
	-2.0 - <-0.3	Sugut, Liwagu, Segama					

Note:

* Classification on the state of river pollution based on DOE's WQI system to indicate the composite effect of BOD, COD, AN, SS and PH.

Table 5.12

Sarawak: Summary of Water Quality Condition, 1985 - 1987

Trend (1985 - 1987)				Parameter	Status (1987) *		
Improving	Rate(%/Year)	Deteriorating	No Change		Clean	Slightly Polluted	Very Polluted
Sarawak/Samarahan,Batang Lupar, Batang Rajang, Batang Kemena	>0.2 - 2.5 0 -2.0 - <-1.0	Miri/Lutong		Overall	Batang Lupar, Batang Rajang, Batang Kemena, Batang Baram	Sarawak/Samarahan, Miri/Lutong	
Batang Lupar, Batang Baram	>0.5 - 1.0 0 -1.5 - <-0.1	Sarawak/Samarahan, Batang Rajang, Batang Kemena, Miri/Lutong		BOD	Sarawak/Samarahan,Batang Lupar, Batang Rajang, Batang Kemena, Batang Baram, Miri/Lutong		
Batang Baram Sarawak/Samarahan,Batang Kemena, Miri/Lutong	>2.5 - 5.0 >0.5 - 2.5 0 -2.5 - <-0.2 -5.0 - <-2.5	 Batang Lupar Batang Rajang		SS	Batang Baram, Batang Kemena	Miri/Lutong	Sarawak/Samarahan, Batang Lupar, Batang Rajang
Batang Rajang Sarawak/Samarahan,Batang Lupar, Batang Kemena Batang Baram	>15.0 - 20.0 >10.0 - 15.0 >1.0 - 10.0 0 -4.0 - <0	 Miri/Lutong		AN	Sarawak/Samarahan,Batang Lupar, Batang Rajang, Batang Kemena,Batang Baram		Miri/Lutong

Note: * Classification on the state of river pollution based on DOE's WQI system to indicate the composite effect of BOD, COD, AN, SS and PH.

Table 5.13

Peninsular Malaysia: Status of River Water Quality, 1987

NAME OF RIVER	BOD @ 20°C (mg/l)					Ammoniacal Nitrogen (mg/l)					Suspended Solids (mg/l)				
	Number of Samples	Min.	Max.	Mean	Samples Exceeding 6.0 mg/l (Per Cent)	Number of Samples	Min.	Max.	Mean	Samples Exceeding 0.9 mg/l (Per Cent)	Number of Samples	Min.	Max.	Mean	Samples Exceeding 150 mg/l (Per Cent)
PERLIS	23	1.0	9.0	2.1	4.3	24	0.06	0.18	0.38	8.3	24	5	255	59	8.3
KEDAH	42	1.0	11.0	2.1	7.1	60	0.04	0.38	0.49	10.0	60	5	195	47	3.3
MERBOK	67	1.0	21.0	3.2	11.9	67	0.10	47.4	4.73	61.2	84	5	270	62	8.3
MUDA	67	1.0	8.0	1.7	1.5	96	0.01	0.57	0.26	4.2	96	5	290	48	5.2
PERAI	78	1.0	284.0	9.3	19.2	95	0.02	40.50	1.98	27.4	95	5	505	57	6.3
JURU	58	2.0	360.0	28.0	77.6	60	1.15	34.70	7.77	100	55	10	1685	85	3.6
RAJA HITAM	18	0.2	600.0	86.0	27.8	16	0.23	8.20	0.86	31.3	15	5	380	61	13.3
PERAK	150	0.2	12.0	1.1	6.0	147	0.02	7.38	0.47	9.5	148	3	805	114	21.0
BERNAM	35	0.2	3.2	0.7	0.0	29	0.05	0.26	0.06	0.0	35	7	5140	350	31.4
SELANGOR	28	0.3	3.5	1.0	0.0	19	0.02	0.25	0.11	0.0	28	4	732	74	10.7
KELANG	517	0.3	118.0	7.4	42.0	513	0.03	83.00	4.60	85.6	512	9	3130	165	25.2
LANGAT	39	0.1	16.0	3.6	18.0	36	0.00	1.50	0.45	11.1	39	8	1950	294	51.3
SEPANG	5	1.0	14.0	9.1	60.0	4	2.10	21.00	11.2	100	5	15	40	32	0.0
LINGGI	39	0.4	11.0	3.6	23.1	39	0.02	7.60	1.64	59.0	39	12	531	76	10.3
MELAKA	24	0.5	28.0	4.1	25.0	24	0.09	1.80	1.66	45.8	24	10	270	52	8.3
MUAR	77	0.1	5.7	1.1	2.6	80	0.07	4.80	0.32	5.0	80	1	620	58	8.8
BATU PAHAT	59	0.1	3.2	0.9	0.0	59	0.05	0.96	0.34	0.0	55	1	167	32	3.6
JOHOR	80	0.3	6.8	2.6	11.3	78	0.02	4.56	0.78	17.9	80	1	241	35	1.3
ENDAU	49	0.1	5.7	1.6	8.2	48	0.07	2.40	0.40	8.3	49	2	243	47	6.1
ROMPIN	72	0.3	11.4	1.8	2.8	72	0.01	0.34	0.09	0.0	71	5	50	17	0.0
PAHANG	257	0.1	15.2	1.8	4.3	237	0.10	7.00	0.20	4.6	253	1	184	34	1.6
KEMAMAN	61	0.1	4.6	1.2	0.0	61	0.10	1.98	0.60	22.9	61	5	258	62	11.5
TERENGGANU	38	0.3	6.0	1.7	5.3	38	0.03	1.84	0.59	21.1	38	4	143	27	0.0
KELANTAN	38	0.1	2.9	0.9	0.0	36	0.03	1.84	0.54	11.1	37	7	1357	105	13.5

Table 5.14

Sabah and Sarawak: Status of River Water Quality, 1987

NAME OF RIVER	BOD @ 20°C (mg/l)					Ammoniacal Nitrogen (mg/l)					Suspended Solids (mg/l)				
	Number of Samples	Min.	Max.	Mean	Samples Exceeding 6.0 mg/l (Per Cent)	Number of Samples	Min.	Max.	Mean	Samples Exceeding 0.9 mg/l (Per Cent)	Number of Samples	Min.	Max.	Mean	Samples Exceeding 150 mg/l (Per Cent)
SABAH															
Padas	22	0.2	8.8	1.4	4.5	22	0.01	0.04	0.01	0.0	24	6	1180	165	25.0
Sugut	11	0.2	4.2	1.2	0.0	20	0.01	0.30	0.04	0.0	31	3	650	67	9.7
Liwagu	7	0.4	1.6	1.0	0.0	6	0.01	0.04	0.02	0.0	13	9	40	22	0.0
Kinabatangan	21	0.2	2.0	1.1	0.0	23	0.01	0.02	0.01	0.0	24	25	318	127	33.3
Segama	2	1.6	2.0	1.8	0.0	5	0.01	0.02	0.01	0.0	5	40	343	136	20.0
SARAWAK															
Sarawak/ Samarahan	41	0.1	1.8	0.9	0.0	28	0.05	0.65	0.08	0.0	41	4	2906	225	24.4
Btg.Lupar	22	0.3	2.5	0.9	0.0	12	0.05	0.15	0.07	0.0	22	3	2047	232	18.2
Btg.Rajang	38	0.2	3.5	1.3	0.0	32	0.05	0.15	0.07	0.0	39	5	3909	276	35.9
Btg.Kemena	3	0.5	1.7	1.2	0.0	3	0.05	0.20	0.12	0.0	3	13	51	37	0.0
Miri/Lutong	4	0.8	7.2	2.6	25.0	8	0.15	5.80	2.21	37.5	8	7	104	61	0.0
Btg.Baram	1	0.4	-	-	0.0	1	0.05	-	-	0.0	1	9	-	-	0.0

Table 5.15

Peninsular Malaysia: Heavy Metals in Selected Rivers, 1987

		River Name							
		Merbok	Perai	Juru	Perak	Kelang	Langat	Muar	Bt. Pahat
Pb	Number of Samples	23	38	11	60	232	11	10	11
	Samples Exceeding Standard (%)	95.6	89.5	90.9	33.3	35.6	36.4	0.0	0.0
	Minimum	0.01	0.01	0.01	ND	ND	ND	-	-
	Maximum	0.22	0.15	0.20	0.08	0.55	0.08	ND	ND
	Mean	0.09	0.06	0.09	0.02	0.02	0.02	-	-
Hg	Number of Samples	17	26	9	59	235	9	10	12
	Samples Exceeding Standard (%)	17.6	0.0	22.2	0.0	0.4	0.0	0.0	0.0
	Minimum	ND	ND	0.001	-	ND	ND	-	-
	Maximum	0.005	0.004	0.008	ND	0.005	0.001	ND	ND
	Mean	0.003	0.003	0.004	-	0.001	-	-	-
Cd	Number of Samples	23	38	11	62	241	11	10	11
	Samples Exceeding Standard (%)	26.1	15.8	18.2	1.61	0.0	0.0	0.0	45.5
	Minimum	0.002	ND	0.004	ND	ND	-	ND	ND
	Maximum	0.060	0.030	0.020	0.030	0.010	ND	0.010	0.018
	Mean	0.014	0.009	0.009	0.002	0.001	-	0.003	0.008
Cu	Number of Samples	-	1	-	1	29	-	-	-
	Samples Exceeding Standard (%)	-	0.0	-	100	48.3	-	-	-
	Minimum	-	-	-	0.2	ND	-	-	-
	Maximum	-	0.10	-	-	0.04	-	-	-
	mean	-	-	-	-	0.02	-	-	-
Zn	Number of Samples	-	-	-	4	205	2	-	-
	Samples Exceeding Standard (%)	-	-	-	0.0	0.5	0.0	-	-
	Minimum	-	-	-	ND	ND	0.020	-	-
	Maximum	-	-	-	0.050	0.440	0.030	-	-
	Mean	-	-	-	-	0.060	0.025	-	-
As	Number of Samples	18	23	8	62	238	11	10	13
	Samples Exceeding Standard (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minimum	ND	ND	ND	ND	ND	ND	-	-
	Maximum	0.006	0.004	0.003	0.050	0.100	0.040	ND	ND
	Mean	0.002	0.001	0.002	0.007	0.020	0.011	-	-

Note: i) ND indicates measurement below limit of detection.
ii) The limits of detection for the above mentioned heavy metals, viz; Pb, Hg, Cd, Cu, Zn, As are respectively 0.005, 0.001, 0.001,0.01, 0.01 and 0.001 mg/l.
iii) For the above mentioned heavy metals, the recommended standards with respect to Class III are respectively, 0.014, 0.004, 0.011, 0.012, 0.35 and 0.44 in mg/l.

CHAPTER 6
POLLUTION ABATEMENT AND CONTROL

CHAPTER 9
POLLUTION
MANAGEMENT
AND CONTROL

POLLUTION ABATEMENT AND CONTROL

egislation and Control

ıe Environmental Quality Act, 1974 and the Regulations ade under it remain to be the main instruments in the ıatement and control of pollution especially from indus- al sources.

As at 31 December 1987, the following legislations e 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) Environmental Quality (Motor Vehicle Noise) Regulations, 1987; and

(xii) Motor Vehicle (Control of Smoke and Gas Emissions) Rules, 1977 made under the Road Traffic Ordinance, 1958.

Air Pollution Control

Air Pollution Source Inventory

In 1987, the potential and significant air pollution sources, grouped under stationary industrial proceses, fuel combustion, solid waste disposal and mobile sources are shown in Tables 6.1 and 6.2. Their distributions by geographical locations are shown in Table 6.3. Fuel burning equipment increased by 196 in number and type of approval granted is shown in Table 6.4.

Air Pollution Emission Loads

The quantifying of emission loads from various industrial emission sources still encountered difficulties due to severe lack of reliable data on the processes involved. Effort is being countinued to overcome these difficulties. Some preliminary estimates on pollution load, generated by stationary fuel burning and mobile sources are shown in Tables 6.5 and 6.6. An estimate on air pollutants resulting from open burning practices at refuse disposal grounds is shown in Table 6.7.

The agricultural sector practised open burning in land clearing for replanting. The cases reported and areas involved are shown in Table 6.8.

Certain industrial sectors especially wood-based industries, which encountered difficulties in disposing of their wastes were granted permission to carry out open burning. The distribution and loads are shown in Table 6.9.

In the year of review, emission inventories were also carried out in six areas: Pahang Industrial Areas, Central Malacca Industrial Area, Pulau Langkawi, West Johore, Jeli-Pasir Putih-Machang in Kelantan and Port Dickson.

Abatement and Control

Stationary Sources

Abatement and Control of air pollution was effected through the Environmental Quality (Clean Air) Regulations 1978.

Measures adopted by major works such as power stations, cement works, acid manufacturers, metallurgical works, lead recovery plants, chemical works, fertilizer works and petroleum refineries, continued to be effective and adequate except during short period of plant upset.

For the palm oil mills, although boiler stack sam-

plings showed general compliance with dust emission standard, sporadic discharges of excessive black smoke still occurred, especially from older boilers. There was yet no sufficent evidence that the smoke standards were over-stringent for these sources. In this respect, there was general trend in providing higher steam/ffb design ratio to reduce possible over-loadings.

Small works such as rice mills, sawmills and small quarries and other similar small scale industries remained as problematic sources especially within urban areas such as Kuala Lumpur, where increasing demands for air space generally brought about shrinking buffer zones and reduced assimilation capacity.

Power stations operated by the National Electricity Board (NEB) performed well in 1987. There was no incident of excessive particulate or smoke emission. Results of ambient sulphur dioxide showed that there was proper dispersion and the level was not significant, while those for ground level particulate matter also comply with desirable goals. The Sultan Salahuddin Power Station in Klang, was equiped with TV flame monitors and chimney monitors, and all the control equipment functioned satisfactorily. M$10.4 million was spent for electrostatic precipitators installation in the Phase II works and M$0.48 million on air pollution monitoring facilities. The NEB had also introduced fuel oil additive treatment at the Tuanku Jaafar Power Plant at Port Dickson and Sultan Iskandar Power Station in Penang.

Cement works generally performed satisfactorily except for Perak Hanjoong Cement Works where raw material extraction stage had become source of low level dust emission.

In Amalgamated Steel Mill (ASM), extention of dust collection system at a cost of M$2.2 million had been completed. Annual pollution cost is M$1.40 million at the present electricity rate and filter replacement cost. Standard Operation Procedure had been firmed up to cater for plant upset. Fugitive dust emissions from Malayawata Steel Mill, especially from charcoal handling plant required regular and continued attention. In Perwaja, fugitive emissions were becoming apparent; process adjustment and improvement plan to dust control system were underway.

The Chemical Company of Malaysia acid/fertilizer works at Shah Alam operated the low emission neutraliser successfully. The plant, built at a cost of approximately one million ringgit was effective in reducing ammonia and ammonium nitrate particulate emission. Year-round monitoring on the ambient air at selected sites are being continued.

Waste disposal problems faced by small wood-based industries remained acute. Project proposal to establish effective disposal facilities had been put up to UNEP for consideration. A plant in Cheras has successfully utilised low-cost technology to convert sawdust into quality briquette for export. Such simple method could be adopted by other mills facing similar disposal problem. The plant is however facing problem in overcoming associated emissions of fumes, affecting newly constructed residential areas nearby.

Currently, no viable waste disposal technology had emerged for small rice mills. Controlled open burning was permitted for selected mills at non-sensitive areas. With much urging from the Department, the National Paddy and Rice Board had finally proposed to build three more waste heat recovery complexes utilising paddy husk, similar to those two which were built earlier at Teluk Kecai and Jerlun.

Open burning of refuse at municipal waste dumping grounds still occurred and no significant effort was made by the operating authorities to control such practice. Year-round burning was common at some sites such as Jinjang refuse disposal ground operated by the Kuala Lumpur City Hall. In the year of review, only one municipal incinerator was proposed in Kuala Terengganu and the construction is near completion.

Mobile Sources

After a series of awareness campaigns on black smoke emission, the Department of Environment in 1987 extended the enforcement of the Motor Vehicles (Control of Smoke and Gas Emissions) Rules, 1977 to Sabah and Sarawak. Compliance in Sarawak was generally below the national average (Table 6.10).

In 1987, the Department of Environment with the co-operation of traffic police conducted 302 enforcement compaigns in all major towns in the country. From these campaigns, 35,513 vehicles were tested, and 4712 drivers/vehicle owners were served with summons for violating the above Rules. The overall percentage of compliance is 87 per cent.

Figure 6.1 shows the breakdown for the type and number of vehicles summoned and their compliance percentage. The highest percentage of compliance is by lorries (90 per cent), followed by vans, (87 per cent), taxis (85 per

cent), buses (84 per cent), and private cars (60 per cent).

In terms of numbers being summoned, the highest violator were lorries, followed by buses and taxis. Table 6.10 shows the above enforcements statistics by states. The total number of campaigns and amount of compounds collected are given in Table 6.11. It showed that the number of compliance improved compared with the past two years.

For more effective implementation of the above Rules, early and effective detection of smoky vehicles is necessary. Further more, the smoke-test should be carried out in the shortest possible time so as to minimise inconvenience to the public/vehicle operators. In this respect, the Department introduced the 'Roving Squad' in July in Kuala Lumpur to carry out the above function. The programme was carried out with the co-operation of City Police.

Under the Fifth Malaysian Plan, mobile testing stations would be set-up. Budget for portable data acquisition and retrieval devices had been approved. Acquisition is anticipated in 1988.

Lead level in petrol as specified in the Environmental Quality (Control of Lead Concentrations in Motor Gasoline) Regulations, 1985 was monitored closely. In 1987, a total of 221 samples of premium and regular grade petrol from all the petrol manufacturers/suppliers in Malaysia were taken for analysis. Of these, 190 samples were randomly taken from the petrol kiosks, while the remaining 31 samples were from the oil refineries and storage depots. All samples met the stipulated standards.

Studies and consultations were also carried out to determine the needs to regulate exhaust emissions from petrol driven vehicles and the appropriate control strategies. A draft regulation to control emission from petrol vehicles based on ECE Regulation 15-03 and 15-04 is being formulated.

Water Pollution Control

Water Pollution Sources Inventory

Point Sources

Inventory of significant pollution sources indicated at present there are 2626 industries identified as major potential water pollution sources in Malaysia. The break down of these industrial sectors by states and industry types is as shown in Table 6.12.

Overall number of industries does not change significantly over the year 1986; number of those closed down was made up by new ones. A number of agro-based industries, especially rubber mills have been shutdown probably affected by the economic situation.

Palm Oil Mills

In 1987, 250 palm oil mills were in existence. Of this total, 40 per cent are located in the catchment areas for domestic water supply (Table 6.13). For the same year, only one operation source emerged and two had stopped operation.

Among the existing mills 150 or 60 per cent disposed their effluent into the water courses. Of these, 63 mills are located in the drinking water catchment area. The basin having the greatest number of mills in operation is Sungai Pahang with 39 mills and all of them are within the sensitive area.

Rubber Processing Factories

Till the end of 1987, 209 mills were in existence, out of which seven were known to be temporarily closed. Of this total, 90 per cent disposed their effluent into water courses and 44 per cent are located above domestic water supply intakes (Table 6.13).

Manufacturing Industries

To date, the number of sources under this sector which classified as potential water polluters in Malaysia is 2167, and 6 per cent are located in the catchment area for drinking water. By number, the industries may follow this sequence: food (25 per cent); primary metals (17.1 per cent); non metalic minerals (15.4 per cent); chemicals and petrochemicals (13.7 per cent); textiles (6.8 per cent) (Table 6.12).

Discharge Loads

Point Sources

Palm Oil Mill Effluent

In 1987, the amount of load discharge from this processes, in terms of BOD, was estimated to be 5.16 tonnes/day or equivalent to a population of 102,920 persons (Table 6.14).

About 66 per cent of this amount enter watercourses within the drinking water catchment areas. The Pahang

River Basin having the highest discharged into water courses within the catchment area, with more than 35 per cent of the total discharged load.

Natural Rubber Processing Effluent

The discharge of BOD load from these mill in 1987 is estimated to be 5.09 tonnes/day or equivalent to a population of 101,900 persons. Similar to the discharge of palm oil mill effluent, the amount of rubber processing effluent entering the drinking water catchment areas was estimated to be 3.4 tonnes/day or 67 per cent.

Manufacturing Industries

In terms of organic load, food industries are the largest contributor with 59 per cent of the total BOD load discharged from this sector. This is followed by the textiles industries (14 per cent), beverages (11 per cent), chemicals (6 per cent), and rubber products industries (3 per cent) (Figure 6.2).

Based on available data, the overall total BOD load for the manufacturing sector was estimated to be 20 tonnes/day or waste load equivalent to a population of 400,000 people. About 5 per cent of the total BOD load discharged enter watercourses within the drinking water catchment areas.

Non-Point Sources

Domestic Waste and Sewerage System

The 1987 population of Malaysia was estimated at 16.5 million persons with almost 83 per cent in Peninsular Malaysia. With this number of population, it was estimated that the BOD load generated from sewage was 826 tonnes/day, and 348 tonnes/day were discharged and enter watercourses.

The 1980 census data indicate that only 4.0 per cent of the total population of Malaysia were served by central water-borne sewerage system and in 1985 it was estimated that 5.3 per cent of the population have been served with such system (Table 6.15). To date, there are five systems which have been in operation in Peninsular Malaysia, namely at Georgetown, Shah Alam, Kuala Lumpur, Bangi and Butterworth, serving a population almost a million or 5.2 per cent of the total (Table 6.16). In the absence of significant progress in the implementation of sewerage project under the sewerage plan, the BOD level discharge would continue to be high.

Soil Erosion and Siltation

There are insufficient data to carry out accurate assessment of soil erosion and siltation loads. A preliminary estimation of the amount of sediment being washed by the major river basins is shown in Table 6.17.

Among these selected river basins, Sungai Bernam and Sungai Klang indicated the occurence of extensive soil loss with a sediment yeild of 328 tonnes/Km^2/year, and 147 tonnes/Km^2/year, respectively.

Abatement and Control

Palm Oil Industries

The number of mills processing crude palm oil that were licensed under the Environmental Quality Act, 1974 increased by 3 per cent in 1987, from 236 in 1986 to 244 in 1987. There was no case of application for renewal after expiry of licence; however late applications after the stipulated period of April to June still happened, though the numbers were less than in 1986. To bring about more stringent and effective control, five mills have their licensing conditions varied under Section 11 of the Act, two mills were given order to limit the quantity of effluent to be discharged, while three mills were given approval to increase production after they have satisfied the Department on increased effluent handling capacity of their treatment facilities.

Despite concern and warnings issued by the Department on the potential impact of siting mills in catchment areas, some proponents still proceeded to locate mills in these areas. The licensing conditions were stricter than normal and five mills were required to comply to a biological oxygen demand standard of 20 mg/l for watercourse disposal and four mills had to comply to a standard of 100 mg/l for land disposal. The licensing conditions may have to be further tightened if the trend persists and the increased discharge loads exceed assimilative capacity of the receiving waters. The costs of operation and production would consequentially increased.

Generally, performance record of the palm oil industry in meeting the effluent discharge standards was generally satisfactory during the period. There were occasions where mills sought to switch over to land disposal in order to avoid complying with the more stringent requirements imposed on watercourse discharges. Onus had been placed on the applicant to prove the benefits before approval to switch could be granted. The Department had cautioned that analysis on performance showed some premises ope-

rating land disposal had encountered high maintenance demands, excessive operation cost and low absorption due to inadequate soil investigation.

Rubber Industries

In 1987, 206 licences were issued under the Environmental Quality (Prescribed Premises)(Raw Natural Rubber) Regulations, 1978, compared to 218 issued in 1986. The 12 mills that stopped operation comprised of 11 Standard Malaysian Rubber (SMR) and conventional grade factories and a latex concentrate factory.There was no case of application for renewal after expiry of licence, however, late applications after the stipulated period of December to March still occurred and penalty under Section 13 of the Act was imposed, which amounted to M$7,124.19 (Table 6.18). Two mills have their licensing conditions varied under Section 11 of the Act, five mills were given approval to produce latex concentrate as well as SMR and five existing smokehouses which had increased their capacity to more than 5 metric tons per day were brought under the control of the Act.

The treatment technology for the natural rubber industries were the same as in 1986. However, efforts by the industry and the Rubber Producers Council to look into new technologies still continue eg. drying of effluent to scum powder, and closed anaerobic digester system. In this aspect, Malaysia Rubber Development Corporation (MARDEC) which had encountered space problem in building treatment ponds at its various mills, installed a tank digester for biogas production in a mill. This treatment technolgy for rubber mill is still under experimentation. Lee Rubber Group with the assistance of a consultant firm had experimented on the use of scrubber to control odour. There was some progress and it is anticipated that more advance technologies would be gained.

The majority of the raw natural rubber mills were able to comply with the effluent discharge standards. However, mills without the availability of land to set up control equipment still pose some problems. Non-compliance normally attribute to lack of maintenance and the high level of ammoniacal and total nitrogen in the effluent discharged (Table 6.19). The discharged of effluent containing high content of ammoniacal nitrogen is causing concern to water treatment plants located downstream of effluent discharged points.

Manufacturing Industries

Discharging of effluent and sludge from manufacturing industries were mainly regulated under the Environmental Quality) (Sewerage and Industrial Effluent) Regulations, 1979. Through thorough consideration on the benefical uses of the receiving waters, availability and status of technology development and the size and nature of the industries, and the cutback of pollutants achievable, a greater degree of balance on enforcement compliance and environmental quality preservation was maintaned. On the average, there was 3.5 per cent improvement on compliance for majority of industrial sectors.

The regular reviews on the requirements of non-compliance, discharge conditons, and progress in treatment system constructions, had improved the progress in compliance status, notably in BOD and oil and grease parameters from palm oil refineries, and food and beverages production.

The increase world demands for rubber related products, especially examination gloves and condoms did bring about the establishment of more factories and discharge sources. The unusual accelerated approval by state planning authorities and subsequent exceptional speedy construction of industrial premises and facilities, had resulted in inadequate reference to the Department for incoporation of preventive control measures and delay in implementation of pollution abatement systems.

Through close co-operation between the Department and the industries, many of the mills co-operated and worked closely with the Department in the improvement, upgrading and construction of their effluent treatment systems eg. the Ansell Group, Heveafil Co. and Rubberflex Co.

The older and small scale industries continued to face serious problem in meeting specified standards; most important amongst these are textile factories, metal finishing works, distilleries, sago and tapioca factories, and coconut-based producers.

The limitation of water use and elementary treatment in these industries especially for metal finishing works could only serve as temporary measures while waiting for centralised treatment or relocation of plants. In the case of the metal finishing works unless concerted assistance is provided to this industry, this sector would continue to be a major contributor to the heavy metal components of pollution loads.

Representations had been made by the Department for the admission of industrial effluents into municipal sewage treatment works. The Department would continue with such effort as the proposal provides the quickest and

most cost effective means of preserving the water quality in the areas concerned. The Department urged that all planning authorities give priority consideration to this matter, especially in fund diversion to the construction of central sewerage.

Marine Pollution Control

Oil Spill Incidents

In 1987, 15 cases of sighting of oil were reported, five of which were in Johor Bahru and Kuantan ports, six in South China Sea area, and the remaining were in areas of the Straits of Malacca. A cleaning cost of M$8,955 was recovered. Table 6.20 shows the occurrece and expenditures incurred and Table 6.21 shows the nature of spill attributable. There was no case involving legal action (prosecution).

In July/August there were two major oil spill incidents involving the groundings of tankers Stolt Avance and El-Hani occurring in the Strait of Singapore outside Malaysian waters but due to the influence of wind and sea currents the spills moved to our waters and eventually hit the coastlines of south east of Johor. Damage claims put forward by the fishermen certified by the Fisheries Department amounted to M$300,000. The incidents further highlighted the needs to strengthen oil spill operation procedures amongst neighbouring countries and to improve communication facility.

The activities in tank cleaning and desludging were found to be increasing especially in areas off Tanjung Piai in Johor. While such activities brought some economic gains in terms of an increase in employment opportunities to the state involved, there was also serious concern on the potential pollution of seas and damage to fishing gears brought about by such activities. The oil pollution resulted from tanker cleaning of M.T. Angel in June clearly showed that the conditions laid down in the approval certificate/ letter issued by the Marine Department could easily be violated by the ship owner and as such strict supervision/ monitoring from related Government agencies was needed to control it. While regulations may be drawn up to regulate such activities, the provision of basic facilitites such as on-land disposal sites must also be co-ordinated and provided for. The Director General of Environment in exercising his power under Section 48 of the Environmental Quality Act, 1974 had ordered a Taiwanese vessel Lady A, and a Singapore registered barge Eastern Bright, be detained by the Marine Department on suspicion of discharging oily wastes into Malaysian waters.

Oil Spill Response Planning

Five working groups at the regional levels; Johor East, Pahang, Terengganu and Kelantan, Sarawak and Sabah have established the respective sub-plans for combatting oil spills. These sub-plans would be integrated into the South China Sea Oil Spill Response Plan, which in turn together with the existing Malacca Straits Oil Spill Contingency Plan be the National Contingency Plan. Meanwhile, the Marine Pollution Communication and Response Procedures were updated on two occasions during the year particularly with regard to the lists of contact persons in the event of oil spills and the resources available for combat.

The whole of Malaysian coastlines were digitised into the computer and the works to digitize the information and data on environmental sensitivity areas for identification and establishing the priority of the protection of coastal resources were in progress.

Apart from establishing a provisional list of approved dispersants which was based on the results of the COBSEA Project on dispersant toxicity testing, a draft Guidelines on the Use of Dispersants was also prepared. These guidelines, which would be formalised in 1988, were aimed to help the On-Scene Commander and other oil pollution combatting personnels in deciding when and where to use dispersants in the event of an oil spill. In view of the need to incorporate the effectiveness factor, the Department of Environment would continue to encourage any research effort towards this end.

The work on acquiring new oil booms and skimmers, construction of storage facilities, and establishment of communication centre was in progress. This would materialise in early 1988. Meanwhile, effort has been made to explore the optimised usage of the boats, bought by the Department under the Malacca Straits Contingency Plan, for other purposes other than to combat oil spills. Agencies such as universities, PETRONAS, port authorities were approached in the preliminary survey. Feedback obtained was not satisfactory. In this respect it was felt that a thorough study should be conducted on the conditions of the boats as well as the necessary modifications so as to meet the market demand for the boats.

The result of a survey conducted on the reponse capabilities of the agencies particularly the Port Authorities revealed that facilities available were generally lacking. Steps should be taken by these agencies to equip themselves with adequate ficilities such as boats, booms, and oil skimmers for combating oil spills.

Contravention Licences

Section 22 (1) and Section 25 (1) of the Environmental Quality Act, 1974 provide for contravention of acceptable conditions specified in the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 respectively.

56 applications for contravention licence were received and processed under Section 22 (1) in 1987 compared to 37 in 1986. The breakdown according to types of industries and type of contravention required are as shown in Tables 6.22 and 6.23.

Applications for licence under Section 22 (1) were received mainly from the woodbased industries which faced problems in disposing wastes which cannot be recycled or disposed off by other means other than by open burning. Rice mills also faced similar problems in disposing off husk left behind from milling of rice. However, licences were issued only to genuine cases and those that would not be likely to give rise to pollution problems to the people in the vicinity of the facility. Applications were also received from various agencies for disposal of surplus materials and destruction of tax-exempt raw materials. The Department had informed the parties concerned on the wasteful practices and the needs to conserve resources, better utilization of surplus and urgent attention for long term plan for environmentallly sound disposal.

In 1987, 81 applications were received for licence under Section 25 (1) of the Act compared to 99 that were received in 1986. Applications were received from various industries but the majority came from the food and beverage industries. These industries faced problems in meeting the discharge standards under the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979 due to a number of reasons such as lack of land and financial constraints in putting up effluent treatment plants. However, a number of industries which had existing treatment plants were unable to meet the required discharge standards and thus applied for licences while the treatment plants were being upgraded. The breakdown of the number of applications for contravention licence under Section 25 (1) of the Act according to the types of industries and justifications are as shown in Tables 6.24 and 6.25.

Enforcement

Enforcement Programme

Enforcement programme was again reviewed based on previous enforcement and monitoring data with a view to increase productivity.

In 1987, a total of 3052 factories were inspected, an increment of 28 per cent over the previous year. That improvement was attributed to more efficient utilisation of available resources and better work scheduling and prioritization.

Legal Action

Any violation of the Environmental Quality Act 1974/ (Amendment), 1985, could result in the violators being charged in court and fined accordingly. Such violations were normally viewed seriously, and warnings, directives, compounds and formal prosecutions in courts were actions taken by the Department. Normally prosecution in court is reserved as a last resort when repeated violation or gross negligence cases occurred.

Offers of compound were applicable only for cases under the Environment Quality (Clean Air) Regulations, 1978.

In 1987, a total of 307 compounds were issued, as compared to 282 in 1986. The wood-based industry continued to be the highest sector to be fined. An analysis of the Department's records indicated the following major causes:

(i) Financial resources constraints to install control systems;

(ii) Absence of local R & D support to dispose wastes generated; and

(iii) Gross negligence in operation of control systems.

The breakdown of compounds offered and prosecutions in courts are shown in Tables 6.26, 6.27, 6.28 and 6.29.

Public Complaints

In 1987, a total of 501 complaints were received by the Department. This was the highest number of complaints recorded over the past five years (Figure 6.3). Complaints were lodged by the public through various means such as newspapers, letters, telephone calls, personal visits, or through elected representatives, Local Authorities, District Offices, Public Complaints Bureau, Village Development and Security Committee and Non Govern-mental Organisations. All complaints received were given priority for investigations and appropriate corrective measures were taken accordingly. 53 complaints were referred to other relevant agencies as the matters being complained

were beyond the jurisdiction of this Department. These included complaints on use of residential premises for trade usage in violation of planning laws, clogged drains due to inadequate sanitary services, poor household rubbish collection and disposal, illegal parking, nuisances by hawkers etc.

Detailed breakdown of complaints received, by states is shown in Figure 6.4. The Selangor State come up top as the state where most complaints were received which accounted for 22 per cent of the total complaints received. While 10 to 13 per cent of the complaints were received from the State of Pulau Pinang, Perak, Wilayah Persekutuan and Johor. The breakdown on complaints received by the nature of air pollution, water pollution, noise pollution and others accounted for 63 per cent, 18 per cent, 12 per cent and 7 per cent respectively.

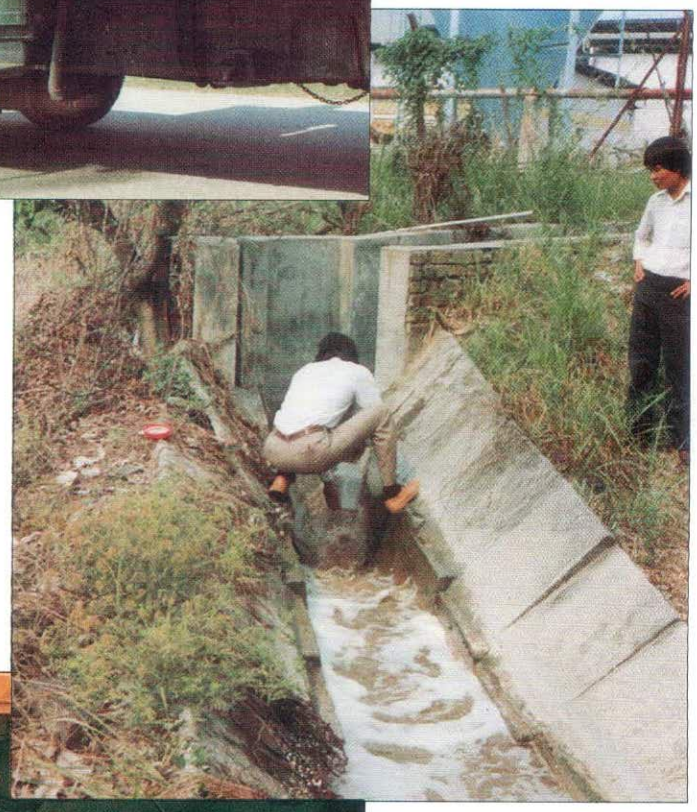
Complaints on dust particulates were still the highest and constituted 32 per cent of the total air pollution including noise pollution complaints. Other air pollution complaints were due to smoke, gas, odour, noise and others (Table 6.30). In terms of air pollution sources, sawmill and woodbased industries continued to be the major sources. It constituted 23 per cent of the total air pollution complaints. Other significant sources of air pollution are shown in Table 6.31.

As for water pollution complaints, the highest number of complaints were received from Perak State which was amounted to 22 complaints. Between 10 to 13 complaints were received respectively from Pulau Pinang, Selangor, Wilayah Persekutuan, Negri Sembilan, Johor and Pahang (Figure 6.5). Analysis of water pollution complaints received by the Department showed that it followed a similar trend as in 1986 and 1985. Even though Palm Oil Mills and Rubber Mills continued to be sources of water pollution, however the highest contributors were other industries which accounted for 26 per cent of the total water pollution complaints received. Other sources of water pollution included mining and solid waste (Figure 6.6).

Investigation findings revealed that among environmental pollution causes were incompatibility in the siting of industries such as food industries sited adjacent to chemical industries and insufficient buffer zone between housing areas and industrial areas especially in the old established areas. The findings also suggest that proposals by the Department since 1978 to provide for adequate buffer zones and compatability in the siting of industries to residential areas and vice-versa have yet to receive wide acceptance by planning and development authorities. The plights of residents from several housing schemes and villages, who suffer serious residual pollution e.g. at 8th mile Jalan Cheras, Bukit Rambai in Melaka, Taman Rajang at Sarikei, Jalan Ding Lik Kwong at Sibu, Simpang Tiga and Jalan Kaki Bukit in Kangar, and residents next to Hanjoong Quarry in Perak were the recent examples of failures to incorporate environmental dimensions in the development projects.

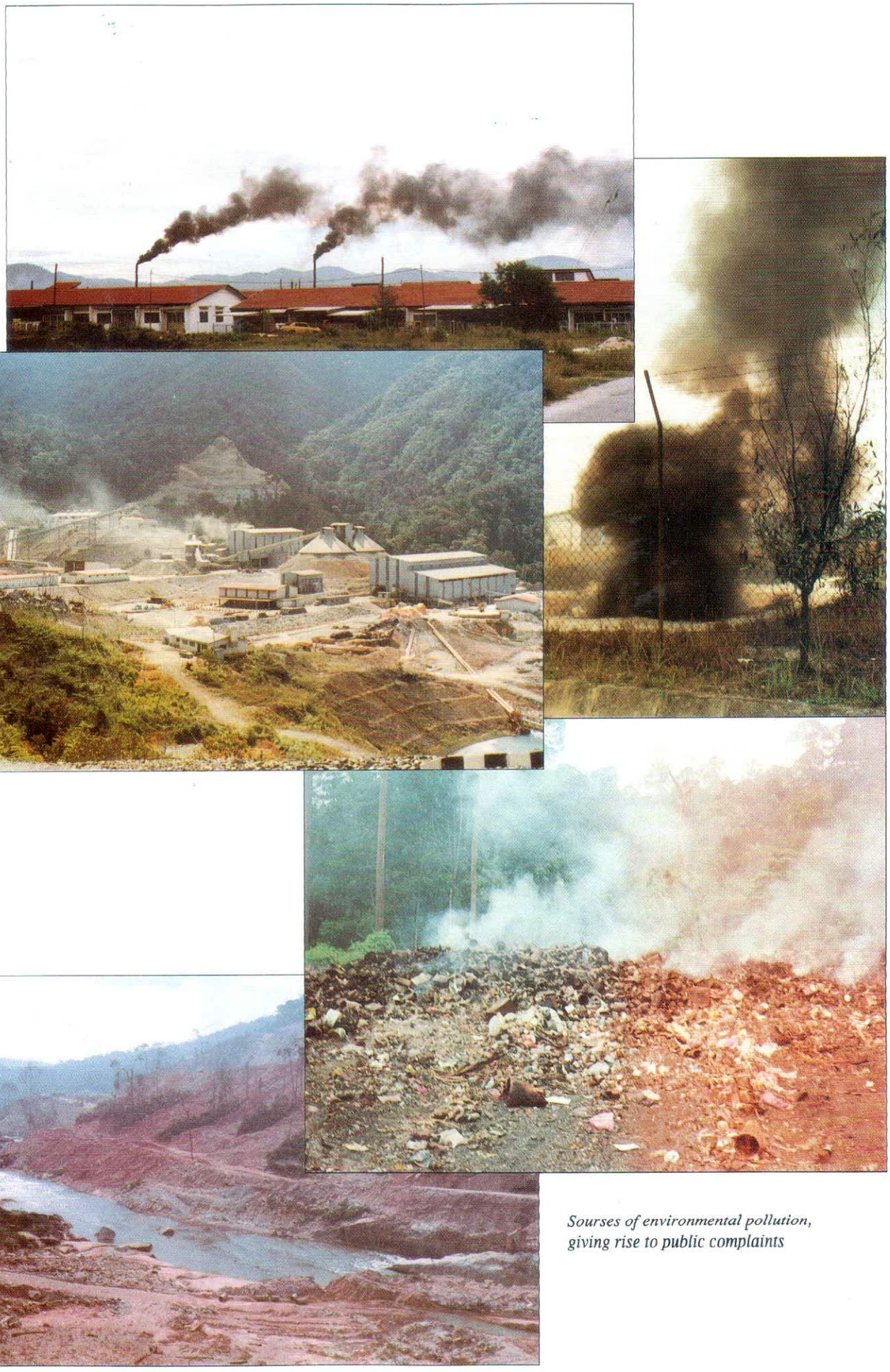
Complaints from inadequate control of discharges from animal husbandry would continue in the years to come. In this aspect, the studies by Veterinary Department and its recommendations must be seriously followed by all state authorities if any meaningful progress in controlling the wastes are to gain any headway. The solution to this sector of pollution would largely hinge on appropriate land allocation and land-use.

Measurement of dark smoke emission



Sampling of industrial effluent

Motor vehicle noise measurement



Sourses of environmental pollution, giving rise to public complaints

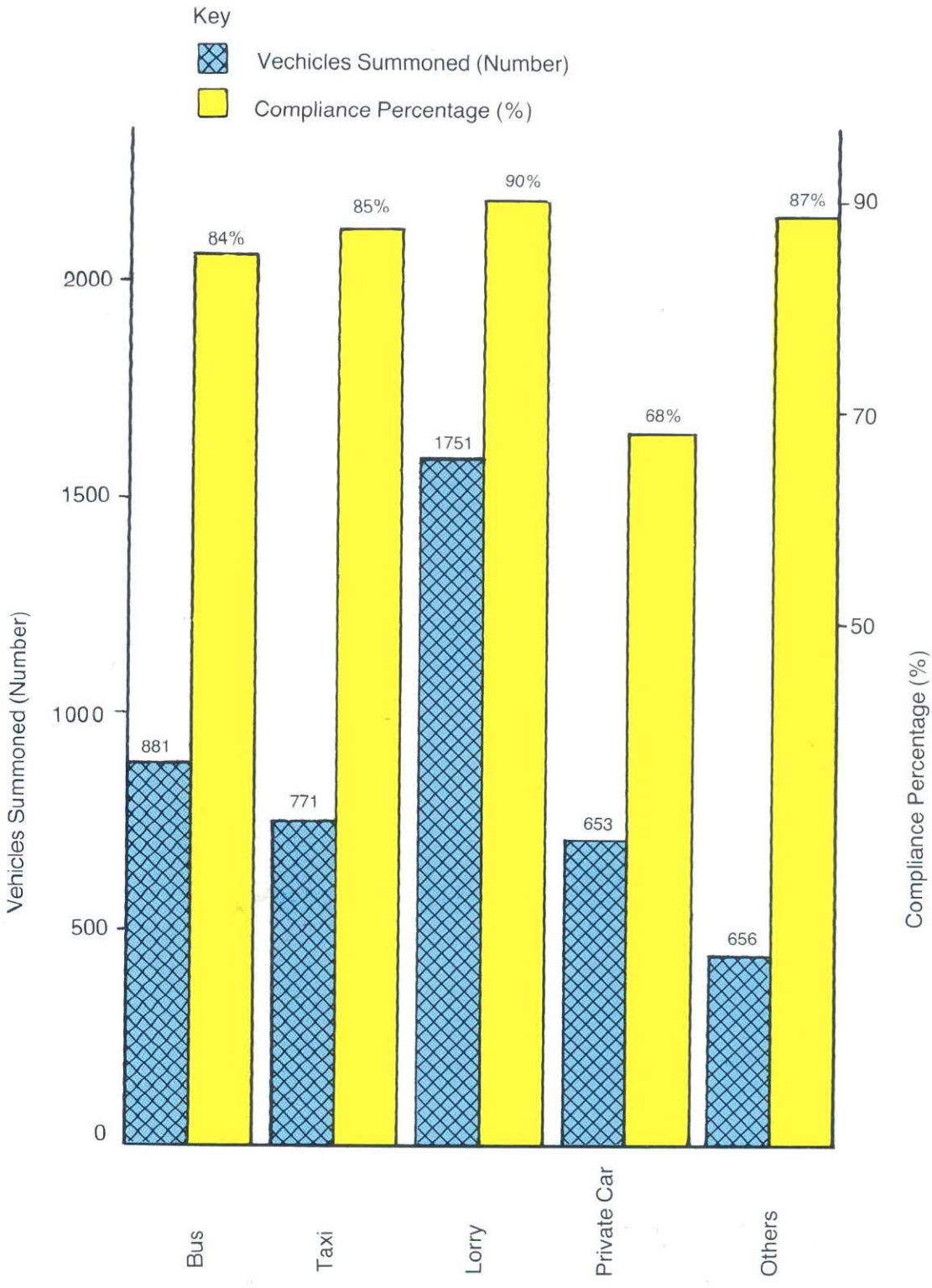


Figure 6.1. Malaysia: Enforcement of Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977. Vehicles Summoned and Compliance Percentage by Type of Vehicle, 1987.

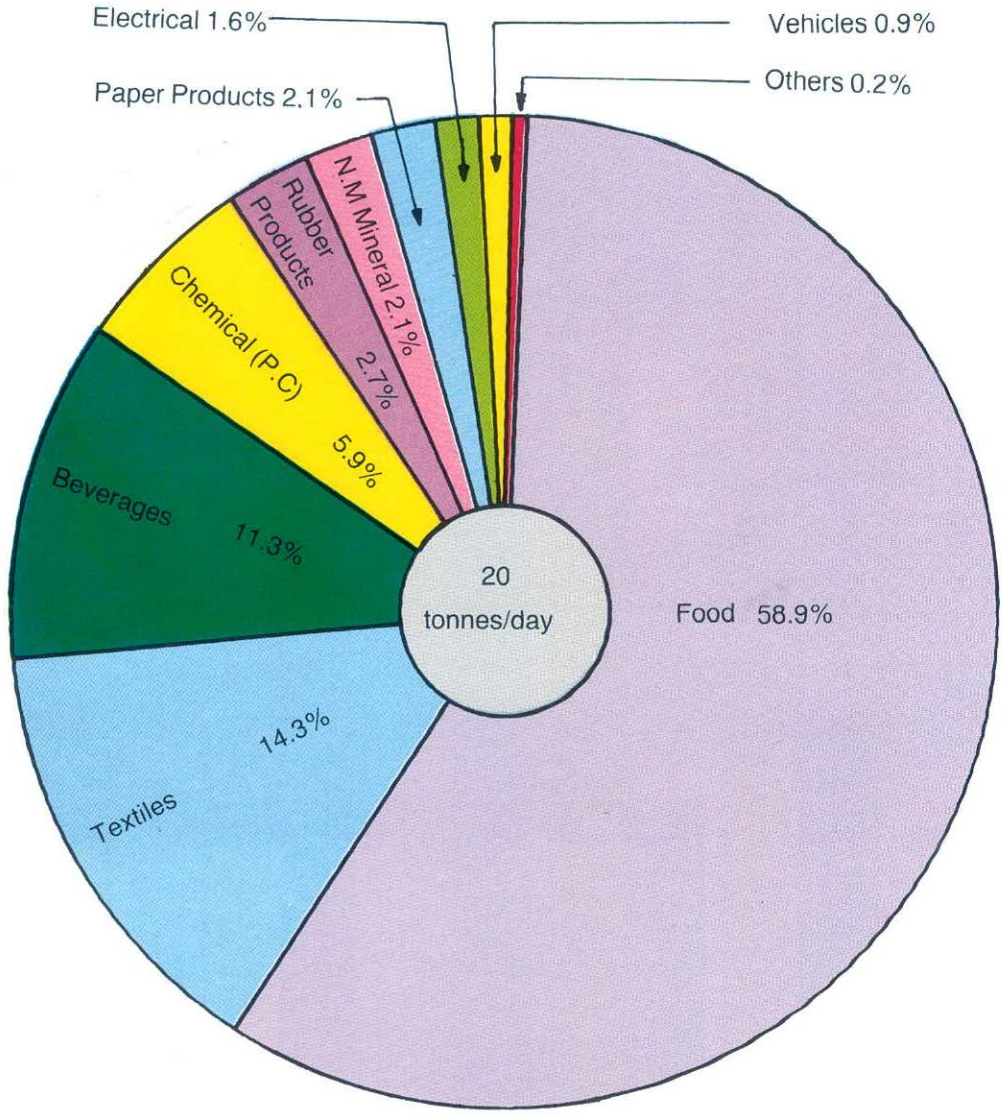


Figure 6.2. Malaysia: BOD Load by Industries, 1987.

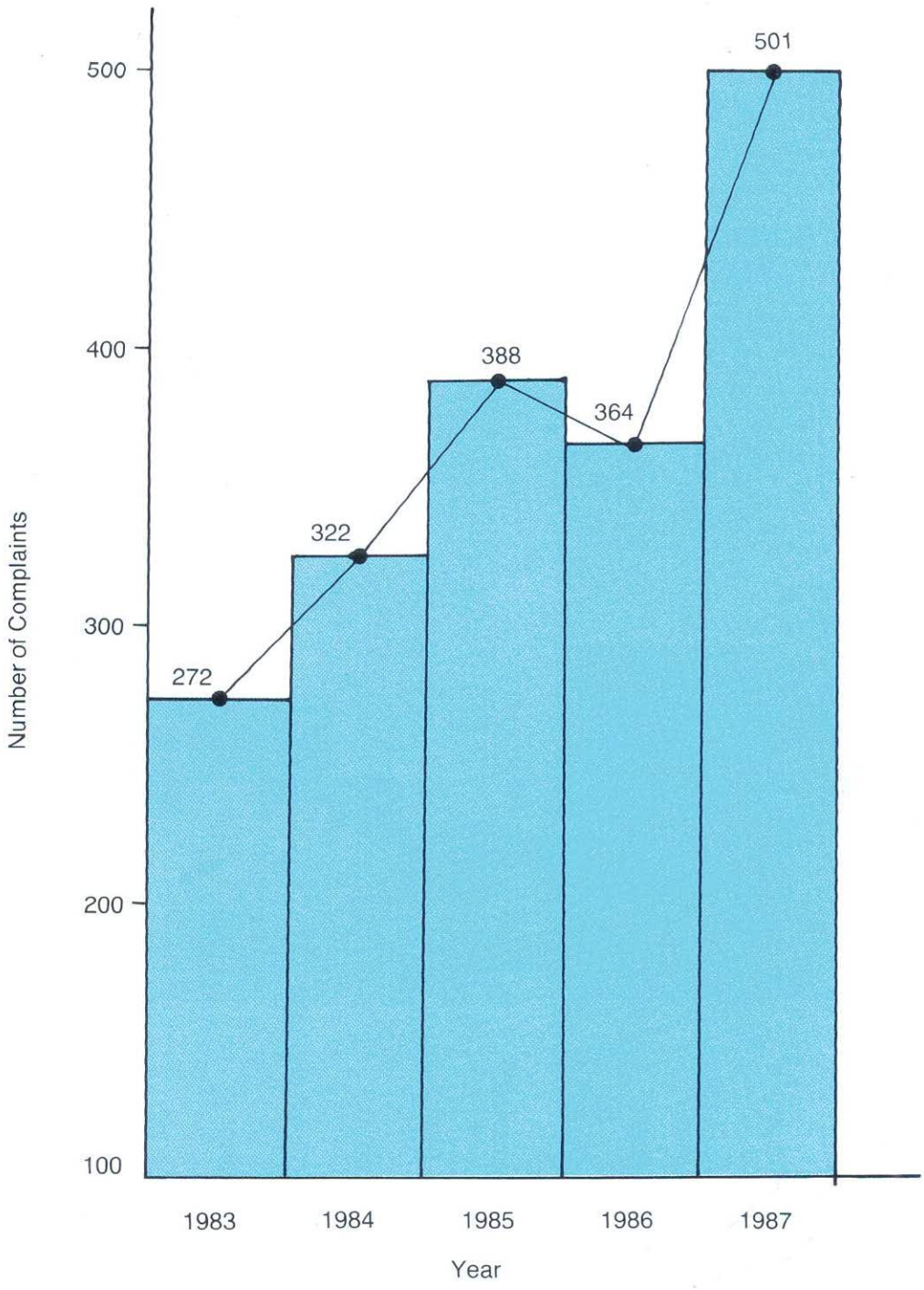


Figure 6.3. Malaysia: Trend in the Total Number of Complaints Received by DOE, 1983 – 1987.

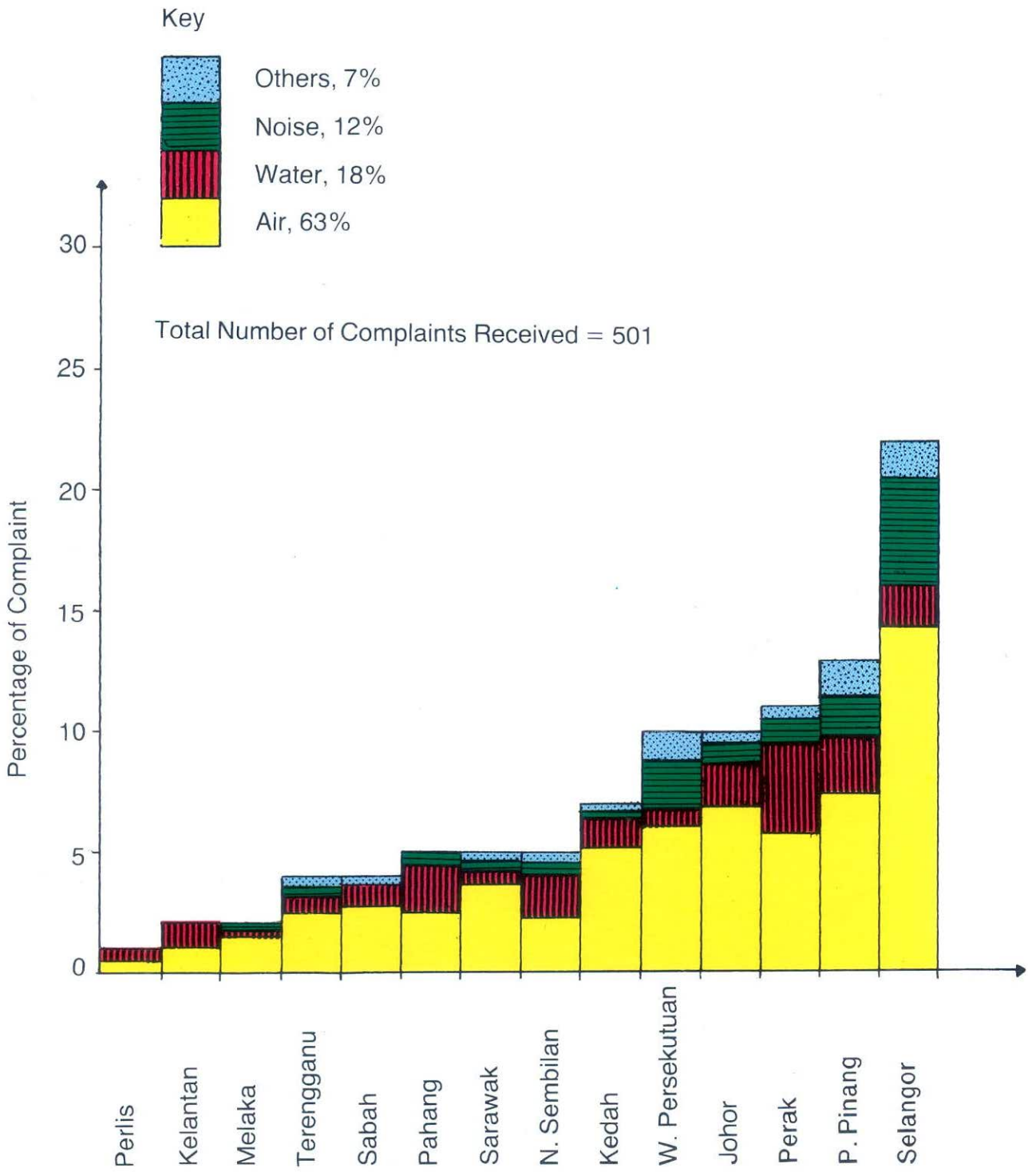


Figure 6.4. Malaysia: Nature of Pollution Complaints Received by Department of Environment, 1987.

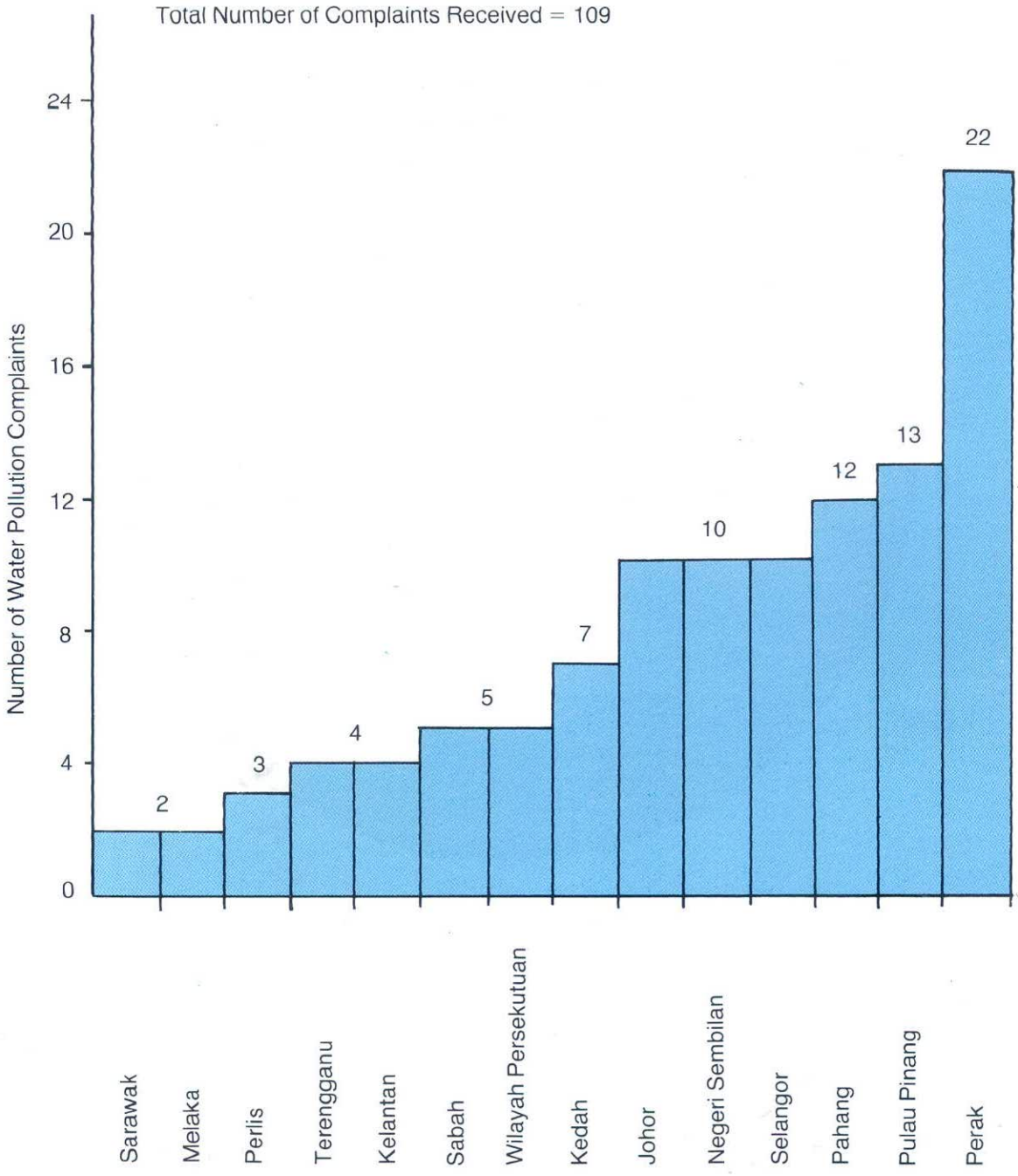


Figure 6.5. Malaysia: Number of Water Pollution Complaints Received by DOE by State, 1987.

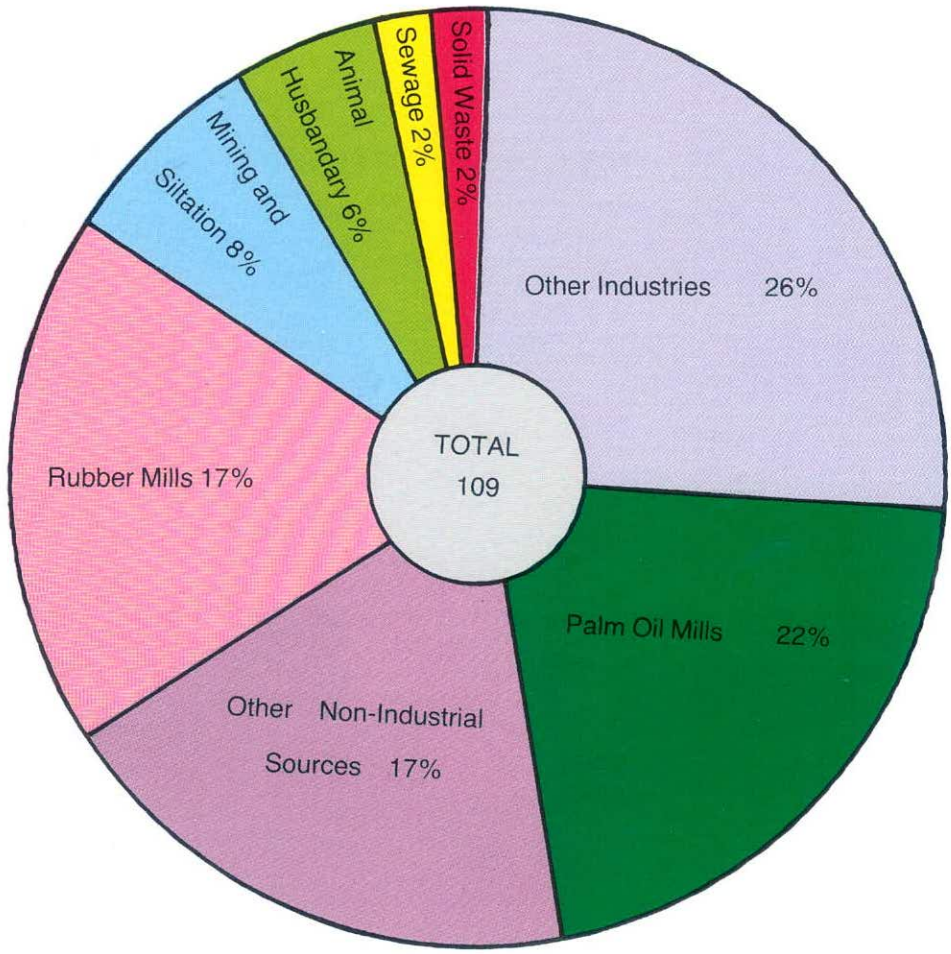


Figure 6.6. Malaysia: Sources of Water Pollution Complaints, 1987.

Table 6.1

Malaysia: Potential and Significant Air Pollution Sources, 1987

Type of Sources	No.of Sources
I. Stationary Sources	
a. Industrial Process Industries	
- Acid Manufacturing	6
- Chemical Manufacturing	198
- Paint and Vanish	19
- Plastics and Resin	88
- Soaps and Detergents	9
b. Food Agriculture	
- Fishmeal	189
- Palm Oil Mill	250
- Rice Mill	1250
- Rubber Mill	209
- Rubber Products Manufacturing	69
- Smoke House	700
c. Metal Industries	
- Aluminium Works	19
- Foundries	295
- Iron and Steel Mill	24
- Lead Smelter and Related Works	4
- Tin Smelting	4
d. Mineral Products	
- Asbestos Works	5
- Asphalts and Concrete Batching	60
- Bricks Work Clay and Clay Works	94
- Cement Products	176
- Glass Work	28
- Line and Plaster Works	321
- Portland Cement Manufacturing	5
- Stone Quarrying	305
e. Petroleum Industry	
- Peroleum Refineries	5
- Miscellaneous Petroleum Process	28
- Gas Processing	24

Continued.....Table 6.1

Type of Sources	No.of Sources
f. Woodbased Products and Others	
- Charcoal Making	520
- Pulp and Paper Recycling	6
- Paper Products	51
- Sawmills	1047
g. Fuel Combustion Sources	
- Thermal Power Station	14
- Boiler and Furnaces	2040
- Incinerator	214
II. Mobile Sources	
- Motor Vehicles	
- Petrol Powered	4211566
- Diesel Powered	353508
III. Solid Waste Disposal	
- Municipal Waste Disposal Site	89
- Municipal Incinerator	2

Table 6.2

Malaysia: Number of Motor Vehicles Until 1987

Type of Vehicle	No of Vehicles			Percentage
	Petrol Powered	Diesel Powered	Total	
Motorcycles	261,159	-	2,611,599	57.2
Taxi	8,119	16,513	24,632	0.5
Private Car	1,431,884	47,747	1,479,631	32.4
Van & Lorries	146,876	169,970	316,846	6.9
Buses	1,543	20,591	22,134	0.5
Others	11,545	98,687	110,232	2.5
Total	4,211,566	353,508	4,565,074	100
Percentage	92.2	7.8	-	-

Table 6.3

Malaysia: Distribution of Significant Stationary and Mobile Sources of Air Pollution by State, 1987

Type of Sources / State	Stationary Sources	Solid Waste Disposal Site	Mobile Sources
Perlis	28	1	46,220
Kedah	206	8	294,639
Seberang Perai/Penang	292	6	432,717
Perak	335	17	556,191
Selangor	481	9	793,168
Wilayah Persekutuan	298	2	366,078
Negri Sembilan	162	5	217,617
Melaka	156	4	169,570
Johor	289	9	677,848
Pahang	296	13	234,831
Terengganu	154	5	111,910
Kelantan	118	7	192,054
Sabah	132	1	209,265
Sarawak	149	2	262,971
Total	3,200	89	4,565,074

Table 6.4

Malaysia: Inventory of Fuel Burning Equipment (FBE) Approval in 1987

Type of FBE	Number	Percentage
I. BOILER		
1. Solid Fuel	43	21.9
2. Liquid Fuel	52	26.5
II. INCINERATOR		
1. Wood-Based Industry	4	2.0
2. Palm Oil Mill	6	3.I
3. Others	3	I.5
III.OTHER FBE		
1. Kiln	4	2.0
2. Furnace	9	4.6
3. Heater	11	5.6
4. Generator	57	29.1
5. Dryer	5	2.6
6. Asphalt Plant	1	0.5
7. Burner	1	0.5
Total FBE Approved	196	100

Table 6.5

Malaysia: Emission of Air Pollutants from Fuel-Burning Sources, 1987

Sources	Fuel Burning	Consumption ($x10^3$ tonnes/ year)	Major Pollutants (Tonnes/year)				
			Particulates	SOx	NOx	HC	CO
Power Station	Natural Gas	703	203.9	13,989.7	8,084.5	13.4	225.0
	Fuel Oil	2,213	2,301.5	177,916.4	2,911.6	287.7	1,460.6
Total I		2,916	2,505.4	191,906.4	37,296.1	301.1	1,685.6
Industry	Natural Gas	356	121.1	7120.0	1281.6	20.6	113.9
	LPG	41	15.6	0.8	106.6	2.7	14.4
	Kerosene	18	54.0	61.2	41.4	7.2	4.5
	Diesel	1,670	3,557.1	33,567.0	12,525.0	684.7	651.3
	Fuel Oil	487	1,397.1	9,253.0	3,652.5	180.2	155.8
	Coal	268	1,742.0	5,092.0	2,010.0	134.0	268.0
Total II		2,840	6,886.9	55,094.0	19,617.1	1,029.4	1,207.9
Domestic	Natural Gas	54	19.6	1,080.0	84.2	8.3	18.9
	LPG	230	96.6	4.6	414.0	39.1	50.6
	Kerosene	283	849.0	4,811.0	650.9	113.2	65.1
Total III		567	965.2	5,895.6	1,149.1	160.6	134.6
Grand Total		6,323	10,357.5	252,895.7	58,062.3	1,491.1	3,028.1

Table 6.6

Malaysia:Estimate of Emission of Air Pollutants from Mobile Sources, 1987

Type of Vehicle	Number	Pollutant Load (x 10^3 tonnes)				
		Particulates	SOx	NOx	HC	CO
GASOLINE FUEL						
Motorcycles	2,611,599	5.4	0.5	1.9	270.0	459.0
Taxi	8,119	0.8	0.2	4.0	5.7	148.0
Cars	1,431,884	2.9	0.8	14.9	21.0	546.7
Lorry and Vans	146,876	0.8	0.2	4.2	6.0	15.5
Bus	1,543	0.1	0.02	0.8	0.1	12.1
Others	11,545	-	-	-	-	-
Total	4,211,566	10.0	1.72	25.8	302.8	1181.3
DIESEL FUEL						
Taxi	16,513	0.1	1.1	0.6	0.1	2.4
Cars	47,747	0.07	0.5	0.3	0.08	1.3
Lorry and Vans	169,970	0.9	8.9	2.4	2.4	15.0
Bus	20,591	0.3	2.9	7.9	0.8	4.9
Others	98,687	-	-	-	-	-
Total	180,769	1.37	13.4	11.2	3.38	23.6
TOTAL	4,565,074	11.4	15.1	37.0	306.2	1204.9
Percentage		0.7	1.0	2.3	19.4	76.5

Table 6.7

Malaysia: Pollutants Load Estimated from Open Burning Practices at Refuse Disposal Grounds, 1987

State	No. of Site	Refuse Waste ($x10^3$ tonnes/day)	Pollutants Load	
			Particulates	NOx
Perlis	1	20.0	50.0	8.1
Kedah	8	188.9	472.3	80.4
S.Perai/Penang	6	66.1	165.3	30.0
Perak	17	177.0	442.5	68.6
Selangor	9	180.1	450.3	70.6
Wilayah Persekutuan	2	106.0	265.0	40.3
Negri Sembilan	5	27.2	68.0	10.2
Melaka	4	69.4	173.5	32.0
Terengganu	9	120.5	301.3	50.9
Kelantan	7	46.5	116.3	25.1
Sabah	1	20.0	50.0	8.1
Sarawak	2	18.0	45.0	7.4
Total	89	1,123.4	28,08.8	476.6

Table 6.8

Malaysia: Open Burning Practices in Land Clearing by Agriculture Sectors, 1987

Location	Type of Waste	Area (Hectar)	Date of Burning
Yong Peng	Rubber Wood	63.6	5/3-30/4
Air Hitam	Rubber Wood	21.4	Jun-July
Bagan Serai	Palm Waste	32.4	May

Table 6.9

Malaysia: Pollutants Load Estimated from the Burning of Industrial Trade Waste, 1987

Location	Type of Waste	Quantity (Tonnes)	Pollutants Load (Tonnes/yr)	
			Particulate	NOx
Kulim	Wood	110	56.1	99
Kodiang	Wood	972	4957.2	874.8

Table 6.10

Malaysia: Number of Offences by Motor Vehicles Under the Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977 by State, 1986-1987

State	Number of Vehicles				Compliance (Percent)	
	Stopped for Inspection		Summoned			
	1986	1987	1986	1987	1986	1987
Johor	4,923	9,274	461	494	90.6	94.7
Perlis	218	261	35	16	83.9	93.9
Pahang	3,587	3,973	363	341	89.9	91.4
Kedah	2,204	3,687	200	367	90.9	90.0
Kelantan	483	806	94	82	80.5	89.8
Sabah	-	810	-	85	-	89.5
Pulau Pinang	1,210	3,358	181	449	85.4	86.6
Terengganu	425	648	80	93	81.1	85.6
Sarawak	-	1,004	-	162	-	83.9
Perak	740	2281	110	371	85.1	83.7
Selangor	2,153	2,894	482	516	77.6	82.2
N. Sembilan	434	1,851	102	408	76.5	78.0
Melaka	1,074	1,258	339	326	68.4	74.1
W.Persekutuan (Kuala Lumpur)	15,481	3,408	1,524	1,002	72.1	70.6
Total	22,932	355,113	3,971	4,712	83.0	87.0

Table 6.11

Malaysia: Enforcement of Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977, for 1985-1987

Subject	Year														
	1985					1986					1987				
Total Number of Diesel Vehicles Registered	329,980					346,019					353,508				
Number of Enforcement Campaigns	123					206					302				
Total Number of Vehicles Stopped for Inspection	13,211					22,932					35,513				
Type of Vehicles	L	B	T	O	PC	L	B	T	O	PC	L	B	T	O	PC
Number of Summons Issued	819	640	244	184	172	1576	695	925	404	371	1751	881	771	656	653
Total Number of Summons Issued	2,059					3,971					4,712				
Type of Vehicles	L	O	T	B	PC	L	O	B	T	PC	L	O	T	B	PC
Percentage Compliance	88	83	80	79	70	87	86	82	71	69	90	87	85	84	68
Overall Percentage Compliance (%)	84					83					87				
Compound Collected (M$)	46,760.00					23,615.00					25,580.00				

Note:

Type of Vehicles

L = Lorry PC = Private Car
B = Bus O = Others
T = Taxi

Table 6.12

Malaysia: Distribution of Industries by State, 1987

Type of Industry / State	Prescribed Premises		Non-Prescribed Premises															
	Rubber Mill	Palm Oil Mill	Food	Bever-age	Textile	Leather	Paper	Chemi-cal	Rubber Pdts.	Non-Metallic Mineral	Primary Metal	Metal Fabri-cation	Machi-nery	Elec-trical	Vehicle	Total	Grand Total	Percent
Perlis	-	-	3	-	1	-	-	-	1	5	-	-	-	1	-	11	11	0.4
Kedah	30	3	23	2	8	-	2	9	8	8	13	1	2	8	4	88	121	4.6
Pulau Pinang	10	4	92	8	51	-	13	47	9	37	61	8	10	36	9	381	395	15.0
Perak	28	33	75	1	10	2	3	11	6	47	55	2	-	5	3	220	281	10.7
Selangor	16	29	70	8	17	2	23	111	18	58	68	16	20	30	22	463	508	19.4
Kuala Lumpur (Federal Territory)	3	-	13	3	6	3	3	38	4	83	95	10	5	7	3	273	276	10.5
Negeri Sembilan	22	13	10	-	1	-	1	12	5	16	4	2	1	6	1	59	94	3.6
Melaka	13	1	18	1	5	2	3	11	4	8	12	2	4	6	-	76	90	3.5
Johor	53	64	92	11	43	1	7	34	6	29	40	5	4	13	6	291	408	15.5
Pahang	16	61	17	4	-	-	1	1	1	11	3	-	-	3	1	42	119	4.5
Terengganu	3	11	79	-	1	-	-	1	5	5	1	-	-	1	1	94	108	4.1
Kelantan	9	6	11	1	-	-	1	4	-	9	7	-	-	3	-	36	51	1.9
Sabah	3	20	15	5	5	-	11	11	-	11	1	4	-	-	-	63	86	3.3
Sarawak	3	5	25	8	-	-	3	8	2	9	11	-	-	3	1	70	78	3.0
Total	209	250	543	52	148	10	71	298	69	336	371	50	46	122	51	2167	2626	100

Table 6.13

Malaysia: Industries Within Catchment Areas for Drinking Water, 1987

Type of Industry	Location According to Catchment Areas for Drinking Water		Total
	Within	*Outside*	
Palm Oil Mill	100	150	250
Rubber Factory	89	113	202
Other Manufacturing Industry	283 (134)	4463 (2033)	4746 (2167)
Total	472	4,726	5,198

Note:
( ) indicates potential water polluting manufacturing industries.

Table 6.14

Malaysia: Distribution of Organic Load by Industrial Sources, 1987

Location / Type of Industry	Catchment Area for Drinking Water (Per cent)		Total Amount of BOD load discharge into watercourses (tonnes/day)
	Within	Outside	
Prescribed Premises			
Palm Oil Mills	66	34	5.16
Rubber Factories	67	33	5.09
Non-Prescribed Premises			
Manufacturing Industries	5	95	20.00
Total	26	74	30.25

Table 6.15

Malaysia: Type of Sanitation Facilities, 1980 & 1985

No.	Type of Facilities	Population Served (Persent)	
		1 1980	2 1985
1.	Central Sewerage System	4.0	5.3
2.	Flush Toilets Connected to Septic Tanks or Communal Treatment	21.8	30.6
3.	Pour Flush Latrine	30.3	39.2
4.	Bucket Latrine	7.7	3.4
5.	Pit Latrine	5.3	8.5
6.	Hanging Latrine	4.5	2.8
7.	No Facility	16.4	10.2

Note:

1. 1980 Census Data
2. Estimates Made by Local Government Division, Ministry of Housing and Local Government.

Table 6.16

Malaysia: Sewerage and Wastewater Disposal, 1987

No.	Name of Project	Year Completed	Location		Capital Cost (10^6 M$)	Population
			River	District		
1.	Georgetown	Early 1965	-	Timur Laut	85	300,000
2.	Shah Alam	1986 (1976)	Sg.Renggam	Petaling	29.75	81,600
3.	Kuala Lumpur	1984 (1976)	Bulus to Sg.Gombak Pantai to Sg.Klang Kerayong to Sg. Kerayong Puchong to Sg. Klang	Kuala Lumpur	140	425,000
4.	Bangi	1986 (1980)	Sg.Langat	Hulu Langat	11.5	70,000
5.	Bukit Mertajam /Butterworth	1986 (1981)	Sg.Juru	S.Perai (Tengah)	84.23	84,000
				Total 5 Major Projects		960,600

Note : ( ) Year construction started.

Table 6.17

Sediment Loads of Selected Rivers
In Peninsular Malaysia, 1986

No.	Name of River	Catchment Area (km^2)	Annual Mean		Sediment Load ($x10^3$ tn./yr)	Sediment Yield (tn./km^2yr)
			Quantity of Discharge [1] ($m^3/5$)	Sediment Concentration [2] (mg/l)		
1	Sg. Muda	3,330	64	45	85	25
2	Sg. Kerian	629	34	34	36	57
3	Sg. Kurau	337	18	22	12	37
4	Sg. Perak	7,770	170	106	568	73
5	Sg. Bernam	1,090	53	214	358	328
6	Sg. Selangor	1,450	48	35	53	37
7	Sg. Klang	468	14	156	69	147
8	Sg. Langat	1,240	32	147	148	119
9	Sg. Melaka	350	5	84	13	37
10	Sg. Muar	3,130	35	38	42	22
11	Sg. Johor	1,130	40	43	54	48
12	Sg. Pahang	25,600	363	39	446	17
13	Sg. Dungun	1,480	125	47	185	125
14	Sg. Terengganu	3,340	230	41	297	89
15.	Sg. Kelantan	11,900	525	89	1,474	124
16.	Sg. Golok	761	44	64	89	117
	Total/Mean	64,005	1,800	75	3,929	88

Note:
1 Based on Drainage and Irrigation Department's extrapolation data.
2 Based on Department of Environment's 1986 monitoring data.

Table 6.18

Malaysia: Revenue Obtained from Prescribed Premises, 1986-1987

Year	Industry	Processing Fees (M$)	Effluent Related Fees (M$)	Late Fees (M$)	Recovery of Fees (M$)	Total Revenue (M$)
1986	Crude Palm Oil	23,600.00	258,765.62	23,420.00	314.13	306,099.75
	Raw Natural Rubber	21,800.00	42,641.17	750.00	236.18	65,427.35
	Total	45,400.00	301,406.79	24,170.00	550.31	371,527.10
1987	Crude Palm Oil	24,400.00	284,406.14	930.00	276.93	310,013.07
	Raw Natural Rubber	20,600.00	41,780.17	7,124.19	725.56	70,229.92
	Total	45,000.00	326,186.28	8,054.19	1,002.49	380,242.99

Table 6.19

Malaysia: Incidents of Non-Compliance of Rubber Mills, 1987

Parameter / Mode of Disposal/ Discharge	pH	BOD	SS	AN	TN
Watercourse	2	9	13	19	19
Land	-	-	-	-	-
Total	2	9	13	19	19

Table 6.20

Malaysia: Oil Spill Sighting and Recovered Cleaning Cost by Location, 1985-1987

Location	No. of Sighting			Cost (M$)		
	1985	1986	1987	1985	1986	1987
1. Port						
I. Johor Bharu	5	5	3	13,399.30	10,139.63	7,743.40
II. Kuantan	-	3	2			
III. Kelang	-	1	-			
2. Straits of Malacca	-	6	4			1,480.77
3. South China Sea	-	7	6			
4. Sarawak	-	3	-		60,343.76	
Total	5	25	15	13,399.30	70,483.39	8,955.17

Table 6.21

Malaysia: Oil Spill Incident. Number by Sources, 1985-1987

Sources	No. of Cases		
	1985	1986	1987
1. Bilge/Bunkering	3	7	4
2. Groundings	-	3	2
3. Load Transfer	3	6	3
4. Tank Cleaning/Ballasting	-	3	2
5. Oil Platform	-	-	1
6. Not known	-	6	3

Table 6.22

Malaysia: Contravention Licence Applications Under Section 22(1), Environmental Quality Act, 1974. Number by Type, 1985-1987

Applicant	Year		
	1985	1986	1987
Wood-based Industries	16	26	40
Palm Oil Mills	3	1	4
Government Departments	2	4	3
Project Developers	2	1	-
Rice Mills	-	-	4
Others	3	5	5
Total	26	37	56

Table 6.23

Malaysia:Contravention Licence Application Under Section 22(1), Environmental Quality Act, 1974. Number by Type of Contravention, 1985-1987

Type of Contravention	Year		
	1985	1986	1987
Open Burning of Wastes	13	24	45
Operation of Incinerator not of Approved Design	4	10	5
Emission of Dark Smoke	2	2	4
Emission of Particulates	1	-	1
Non-use of Best Practicable Means	2	-	1
Emission of Unburnt Ash	4	1	-
Total	26	37	56

Table 6.24

Malaysia: Contravention Licence Applications Under Section 25(1), Environmental Quality Act, 1974. Number by Industry, 1985-1987

Industry	Year		
	1985	1986	1987
Beverage	8	17	9
Chemical	0	6	6
Electrical Goods	1	2	1
Food	6	19	21
Paper	2	2	4
Palm Oil Refineries	13	20	13
Textile	8	16	8
Others	4	17	19
Total	41	99	81

Table 6.25

Malaysia: Contravention Licence Applications Under Section 25(1), Environmental Quality Act, 1974. Number by Justifications, 1986-1987

Justification	1986	1987
Lack of Land	19	20
Financial Constraint	4	4
Upgrading of Treatment Plant	11	12
Contruction of Treatment Plant	23	26
Treatment Technology	5	3
Discharge into Central Sewerage Plant	13	11
Others	19	5
Total	99	81

Table 6.26

Malaysia: Enforcement Actions Under the Environmental Quality Act, 1974. Number by Action, 1986-1987.

Action	Year	
	1986	1987
Factory Inspections	2,197	3,052
Directives/Warnings	899	986
Compounds	182	307
Prosecutions	41	26

Table 6.27

Malaysia: Offences Prosecuted Under the Environmental Quality Act, 1974. Number by Type, 1985-1987

Section	Type of Offence	Year		
		1985	1986	1987
16	Failure to comply with conditions of licence	1	15	8
18	Operation and use of prescribed premises without licence	1	1	-
25	Emission of wastes into any inland water without licence	5	5	1
31	Failure to comply with notice	2	-	-
37	Failure to furnish information	5	6	4
	Total	14	27	13

Note:

Section 16 - 7 palm oil mills
1 rubber mill

Section 25 - 1 paper mill

Section 37 - 3 paper mills
1 quarry

Table 6.28

Malaysia: Offences Prosecuted Under the Environmental Quality (Clean Air) Regulations, 1978. Number by Type, 1985-1987

Regulation	Type of Offence	Year		
		1985	1986	1987
11	Open burning of wastes	14	6	6
15	Emission of dark smoke	1	1	2
36	Installation of fuel burning equipment without approval	1	1	2
38	Erection of chimney without approval	1	1	2
40	Operation of facilities without control equipment	1	1	1
	Total	18	10	13

Table 6.29

Malaysia: Offences Compounded Under the Environmental Quality Act (Clean Air) Regulations 1978. Number by Type, 1985-1987

Regulation	Type of Offence	Year		
		1985	1986	1987
7	Using incinerator not of approved design	3	1	5
8	Installation of incinerator without approval	7	16	13
11	Open burning of wastes	140	157	150
15	Emission of dark smoke	11	25	32
36	Installation of fuel burning equipment without approval	15	41	66
38	Erection of chimney without approval	19	36	38
40	Operation of facilities without control equipment	4	6	3
	Total	199	282	307

Table 6.30

Malaysia: Air Pollution Complaints. Number by Nature, 1985-1987

Nature of Complaints	Year					
	1985		1986		1987	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Particulates	132	37	135	35	155	32
Smoke and Fumes	56	16	72	19	108	22
Niose	77	21	67	18	105	21
Odour	55	15	51	13	73	16
Gas	12	3	8	2	39	8
Others	30	8	50	13	6	1
Total	362	100	383	100	486	100

Table 6.31

Malaysia: Air Pollution Complaints. Number by Industry, 1985-1987

Indusrties	Year					
	1985		1986		1987	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Wood based Industries	43	15	53	16	91	23
Chemical Industries	29	13	19	6	31	8
Feedmill and Fishmeal Factories	21	7	19	6	37	10
Rice Mills	20	7	30	10	28	7
Quarries	19	7	19	6	22	6
Engineering Workshops	19	7	10	3	33	9
Metallurgical Works	16	6	31	10	21	5
Concrete and Cement Works	9	3	3	1	8	2
Rubber Based Industries	-	-	-	-	17	4
Others	108	35	121	42	104	26
Total	284	100	305	100	392	100