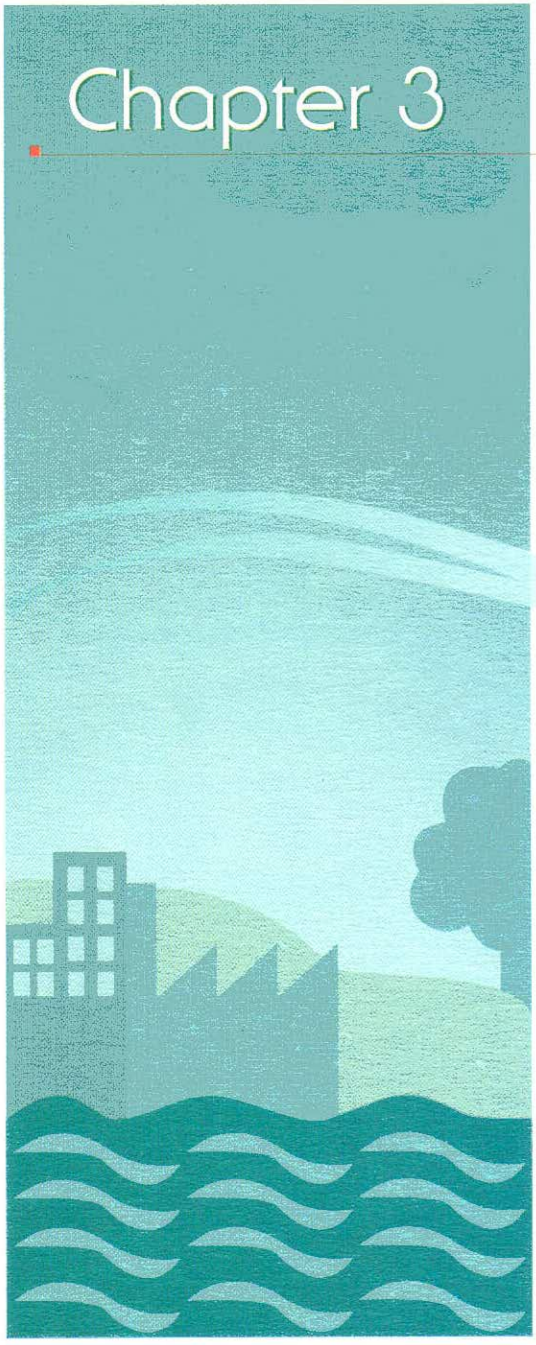
Chapter 3



PROGRAMME DEVELOPMENT

INTRODUCTION

The Environment Quality Act 1974 (EQA) and the regulations made thereunder are the main instruments for the abatement and control of pollution and the enhancement of environmental quality. However efforts are continuously being undertaken to develop new statutory mechanisms, strengthen existing regulations to address emerging environmental issues, as well as to reinforce the legal and regulatory framework for effective environmental protection and conservation in the country.

REVIEW AND FORMULATION OF REGULATIONS

In 1998, priority was given to amending the EQA to provide for the prohibition of open burning as one major step to prevent the recurrence of the haze as seen in 1997. Although forest and peat fires from a neighbouring country were the main causes, local land-clearing activities and peat fires due to the dry season also contributed to the occurrence of haze in the country. The Environmental Quality (Amendment) Bill 1998 was tabled at the Dewan Rakyat and Dewan Negara in 1998. The Bill was given the Royal Assent on 25 June 1998 and the Environmental Quality (Amendment) Act 1998 was gazetted on 1 July 1998. The key amendments include prohibition of open burning, liability of owner or occupier of premises where open burning takes place, and provisions for defence and mitigation if beyond owner's or occupier's control or knowledge or that he has taken all reasonable precautions or exercised due diligence. Penalty for contravention of the prohibition has been increased and upon conviction is liable to a fine not exceeding five hundred thousand ringgit or to imprisonment for a term not exceeding five years or to both.

In order to facilitate the implementation of the Environmental Quality (Amendment) Act 1998, the Environmental Quality (Prescribed Activities) (Open Burning) Order had been drafted to specify activities which could be exempted from the open burning prohibition. Such exempted activities include burning of infected plant materials and carcasses of diseased animals or poultry and fires purposely set for research and training purposes, provided specific conditions are met such as when the Air Pollutant Index (API) is below 100. Inputs and comments from various stake holders, the State Governments, federal agencies and the Environmental Quality Council were taken into account before submission to the Attorney-General's Chambers for vetting prior to gazettement and implementation.

In 1998, a Technical Committee was set up to review the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 and the Environmental Quality (Clean Air) Regulations 1978 and to recommend necessary amendments to keep abreast with the current situation. Upon completion of reviews, the proposed amendments would be submitted to the Environmental Quality Council and the Attorney-General's Office.

Regular briefings and explanations on various aspects of environmental legislations were provided at seminars and training courses organised in-house or by other government agencies, the private sector and other institutions to enhance understanding and compliance of the legislative requirements.

MANAGEMENT OF CHEMICALS

While chemicals are important to help improve the quality of our lives, they also pose risks to human health and the environment if not properly managed. In this regard, the Department of Environment is continuously developing its capability to deal with chemicals on the basis of toxicity, hazard and impact on the environment, particularly those chemicals not otherwise controlled.

At the international level, the DOE participated actively since 1994 in the drafting and development of a legally binding instrument, the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

The PIC procedure has been established to help countries make informed decisions on the import of chemicals that have been banned or severely restricted, which so far has been on a voluntary basis. DOE has been identified as the Designated National Authority and thus will continue to function as the focal point in Malaysia. On 10 September 1998 the Rotterdam Convention was adopted and is now opened for signature. The adoption of this Convention represented a global commitment by both the importing and exporting countries of the world to control international trade in hazardous chemicals and pesticides which could cause significant damage to the environment.

On 7 February 1997, the Governing Council of UNEP passed a resolution to promote international action to reduce/eliminate releases of certain persistent chemicals into the environment. These chemicals, collectively termed Persistent Organic Pollutants (POPs) are organic compounds that are resistant to degradation, environmentally persistent, bioaccumulative and move long distances in the atmosphere. In line with this global initiative on POPs , DOE initiated a study in 1998 to compile data on the profile, sources and usage as well as alternatives of POPs available in Malaysia. The study served as a useful baseline for the development of a national action plan on POPs to meet the requirements of the Convention in future. An Intergovernmental Negotiating Committee for an International Legally Binding Instrument for Implementing Action on Persistent Organic Pollutants has been set up and DOE is an active member.

As prerequisite to the introduction of legislation on chemicals not otherwise controlled under other legal instruments, the DOE stepped up its information compilation efforts with the view to establishing an inventory on the types, quantities and other relevant data of industrial chemicals in use within the country, particularly those harmful to the environment and human health.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

Rivers Classification Project

The project on the classification of Malaysian rivers was initiated in 1985. Phase I of the project resulted in the development of water quality criteria and interim standards based on the beneficial uses of the watercourses. Beneficial uses had been categorized in relation to conservation, fisheries, water supply, recreational use, irrigation and others.

Between 1988 to 1997, Phases II, III and IV were implemented whereby 16 river basins were classified according to their beneficial uses and included other components such as assessment of industrial compliance to effluent discharge standards and establishment of databases on landuse, hydrology, socio-economy, water quality, pollution loading and aquatic ecology.

Phase V of the project started in 1998 and eight river basins would be classified by the end of 1999. The major output of Phase V would be the development of a River Basin Planning Management Information System using GIS. Phase V is being undertaken by a team of experts from Universiti Malaya as (Coordinator), Universiti Malaysia Sabah, Universiti Sains Malaysia, Universiti Teknologi Malaysia and Universiti Putra Malaysia.

Development of River Basin Environmental Management Plan for Sungai Terengganu

The project commenced in mid-1998 by a joint Consultancy Group comprising of experts from Universiti Kebangsaan Malaysia and Universiti Teknologi Malaysia. The principal objective of the study was to develop a River Basin Environmental Management Plan for the Terengganu River Basin which could serve as a model for other river basins. The terms of reference for the study were:

- identification of problems and causes of river pollution and recommend measures to overcome them, particularly at the source
- mitigation of environmental impacts arising from existing and future development activities within the basin
- rehabilitation of the river and maintenance of acceptable river water quality
- recommend measures to ensure sustainable use of the river in relation to beneficial uses of the river basin

An inception report was submitted in August 1998 detailing scope of work and the methodology for the environmental management plan incorporating various components:

- Water Quality Management, Monitoring and Surveillance Plan
- Watershed Management and Conservation Plan
- River Flow Regulation and General Maintenance Plan
- Legislative and Institutional Arrangement
- Public Awareness Programmes

The Plan will cover the entire river basin stretching from the headwater to the coast encompassing terrain, climate and biological organisms as a holistic ecological entity. The proposed plan will respond to the river management activities in providing input for future planning namely:

- Planning for changes affecting the environment – changes in land
- Planning to protect and maintain the present status of the river environment.

The project is expected to be completed by March 2000. The Environmental Management Plan that will be developed will serve as a reference model for the development of similar plans in other river basins in the country.

Assessment of Pollution Levels in the Langat River Basin

In view of the strategic importance of the Langat River as a major source of water supply, a study was initiated by DOE to assess water pollution control measures. The 5 months study was conducted by a team of experts from University of Malaya which covered the Upper Langat River catchment and the Semenyih River catchment.

The Final Report was released in October 1998. The salient findings were:

- The major parts of the Langat River Basin from Teluk Datuk near Banting town and upstream are of Class IV water quality. Only three minor river segment could be identified as Class II and these are segments at the upstream end of the Semenyih River. The analysis results revealed that poor

water quality for most parts of the river segment was mainly attributed to high levels of BOD and NH_3–N.

- Systematic analysis of water quality trends revealed that the Upper Langat River experienced seasonal (dry/wet) water quality fluctuations in terms of BOD, ammonia and dissolved oxygen levels.
- Point sources were responsible for BOD and ammonia pollution problems observed in the Upper Langat River during the dry season. Sewage treatment plants accounted for 74.5% of the total BOD load and 98.5% of the total ammoniacal-nitrogen load in the Upper Langat River.
- The remaining loads were attributed to the manufacturing sector such as food and rubber product industries.
- Non-point sources such as run-off from urban centres and land clearing activities were the major contributors of suspended solids.
- In the case of Semenyih River, BOD pollution was observed in the dry seasons, while pollution by suspended solids was serious during the wet month. Sewage treatment plants accounted for 85.4% of the total BOD load and animal husbandry accounted for 11.1%. The remainder came from the palm oil and manufacturing sector. A similar trend was observed in the case of ammoniacal-nitrogen: 66.2% contributed by sewage and 28.8% from animal husbandry. Run-offs from urban activities, agricultural clearing and logging were responsible for high levels of suspended solids
- Contamination by diesel and fuel oil due to spills and leakages from storage tanks was another important contaminant to the water quality especially affecting the Bukit Tampoi Water Treatment Plant.

The study also formulated a 'Pollution Control Action Plan' for the Upper Langat River Basin which included short, medium and long term strategies as well as administrative and legislative measures.

POLLUTION SOURCES INVENTORY

Updating the inventory of sources of water and air pollution and DOE databases is an exercise continuously conducted throughout the year. Data is collected from various sources such as input from relevant agencies and industries as well as field observations. For air pollution inventory, the assessment of pollution load is determined by applying adopted standard emission factors. Similarly for water pollution, the amount of effluent discharged and pollutant concentrations are computed to estimate the pollution load into the watercourses.

Sources of Air Pollution

The three major sources of air pollution are mobile, stationary and open burning activities. Emissions from motor vehicles were major contributors of air pollution compared to other sources. The 1998 vehicular population in Malaysia stood at 8,925,583, the Federal Territory of Kuala Lumpur having the highest density (1,842,154), followed by Johor (1,280,503) and Selangor (1,152,630). Perlis had the least number of vehicles registered (32,527) (Figure 3.1).

The number of stationary air pollution sources identified in 1998 were 12,056, an increase of 13.5% compared to 1997 (10,619). Johor had the most number of stationary sources, followed by Selangor and Sarawak, while the least number of sources were found in Perlis (Figure 3.2).

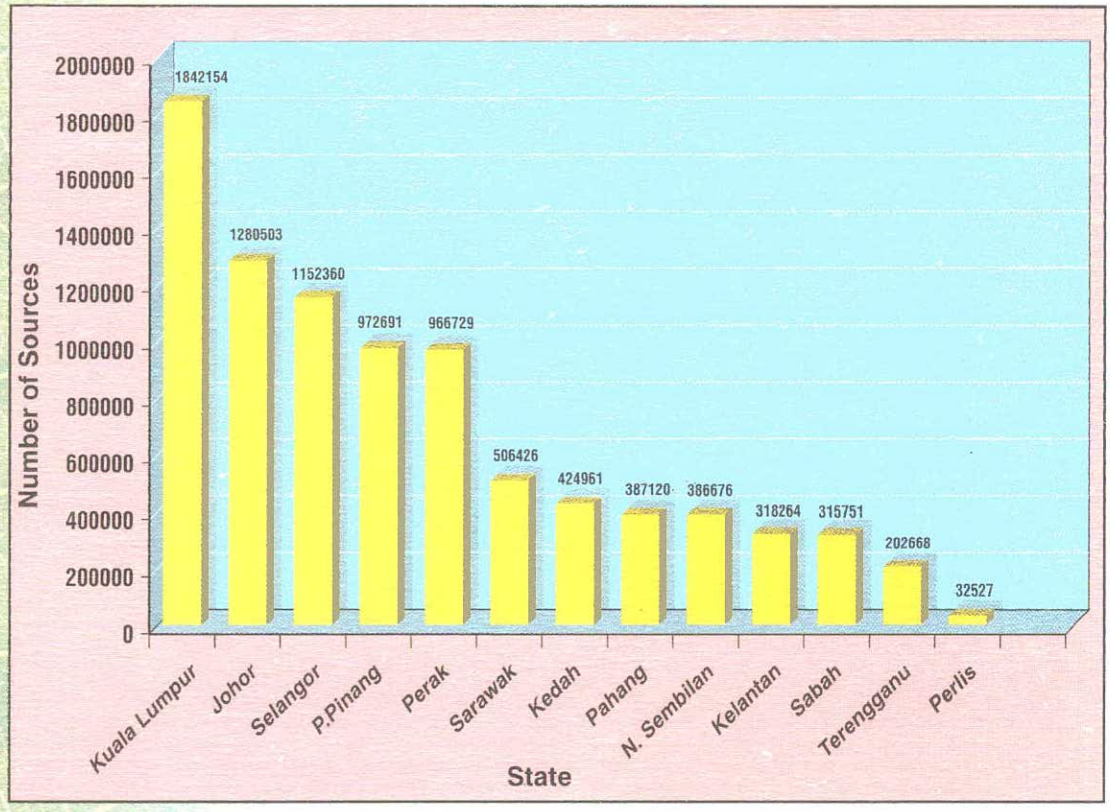


Figure 3.1 Malaysia: Number of Mobile Sources by States, 1998
(* Source : Road Transport Department)

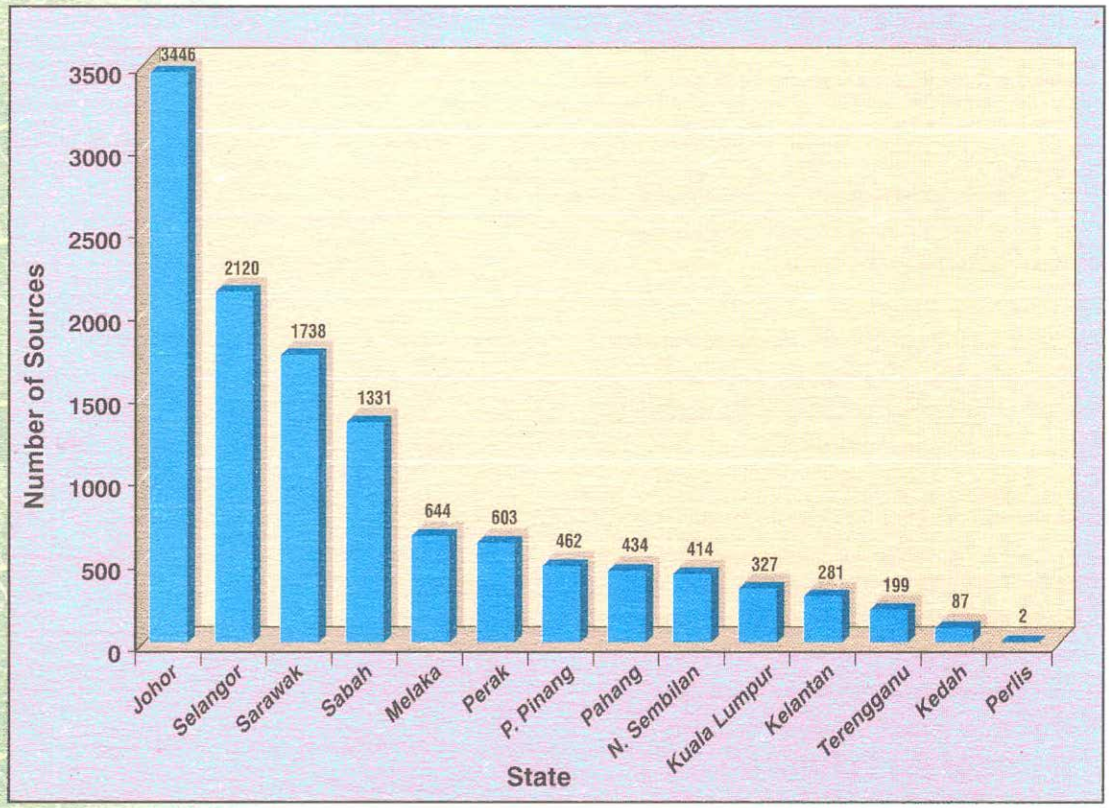


Figure 3.2 Department of Environment: Distribution of Industrial Air Pollution Sources by States, 1998

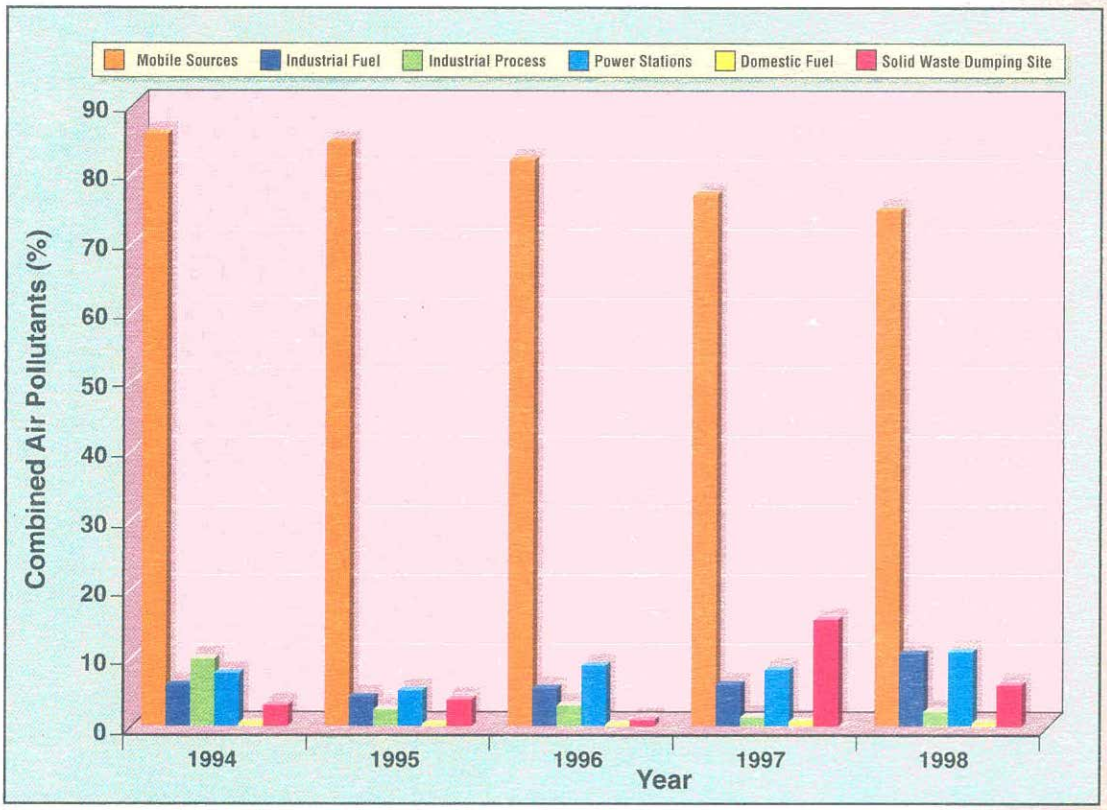


Figure 3.3 Malaysia: Sources of Air Pollution Load by Source, 1994 – 1998

Air Pollution Load

Based on combined estimated emissions of 2 million tonnes of carbon monoxide (CO), 236,000 tonnes of oxides of nitrogen (NOx), 111,300 tonnes of hydrocarbons (HC), 38,200 tonnes of sulphur dioxide (S02) and 17,300 tonnes of particulate matter (PM), motor vehicles were the main contributors of air pollution (73.8%). Of this, petrol and diesel powered cars contributed about 54% of the total load, followed by motorcycles (30%) and other type of vehicles such as lorries, vans and buses (16%). Other sources, such as power stations, industrial fuel consumption, industrial processes and domestic fuel consumption also contributed to the problem accounting for 9.3%, 9.0%, 2.7% and 0.7% respectively. Open burning practices especially at solid wastes dump sites and burning of wood wastes contributed to the remaining 4.5% of the air pollution load. (Figure 3.3). Kuala Lumpur, Johor, Selangor and Pulau Pinang made up more than half of the total air pollution load with reference to the number of mobile sources recorded.

Water Pollution Sources

Four major activities in Malaysia, namely manufacturing, agro-based industry (crude palm oil and raw natural rubber), animal husbandry (pig rearing) and sewage were identified as significant water pollution sources. A total of 13,398 sources were recorded from these four activities in 1998. Sewage activities accounted for 5,665 sources (42.3%) followed by manufacturing (5,029; 37.5%), pig rearing activity (2,235; 16.7%) and agrobased industry (469; 3.5%).

Based on questionnaires returned in 1998, a total of 5,498 agro-based and manufacturing industries were identified. Out of the 16 types of manufacturing industries, the dominant industrial types were food and beverage industries with 1,158 sources constituting 21.1% of the total number, followed by chemical-based industry, 638 (11.6%), electronic and electrical industries, 452

(8.2%), electroplating and metal finishing industries, 433 (7.9%), paper industry, 409 (7.4%) and textile industry, 387 (7.0%). For the agro-based industrial sector, there were 326 (5.9%) crude palm oil mills and 143 (2.6%) raw natural rubber factories. Figure 3.4 shows the distribution of water pollution by sources.

Figure 3.5 shows the distribution of industrial water pollution sources by types. Of the 5,498 sources identified in 1998, Figure 3.6 indicates that Selangor and Johor together made up more than half of the total number of sources i.e. 1,641 (29.8%) and 1,323 (24. 1%) respectively.

In 1998, a total of 2,235 pig farms with a headcount of 2,833,503 were recorded. The pig farms were concentrated mainly in 5 States, namely Negeri Sembilan (741; 33.2%), Pulau Pinang (355, 15.9%), Perak (316, 14.1%), Selangor (293, 13.1%) and Sarawak (261, 11.7%).

The number of sewage treatment plants recorded in 1998 increased to 5,665 as compared to 4,359 plants in 1997. Figure 3.7 shows the distribution of sewage treatment plants by States. Selangor had the highest number of plants (1,471, 26.0%) followed by Perak (934, 16.5%), Johor (566, 10.0%), Negeri Sembilan (549, 9.7%) and Kedah (517, 9.1%).

Water Pollution Load

Based on data collated from questionnaires returned in 1998, the main contributors of organic pollution load were population sewage with an estimated biochemical oxygen demand (BOD) of 957.1 metric tonnes/day followed by pig rearing (BOD, 312.4 metric tonnes/day), agro-based industries (BOD, 14.1 metric tonnes/day) and manufacturing industries (BOD, 12.6 metric tonnes/day). (Figure 3.8). Selangor had the highest organic pollution load with an estimated BOD of 224.9 metric tonnes/day.

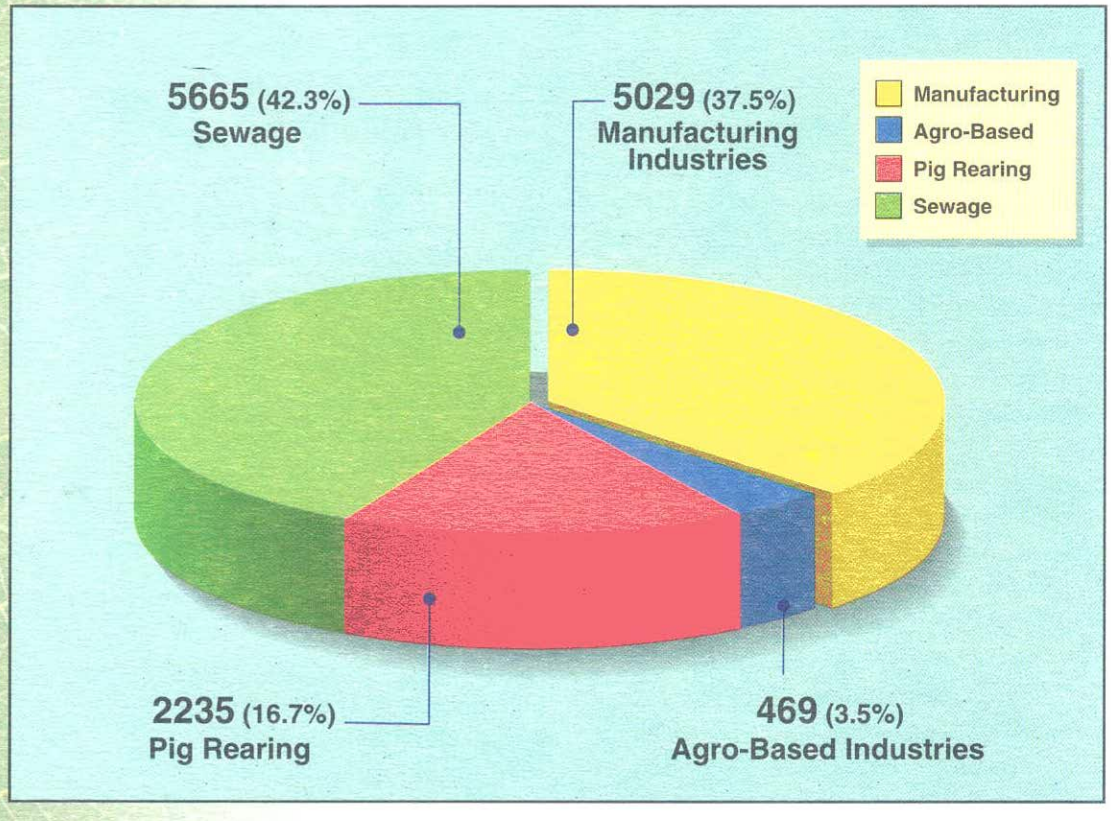


Figure 3.4 Department of Environment: Distribution of Water Pollution by Sources, 1998

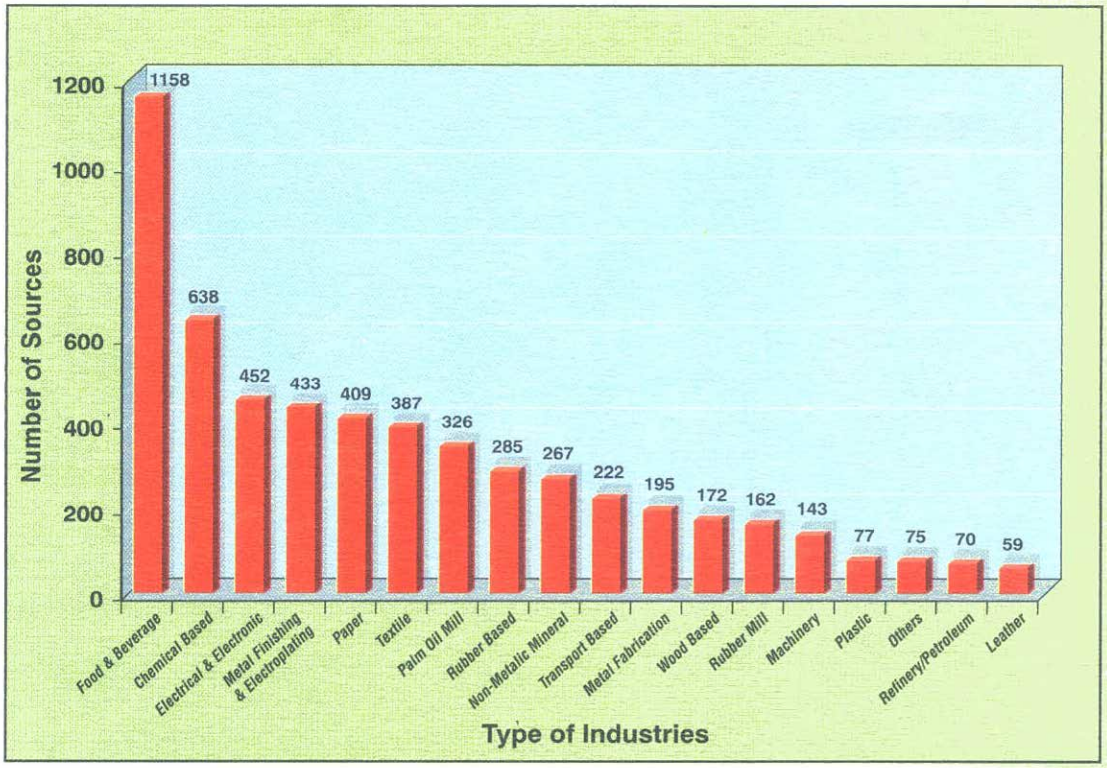


Figure 3.5 Department of Environment: Distribution of Industrial Water Pollution Sources by Types (Agro-Based Industry and Manufacturing), 1998

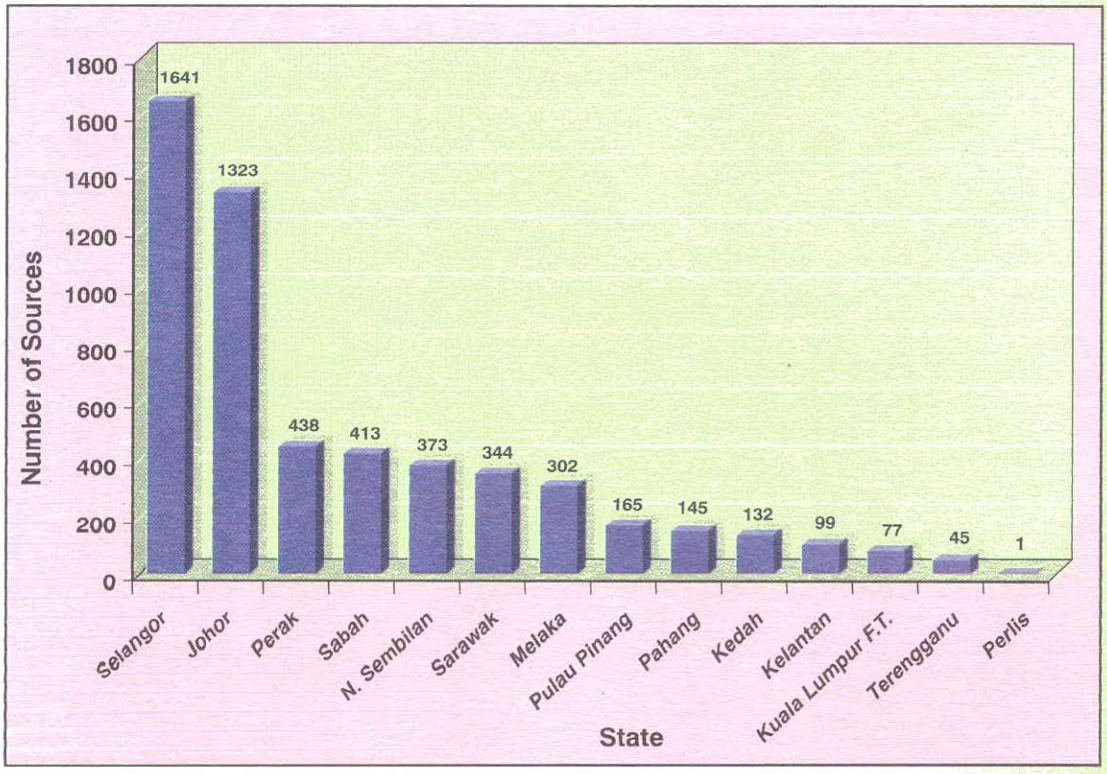


Figure 3.6 Department of Environment: Distribution of Industrial Water Pollution Sources (Agro-Based Industry and Manufacturing) By States, 1998

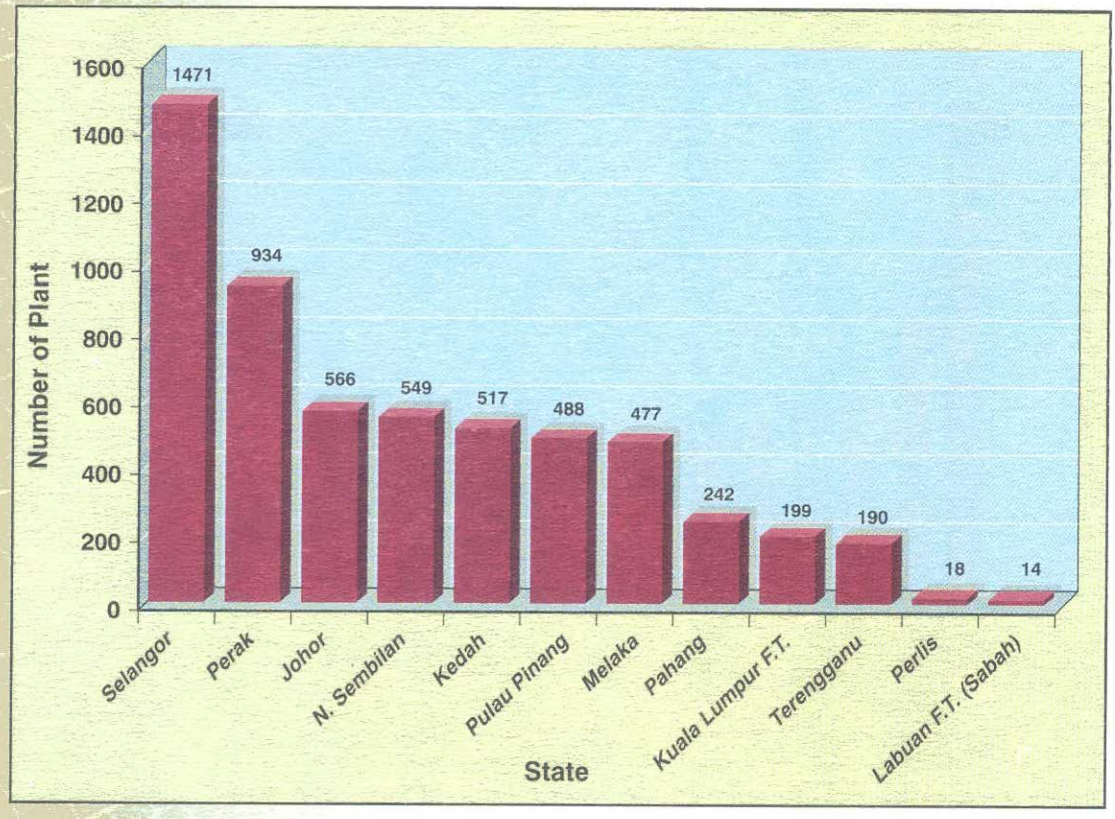


Figure 3.7 Malaysia: Distribution of Sewage Treatment Plants By States, 1998
(* Source : Indah Water Konsortium)

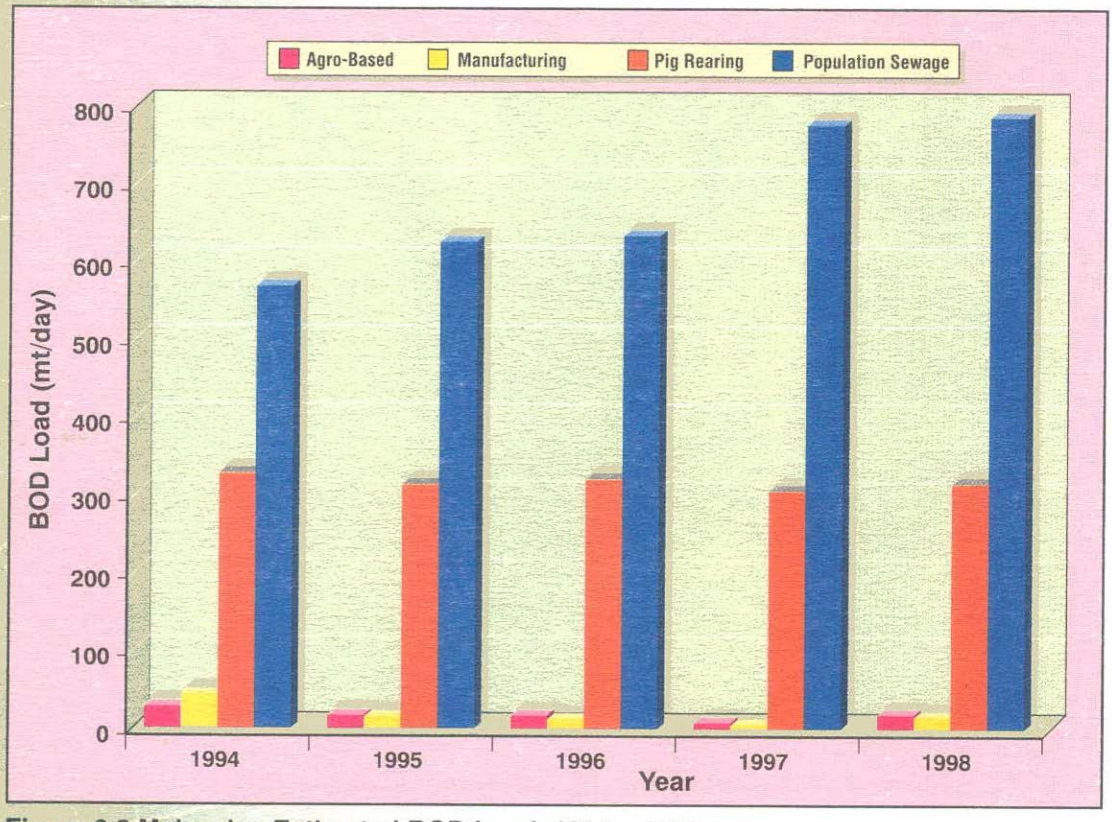


Figure 3.8 Malaysia: Estimated BOD Load, 1994 – 1998

IMPLEMENTATION OF THE MONTREAL PROTOCOL FOR PROTECTION OF OZONE LAYER

In 1998, the implementation of activities under the Montreal Protocol For the Protection of the Ozone Layer were intensified particularly to cater for the freeze of Annex A CFCs at the 1995 – 1997 average levels for Article 5 Countries which included Malaysia. Similar efforts were focused on Malaysia's CFCs and Halon phase-out commitment, to meet the target year 2000 for the manufacturing sector (aerosol, refrigerants, foam and solvent); monitoring of on-going ODS phase-out projects; and the formulation of new projects.

Other activities that were carried out throughout 1998 included regular awareness promotion through the mass media, seminars, children's painting competition, dissemination of publications, close consultations with industries and the annual Malaysia Ozone Protection Award (Table 3.1).

In addition to this, the Unit had to attend to international visitors from the Japan (Bilateral Cooperation Mission), the Multilateral Fund of the Montreal Protocol, International Implementation Agencies such as the World Bank, UNIDO, UNDP and officials from the Egyptian Ozone Unit. Such visits brought about closer interactions, sharing of technical information and experiences on completed phase-out projects as well as technical assistance on project planning and implementation of future ODS phase-out projects in Malaysia.

National Children Painting Competition: Selection of best entries for International Competition in Cairo, 1998

Table 3.1 Malaysia: ODS Phase-Out Awareness Activities, 1998

DATE	ACTIVITIES	VENUE
31 Mac 1998	Launching of the Malaysian-France Project for CFC phase-out for the electronic SMIs	Kuala Lumpur
7 May 1998	Seminar on Halon Bank	Kuala Lumpur
31 July 1998	Seminar on Halon Bank	Penang
July – August 1998	Children painting competition: Selection of best entries for competition in Cairo	Kuala Lumpur
16 September 1998	International Ozone Day, Celebrations (Talk show on RTM on CFC issues & Ozone Quiz)	Kuala Lumpur
13 October 1998	Seminar on Halon Bank	Johor Bahru
10 December 1998	Malaysia Ozone Layer Protection Award Presentation Ceremony	Petaling Jaya
10 December 1998	Seminar on Non-CFC Refrigerants	Petaling Jaya
17 December 1998	Seminar on Halon Bank	Miri

Technology Development and Phase Out projects

The Multilateral Fund of the Montreal Protocol continued to provide financial and technical assistance to Malaysia in 1998. The Executive Committee of the Montreal Protocol (EXCOM) approved 9 more projects in addition to the 100 projects and activities which had been approved since 1992. These nine projects were specific for the foam and methyl bromide sector and for extension of institutional strengthening. The total budget allocated was USD 1.3 million to phase out an additional of 83.1 ODP tons. As at December 1998, Malaysia had received about USD 30 million of which 75 % had been disbursed for 79 projects and activities (Table 3.2). About 2,799 ODP tons (64.2 %) had been phased out so far.

ODS Consumption

In 1998, the total import of ODS (Annex A, B and E) was 2652.5 MT equivalent to 0.12 kg per capital (Figure 3.9). This represented a significant decrease of 20% ODS consumption compared to the 1997 figure of 0.15kg per capita. This figure is expected to be maintained as demand for CFCs and Halon decreases (Figure 3.10). There had been no import of Halon since 1996. The import of these substances is under the control of the Ministry of International Trade and Industry, which determines the yearly allowable quota. The decreasing demand of these controlled substances is a positive indicator of the overall performance of the ODS phase-out programme in Malaysia.

Table 3.2 Malaysia: Projects and Activities Approved by the Multilateral Fund of the Montreal Protocol (as of 31st December 1998)

SECTORS	NO. OF PROJECTS/ACTIVITIES	COST (USD)
REFRIGERATION/AIRCONDITIONING (MAC/COMMERCIAL)	13	11,185,042
SOLVENT	10	2,068,729
FOAM	53	11,291,016
AEROSOL	7	2,603,063
HALON	2	922,932
SEVERAL ACTIVITIES	23	1,911,728
METHYL BROMIDE	1	5,000
TOTAL	**109**	**29,987,510***
YEAR	**NO. OF COMPLETED ACTIVITIES/ PROJECTS**	**ODS PHASED-OUT (ODP Ton)**
1993	5	150.00
1994	8	82
1995	13	348
1996	17	530.46
1997	17	1,024.8
1998	19	663.7
SUB-TOTAL	**21+(57)* =79**	**2,798.96**
	NUMBER OF ACTIVITIES/PROJECTS EXPECTED TO COMPLETE	**EXPECTED ODS TO BE PHASED-OUT (ODP Ton)**
1999	27	1,586
2000	3	355
SUB-TOTAL	**30**	**1,941**
GRAND TOTAL	**109**	**4,739.96**
AMOUNT DISBURSED USD 22.2 MILLION		

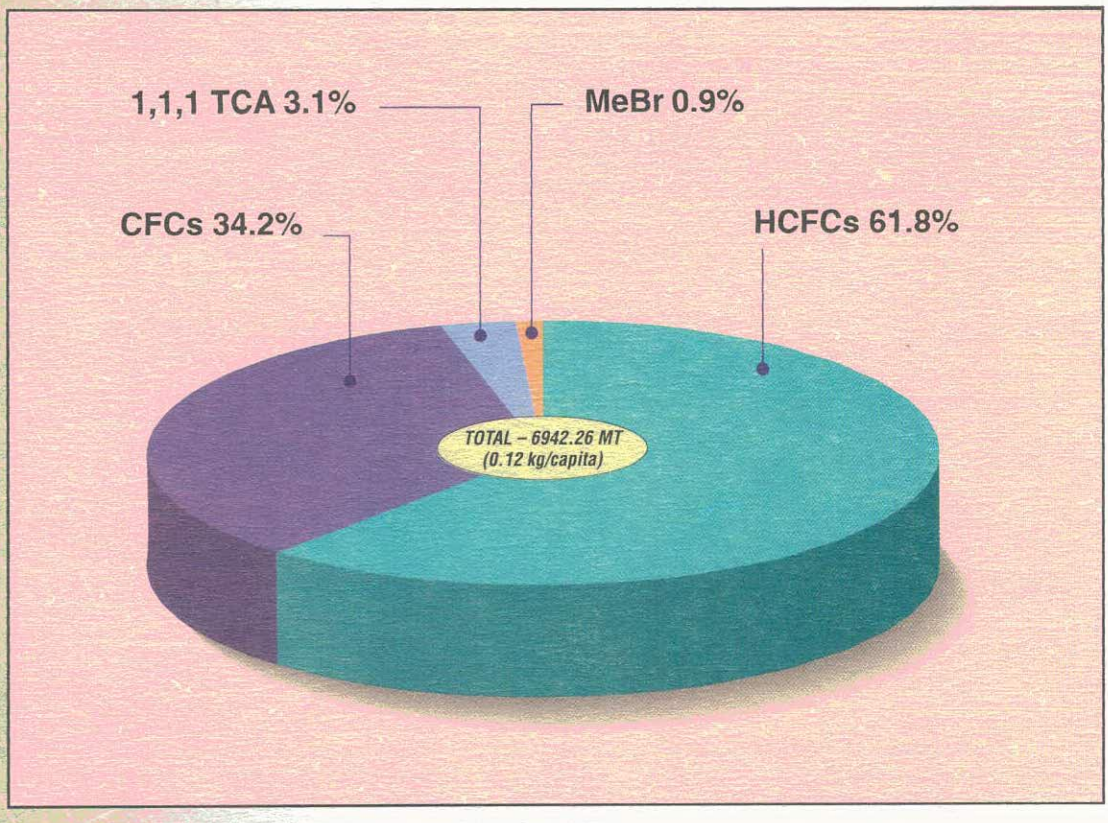


Figure 3.9 Malaysia: ODS Consumption in 1998

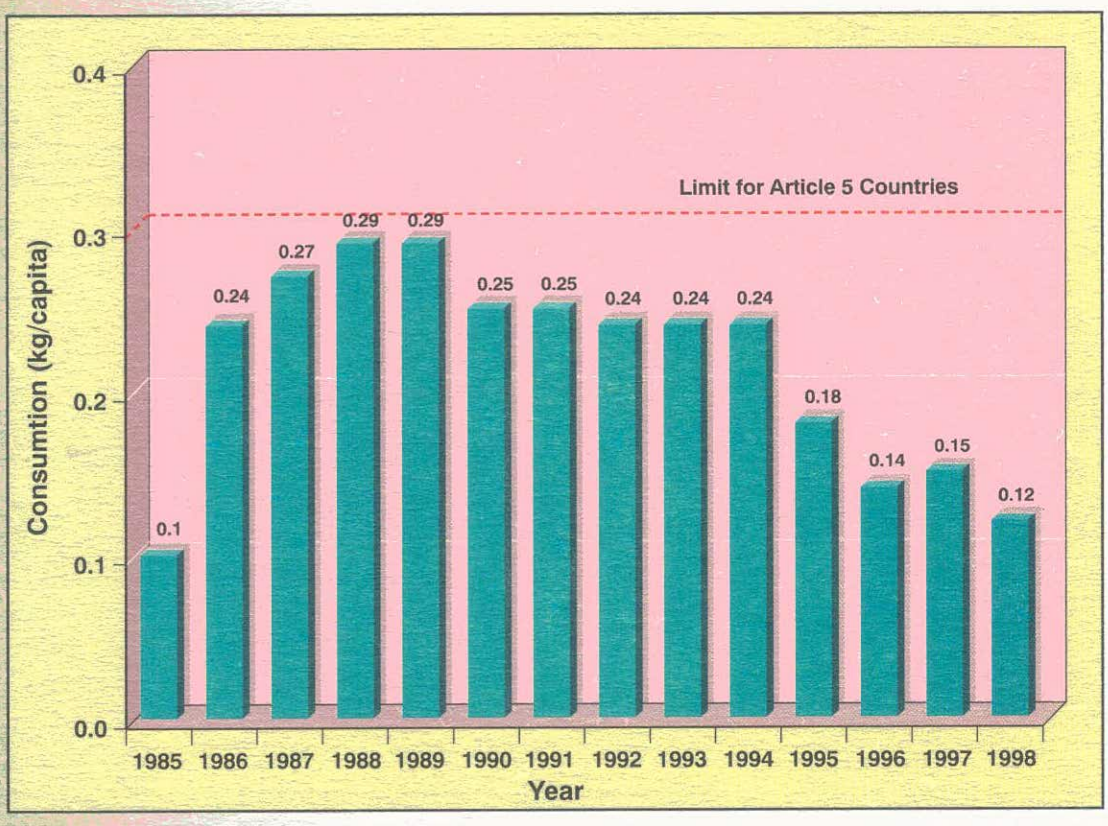


Figure 3.10 Malaysia: CFCs and Halon consumption in kg per capita, 1985 – 1998.

Chapter 4

ENVIRONMENTAL IMPACT ASSESSMENT

ENVIRONMENTAL IMPACT ASSESSMENT

Development without due consideration to the environment has resulted in degradation of land, water and air quality. The failure of development planning to take adequate account of environmental impacts led to the introduction of environmental impact assessment (EIA) in industrialised countries in the early 1970s. Malaysia amended the Environmental Quality Act in 1985 to make EIA a mandatory requirement. The Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 was gazetted on 30 September 1987 and came into force on the 1 April 1988.

After 10 years of implementing the EIA Order, there is a high degree of awareness and acceptance of the requirements of EIA. However the level of public participation is generally very low. In 1998, the number of EIA reports rejected remains high which to a certain extend reflected the poor quality of the reports submitted.

Turfing as Mitigation Measure During Construction of Road at Pos Selim, Perak.

As mathematical and computer modelling are increasingly being utilized to predict impacts there is a need to develop expertise in understanding concepts and construction of such models. Towards this end a training workshop was conducted to provide EIA officers with knowledge on the use of these models such as water quality, noise, hydraulic and soil erosion, its applicability and limitations.

There was a substantial reduction in the number of EIA reports received by DOE in 1998. However there was an increase in reports pertaining to activity 18(a)(ii) i.e construction of recovery plant (off-site).

EIA Awareness

Project proponents are increasingly aware of the usefulness of EIA as a planning tool. In 1998, 21 EIA reports were received for activities that were not subjected to the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987. These include EIAs for mixed development and housing projects (14), undersea cable projects (2), water supply (1), aquaculture (1), oil pipeline construction (1), agro-park development (1) and a steel rolling mill (1).

Quality of EIA Reports

In 1998, 237 EIA reports were received for review. Out of this total, 40 percent were approved after review and 20 per cent rejected. The remaining 40 percent of reports were only approved after additional information were provided by either the project proponents or their consultants. Three reports had to be rejected even after additional information were submitted due to poor report quality such as inadequate mitigating measures to prevent or reduce the impact on the environment.

Public Participation

Public participation is essential in the EIA process. Other than providing the project proponents useful feedback, it enhanced the EIA process by increasing demands for accountability of EIA reviewers, practitioners, proponents and decision-makers. As highlighted in the Handbook of Environmental Impact Assessment Guidelines, public participation in the environmental impact assessment procedure is an aid to project planning. It enables the project proponent to:

- monitor community needs and ensure that the direction or emphasis of his project continues to satisfy those needs
- identify both material and psychological impacts of the projects on the community
- measure and promote the social acceptance of the project in the community and avoid costly modifications or abandonment of the project at a later stage
- monitor changing environmental values in the community.
- obtain additional environmental information known to the local population.

Judging by the respond to the detailed EIA reports in 1998, the level of public participation was still very low. Out of the 12 detailed EIA reports processed, a total of only 13 written comments from the public were received.

To further improve the public participation process, the Department would continue to announce the display of EIA reports for public viewing on the DOE homepage.

EIA Specific Guidelines

Specific EIA Guidelines were prepared to supplement the Handbook of Environmental Impact Assessment Guidelines first published in 1987 and revised in 1995. Through the use of these specific guidelines, it is hoped that EIA consultants, project proponents and operators would understand better the basic requirements, the selection of alternatives, mitigation measures as well as post-EIA compliance. The Department published two more EIA guidelines in 1998 for Land Reclamation and Forestry.

ISO 9002

In striving to improve the EIA processing procedure and in response to the Government's call for excellence in the Civil Service, work was initiated to document the steps in the processing of EIA reports with the aim of achieving ISO 9002 certification.

EIA REPORTS PROCESSED

There was a 43 per cent drop in the number of EIA reports received for review in 1998 as compared to 1997. A total of 216 reports were received compared to 419 in 1997 (Figure 4.1). This could be due to the economic slowdown resulting in project proponents putting projects on hold. However the number of detailed EIA reports increased to 12. Figure 4.2 to Figure 4.4 show number of EIA reports received by State; activities and types.

Preliminary Reports

The most number of reports received in 1998 were for housing, (totalling 37) a drastic drop from 96 in 1997; next was quarrying (32 reports) and infrastructure development (31 reports). The number of scheduled waste

projects such as for used oil, solvents, dross and spent etchants were relatively higher, numbering 30. No EIA report was received for airports, drainage and irrigation, and transportation activities.

Detailed Reports

The number of detailed EIA reports received in 1998 was 12, an increase of 2 from 1997. These were:

- Macro EIA for coastal reclamation along Kedah coast
- Proposed municipal solid wastes transfer stations in Kuala Lumpur and Selangor
- Macro EIA for coastal reclamation in Melaka
- Integrated cement plant in Kanthan, Perak
- Integrated cement plant in Kanthan, Perak (resubmission)
- Macro EIA for development of former Bukit Seputih Forest Reserves, Selangor
- Integrated cement plant in Rawang, Selangor
- Integrated steel mill in Pulau Indah, Selangor
- Recycling paper mill in Mukim Ijok, Selangor
- Thermal waste treatment plant in Kuala Langat, Selangor
- Olefins and derivatives plant in Kerteh, Terengganu; and
- Recovery of scheduled waste in Teluk Kalong, Terengganu.

Out of the 12 reports reviewed by the panel of experts, 4 reports were approved and 5 rejected. The remaining 3 reports which were submitted at the end of the year were assessed in 1999.

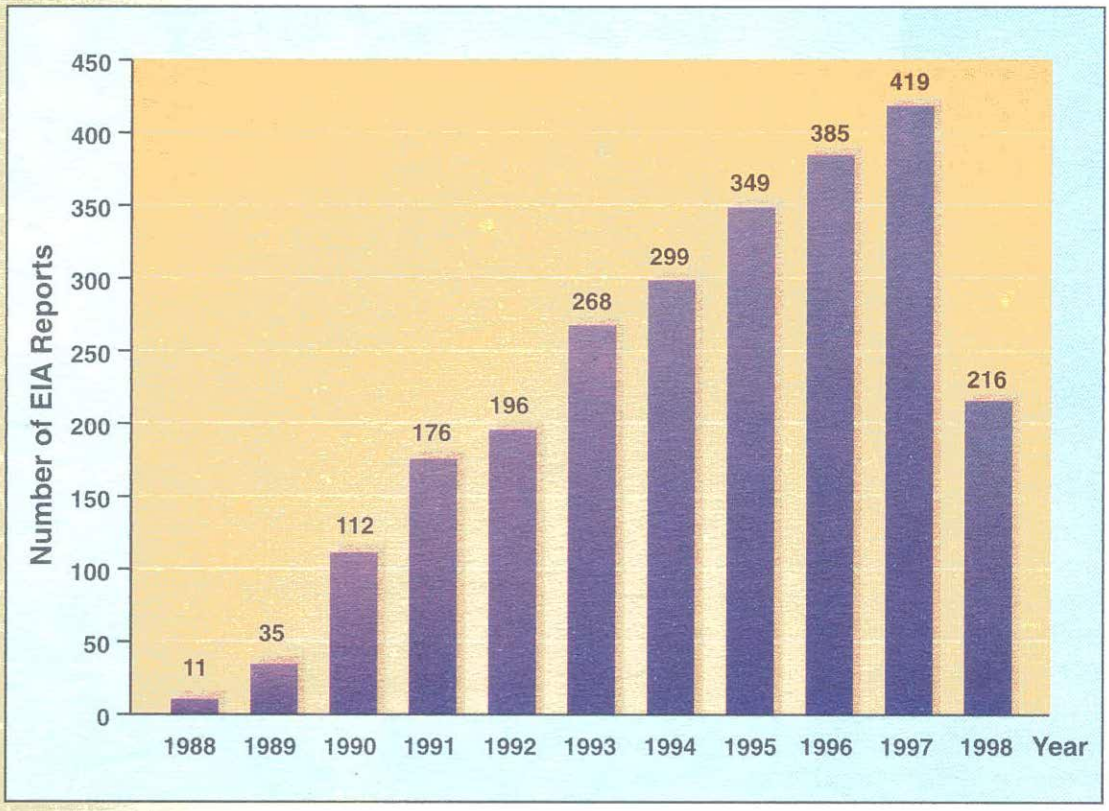


Figure 4.1. Department of Environment: Number of EIA Reports Received, 1988–1998

Silt traps constructed for the Putrajaya Federal Development Project.

Enforcement of EIA projects

In 1998 the Department stepped up enforcement visits for EIA approved projects. From these visits it was found that project proponents generally complied with the conditions of approval. However there were areas that were lacking especially during the earthwork stage. The main problems at this stage of development were inadequate numbers of silt traps, poor maintenance of silt traps and drainage system, no proper turfing of exposed surfaces and slopes and improper disposal of solid wastes. Another common violation is the non-submission of project status and monitoring reports. It was also found that some contractors were unaware of the approval conditions resulting in non-compliance. There were also project proponents who lack commitment in implementing environmental improvement measures such as setting up environmental management unit or appointing environmental officers to monitor and implement the environmental requirements for the projects.

On the whole industrial projects showed better compliance to the EIA approval conditions. Most non-compliance arose from land development activities especially during earthworks.

From the various enforcement visits conducted, 231 notices were issued and 11 cases taken to court for non-compliance of EIA conditions.

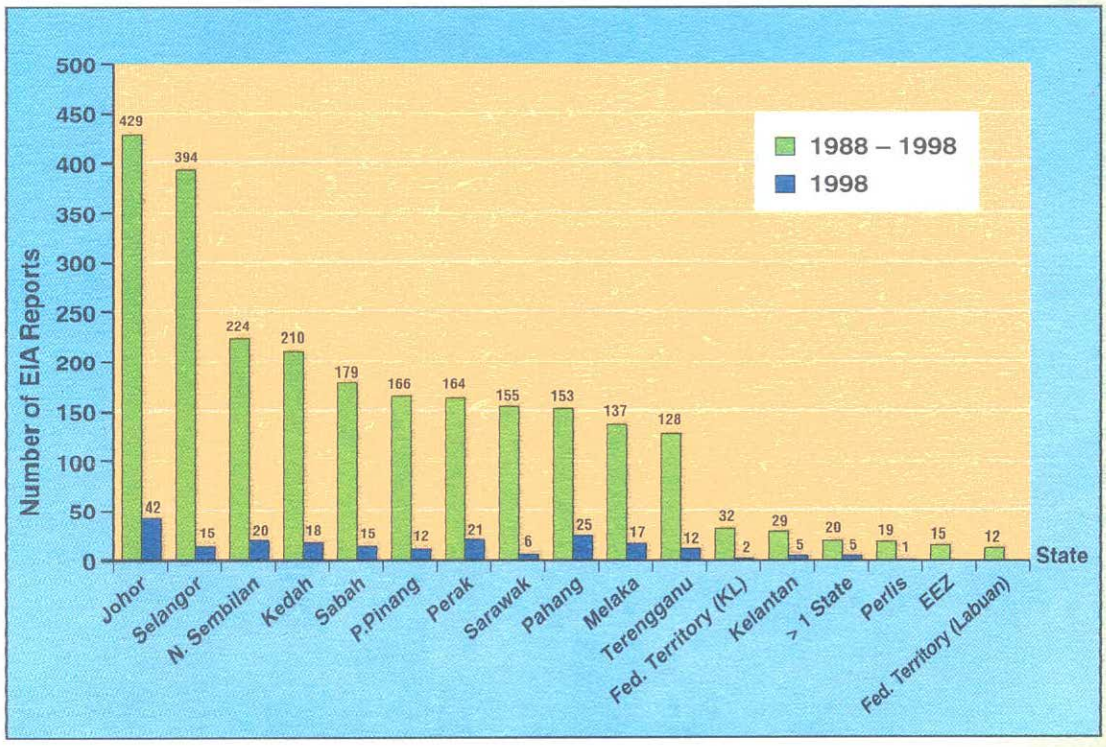


Figure 4.2. Department of Environment: Distribution of EIA Reports by States, 1988–1998

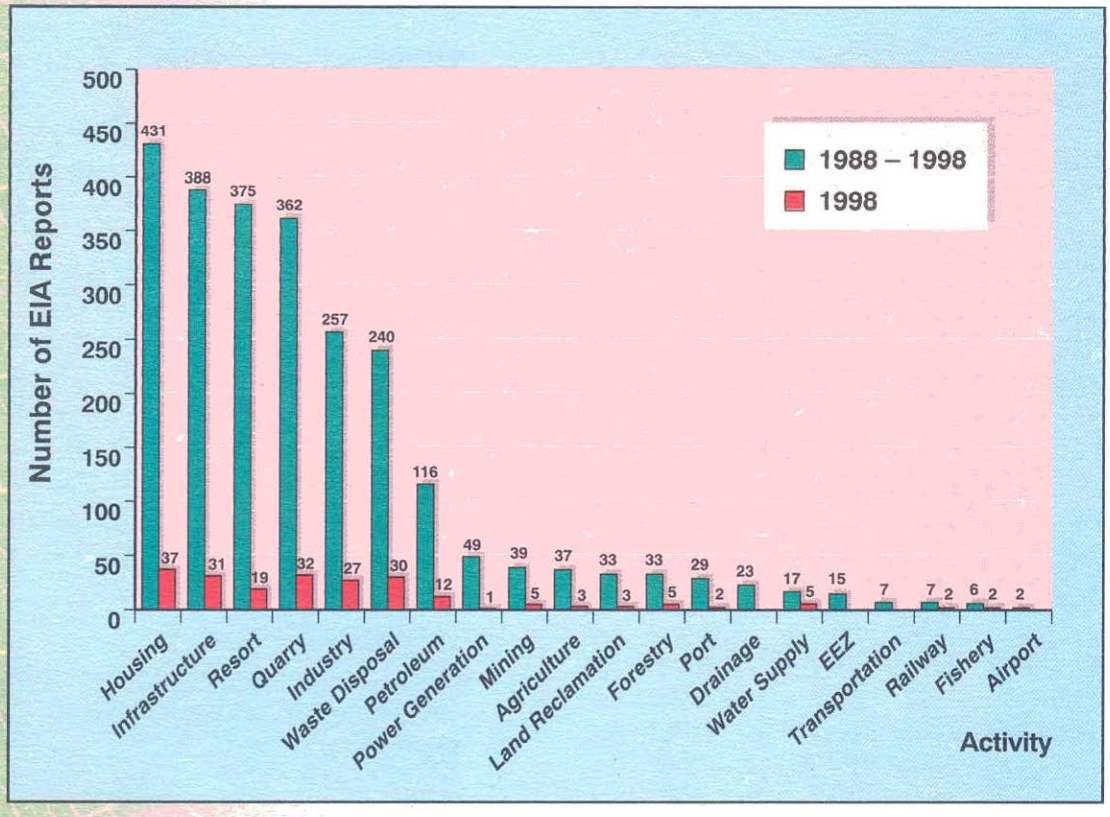


Figure 4.3. Department of Environment: Number of EIA Reports by Prescribed Activities 1988–1998

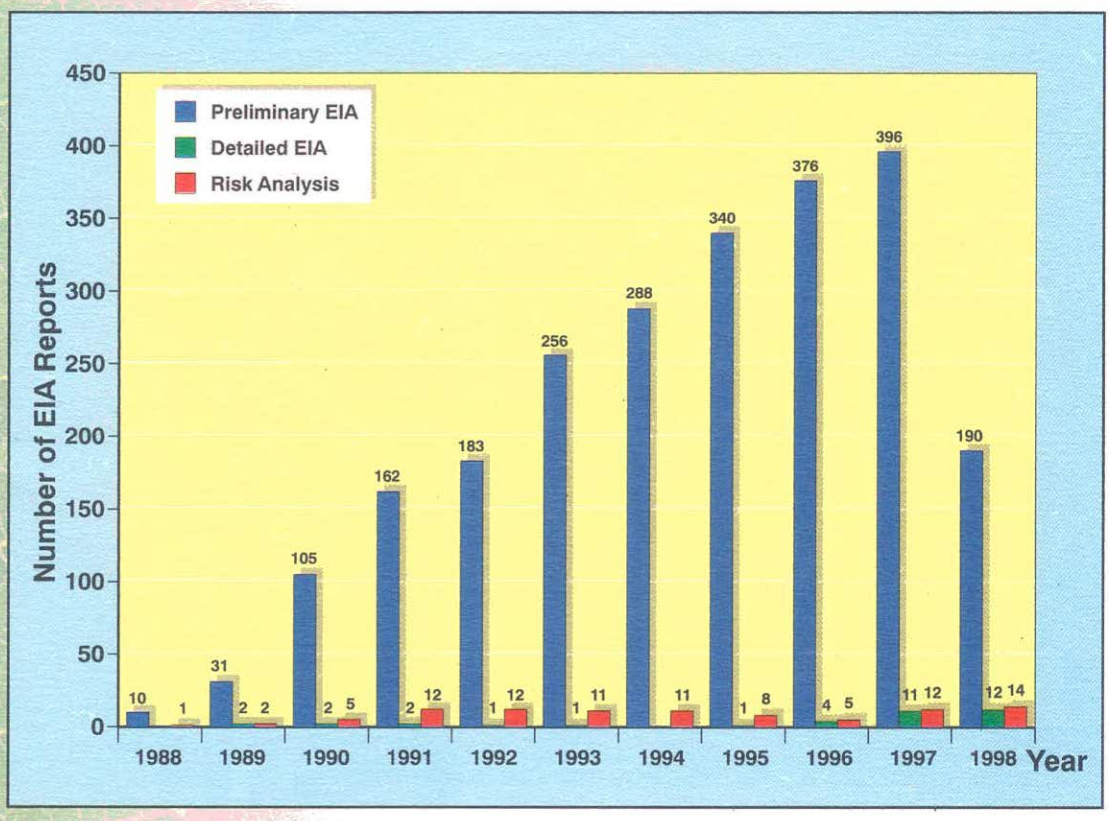


Figure 4.4. Department of Environment: Type of EIA Reports, 1988–1998

ENVIRONMENT INPUT TO DEVELOPMENT PLANNING

The Department continues to provide environmental input to development plans, policies and studies initiated by other agencies. These included:

- Kelantan River Flood Mitigation Plan
- Modernisation of Irrigation Water Management
- ADB Special Study on Environmental and Social Impacts of Hydropower Projects
- Penang Environmental Conservation Strategy
- Perspective Plan Study in Klang Valley Region
- Development AGIS for the Klang Valley
- Planning guidelines by the Town and Country Planning Department

Geographical Information System (GIS)

In 1998, GIS technology was utilised to capture, store, retrieve and analyses the monitoring data of two projects, namely the Island Marine Water Quality Monitoring and the Development of Water Quality Criteria and Standards (Phase V). These projects are still on-going. The GIS system will be fully commissioned at the end of 1999.

In addition, technical inputs on the development of GIS for the Klang Valley (AGISWLK), were forwarded to the Klang Valley Planning Authority. The integration of various databases would further enhanced and complement the GIS capabilities of the Department.

Apart from the above activities, efforts were made to update existing digital databases, mainly EIA projects in Perak, Pulau Pinang, Negeri Sembilan, Melaka and Langkawi. Thematic maps were also produced in support of the Department's activities. These were:

Turfing as a mitigation measure during construction of road at Pos Selim, Perak.

- daily regional surface winds and observed smoke/haze/hot spots over cloud-free areas issued by the ASEAN Meterological Centre.
- EIA projects in Langkawi and Pahang
- Air and water monitoring stations in Pahang and Perak

The GIS was also extended to the oil spill response support system for Negeri Sembilan under the Coastal Zone Environmental and Resources Management Project (CZERMP). This work was supported by the ASEAN-Australia Economic Cooperation Programme and was presented to the 3rd Steering Committee Meeting held in Singapore.

Project Pre-Siting Evaluation

Project pre-siting evaluation is carried out to provide feedback to the approving authorities to enable integration of environmental considerations into development planning. It is undertaken for projects that are not subjected to the EIA Order. The work is normally conducted by DOE State Offices which include investigation to determine site suitability and compatibility to the surrounding land use. In

1998 there was a decrease in the number of applications for pre-siting evaluation due to the economic slowndown. A total of 5892 applications were received compared to 7931 applications in 1997. (Figure 4.5)

Approval of Wastewater Treatment Plant and Fuel Burning Equipment

The construction of wastewater treatment plants and installations of fuel burning equipment require prior written permission from the Director-General of Environmental Quality as stipulated under the Environmental Quality Act 1974 and Regulations made under it.

In 1998, the Department received 615 applications for the construction of wastewater treatment plants. With the commissioning of these plants, the volume of wastewater capable of being treated by these facilities was estimated to be 72,135 m3/day compared to 74,408.5 m3/day in 1997.

There was a slight increase in the number of fuel burning equipment applications processed in 1998. Altogether 1484 applications were received involving the consumption of an additional 129 tonnes/day of liquid fuel and 257 tonnes/day of solid fuel.

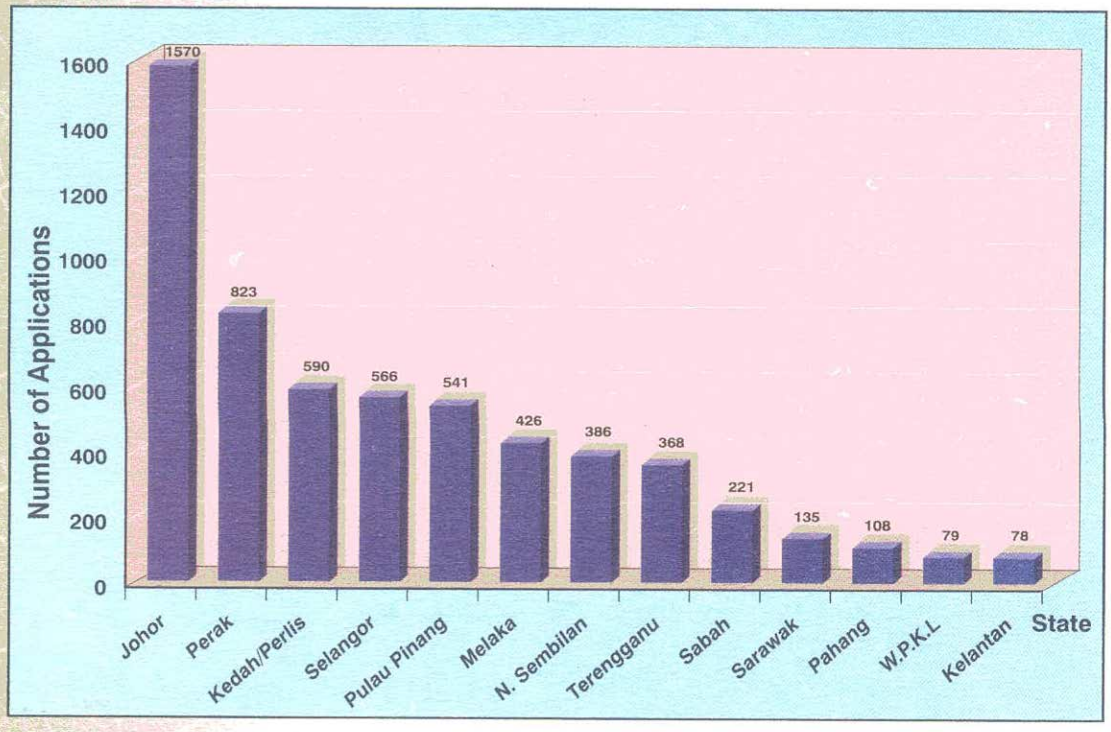


Figure 4.5. Department of Environment: Pre-siting Evaluation of Development Project by States, 1998

DOE ADVISORY SERVICES CENTRE AT MIDA

The Advisory Centre has been set up to facilitate investors to obtain approvals for manufacturing licences, tax incentives and provide general advice on environmental requirements. Table 4.1 shows the number of investments approved for the 1997 – 1998 period. It was estimated that RM3.6million were spent on pollution control and RM150 million spent on environmental protection measures.

Industry	Number		Potential Employment		Proposed Called-up Capital (RM Million)		Loan (RM Million)		Total Proposed Capital Investment (RM Million)	
	1998	1997	1998	1997	1998	1997	1998	1997	1998	1997
Petroleum Products (Inc. Petrochemicals)	10	7	1,269	1,349	1,949.0	1,694.7	4,485.8	4,856.9	6,434.8	6,551.6
Chemicals & Chemical Products	51	50	2,975	2,576	793.3	419.4	5,119.5	903.3	5,912.8	1,322.7
Basic Metal Products	49	39	3,472	3,139	1,286.6	1,112.6	1,574.0	2,649.1	2,860.6	3,761.7
Electrical & Electronic Products	193	190	26,989	24,738	346.0	2,277.2	2,064,2	3,945.5	2,410.2	6,222.7
Transport Equipment	57	48	4,450	7,476	502.4	771.3	1,171.4	255.5	1,673.8	1,026.8
Wood & Wood Products	56	31	12,679	4,230	294.7	120.7	805.2	357.4	1,099.9	478.1
Non-Metallic Mineral Products	57	62	2,451	3,366	304.6	410.6	768.6	1,281.6	1,073.2	1,629.2
Food Manufacturing	43	54	3,467	3,581	214.0	184.8	610.3	356.3	824.3	541.1
Fabricated Metal Products	50	48	3,677	3,696	275.0	326.4	537.9	674.3	812.9	1,000.7
Plastic Products	55	41	4,189	2,743	189.9	168.5	533.9	447.3	723.8	615.8
Textiles & Textile Products	35	30	4,218	2,156	218.9	95.6	481.1	181.4	700.0	277.0
Paper, Printing & Publishing	22	24	2,305	1,855	167.7	174.4	397.5	639.1	565.2	813.5
Machinery Manufacturing	69	49	2,714	2,976	183.6	250.5	246.6	439.4	430.2	689,9
Beverages & Tobacco	12	8	907	440	47.7	10.2	227.5	208.4	273.2	218.6
Rubber Products	28	19	3,076	2,789	58.1	44.9	150.3	240.1	208.4	285.0
Furniture & Fixtures	33	35	3,542	4,597	77.9	78.7	103.9	187.4	181.8	266.1
Scientific & Measuring Equipment	6	6	201	325	18.5	3.5	8.8	4.7	27.3	8.2
Leather & Leather Products	3	1	213	137	6.7	1.0	3.8	5.7	10.5	6.7
Natural Gas	1	–	–	–	–	–	109.7	–	109.7	0.0
Miscellaneous	14	17	863	1,252	23.5	40.1	49.5	65.1	73.0	105.2
	844	**759**	**83,657**	**73,421**	**6,956.1**	**1,185.1**	**19,449.5**	**17,635.5**	**26,405.6**	**25,820.6**

TABLE 4.1 IINDUSTRIAL PROJECTS APPROVED BY MIDA, 1997-1998
Source: MIDA Annual Press Conference on The Performance of The Manufacturing Sector, 1998

Chapter 5

ENVIRONMENTAL EDUCATION, PUBLIC AWARENESS AND INFORMATION DISSEMINATION

INTRODUCTION

The promotion of environmental awareness has always been a priority of the Department of Environment in order to complement efforts towards enhancement and strengthening of sustainable environmental management. Environmental education is also crucial as a long term strategy to increase public awareness on the importance of environmental protection. Since DOEís establishment in 1975, the promotion of environmental awareness over the past two decades had been progressively intensified. The Rio Summit in Environment and Development in 1992 added further impetus to this effort.

PROMOTING EDUCATION, PUBLIC AWARENESS AND INFORMATION DISSEMINATION

Promotion of Environmental Awareness (extracurricular school activities)

In the Seventh Malaysian Plan (1996 – 2000) emphasis has been given to the importance of promoting environmental awareness on sustainable development. At the school level, various environmental protection and conservation activities have been introduced. Among the initiatives in 1998 were:

Wira Alam

Wira Alam is a unique project initiated by DOE in collaboration with the Malaysian Nature Society (MNS) for students of 10 to 16 years. It emphasizes on environmental awareness and commitment at the school level and provides an opportunity for students to undertake individual or collective environmental activities. The project was jointly launched by YB Dato' Sri Mohd. Najib Hj Abdul Razak, the Minister of Education and YB Datuk Law Hieng Ding, the Minister of Science, Technology and the Environment on 5 June 1998 in conjunction with World Environment Day 1998.

The project, the first of its kind for Malaysian school children, consists of three activity booklets for different levels of achievements, namely *Wira Diri*, *Wira Komuniti* and *Wira Alam*. At each stage, the participants are expected to undertake activities that are environmentally-friendly, with emphasis on individual involvement and commitment (Wira Diri); community involvement such as the school community (Wira Komuniti); and outside school activities (Wira Alam). The students will be guided and assisted by their respective school teachers and advisers of Nature Clubs in schools. Up till the end of 1998, 20 schools had registered for the project involving 1767 students. The project is expected to be further expanded in 1999.

Environmental Awareness Camps

In 1998, a total number of 26 environmental camps participated by 1080 students were conducted throughout the country by DOE State Offices with the cooperation of NGOs and the private sector. Four of the camps were held with active assistance from the Golden Hope Plantation Group, Indah Water Konsortium (IWK), Motorola Sdn. Bhd and Majlis Perbandaran Seberang Perai. To date, 3240 students have participated in all 80 camps organized all over Malaysia by DOE since 1994. The camps are based on seven ecosystems: River, Marine, Forest, Highland, Organic Farming, Urban and Plantation Ecosystem. Specific instruction modules have been prepared for each ecosystem.

Promotion of Environmental Awareness (Competitions)

■ *PRIAS (Environment Scrap Book Competition)*

The PRIAS project launched in 1992 is an annual programme jointly organised by the Department of Environment, the Ministry of Education, the Malaysian Science Association with support from Tetra-Pak Sdn.Bhd. for Form Four and Five students throughout Malaysia. Each year schools are invited to send in entries in the form of hands-on participation in environmental activities to showcase their understanding, awareness and commitment towards environmental conservation and protection. So far 2050 schools have participated and benefited from the programme. The winning entries for 1998 were:

- Sekolah Menengah Kebangsaan Lutong, Miri, Sarawak
- Sekolah Menengah Kebangsaan Gajah Berang, Melaka
- Sekolah Menengah Kebangsaan Jalan Damai, Bukit Mertajam, Pulau Pinang

■ *Inter-Varsity Environmental Debate*

For eight consecutive years since 1991, DOE successfully organised the annual Inter-Varsity Environmental Debate involving ten public institutions of higher learning in Malaysia. The 8th Debate was held at Universiti Kebangsaan Malaysia on 19-22 July 1998. All ten institutions of higher learning took part and the winning team came from the University of Malaya represented by Mohd. Azlin Kamuruzzaman, Shazeera Ahmad Zawawi, Zainul Azizi Md. Zin and Hanif Osman. The team received the Minister of Science, Technology and the Environment Challenge Trophy and a cash prize of RM3,000.00, while Ms. Shazeera Ahmad Zawawi from University of Malaya was chosen the best speaker for the Director General of Environment Trophy and a cash prize of RM300.00.

■ *Environmental Poetry Competition*

An Environmental Poetry Recital Competition was held in conjunction with the Environment Week in Kuala Terengganu on 21 October 1998. It was the second poetry competition organised by DOE which attracted more than a thousands entries. The winner for the above 18 years old category was Ms. Amelia Abdul Malek from Perak who received RM1,000.00 and the winner for the below 18 category was Ms. Shakirah Rashid also from Perak, who received RM 800.00.

Promotion of Environmental Awareness (Educational Materials)

Environmental Educational Materials

In 1998, various types of educational materials such as posters, videos, bulletins, fact-sheets, environmental songs were developed and distributed widely to schools, institutions, and government agencies throughout Malaysia.

The winning novels in a novel writing competition organised by DOE and Utusan Malaysia entitled "*Selembut Arusmu*", "*Pengembaraan Melalui Masa*" and "*Hijau Kasihnya*" were put into print for distribution to schools under the "Know Your Environment" series. In collaboration with Institut Kefahaman Islam Malaysia (IKIM), a book "*Alam Sekitar, Anugerah Tuhan*" which was also translated into English entitled "The Environment, A Gift of God" was published in 1998.

Various types of posters relating to Air Pollution, Water and Noise Pollution were also printed for circulation.

An environmental video clip was also produced based on a song entitled "Dayung" by Dr. Wan Zawawi Ibrahim. A compact disc containing environmental songs by local Malaysian singers was also produced.

Promotion of Public Awareness (Public Campaigns)

Malaysia Environment Week (MASM)

The Malaysia Environment Week (MASM) is the premier environmental event for Malaysia which falls on 21 – 27 October each year. The 1998 national-level celebrations were officially launched by the Menteri Besar of Terengganu, YAB Dato' Seri Amar DiRaja Tan Sri Wan Mokhtar Bin Ahmad on 21 October 1998 at the Terengganu State Stadium. The official 1998 MASM theme was 'Cintai Alam, Hargai Kehidupan'. Among the dignitaries present were the Minister of Science, Technology and the Environment, the Deputy Minister, State Executive Council Members responsible for environmental affairs, Environmental Quality Council Members, H.E. Mr. Chitsaka Chipaziwa, High Commissioner of Zimbabwe and representatives of ASEAN Diplomatic Missions in Malaysia. Throughout the week, various environmental-themed activities such as seminars, "gotong-royong", beach clean-up, tree-planting campaigns and enviro-camps were conducted.

Promotion of Environmental Awareness (Mass Media)

Throughout the year, interactive sessions with the electronic media took place on "Global" (TV2), Malaysia Hari Ini (TV3), Selamat Pagi Malaysia (TV1) "Al-Kuliyyah" (TV3), as well as frequent interviews by the print media. Environmental awareness quizzes were regularly aired on Thursday afternoons over Radio Malaysia Channel One.

Environmental Awards and Recognition.

Langkawi Award

The 1998 Langkawi Award, the most prestigious national environmental award for individual environmental excellence, was given to Prof. Dato' Dr. Zakri A Hamid of Universiti Kebangsaan Malaysia in recognition of his outstanding contribution to bio-diversity and conservation.

Launching of Malaysia Environmental Week, 1998 (MASM) by the Rt. Honourable Chief Minister of Terengganu at Kuala Terengganu.

Malaysian Ozone Layer Protection Award (MOLPA)

The MOLPA awards for 1998 were given to 15 individuals and industries in recognition of their achievements for conversion to non-CFC processes and adoption of CFC-free technologies.

Environmental Journalism Award

DOE was actively involved in the 1998 ICI/CCM Journalism Award. The award, first launched in 1992, has been introduced to give recognition to balanced and responsible environmental reporting as well as to raise public

The Eight Langkawi Award Recipient, Prof. Dato' Dr. Zakri bin A Hamid.

awareness and concern for environmental issues affecting the nation and the people. 146 entries were received for three categories: print, electronic and photo-journalism. For the English and Chinese categories, the grand prizes were won by a team from The Star for its 'Flow of Life' and Mr. Lee Kian Kiong of China Press for his article 'The Water Crisis'. The special mention prizes were won by the vernacular Berita Harian, Utusan Malaysia and Tamil Nesan. The winners received their prizes from Y.B. Datuk Law Hieng Ding at a special ceremony in Kuala Lumpur on 2 November 1998.

■ Focal point for International Environmental Award

DOE also served as the focal point and local coordinator for several international environment awards such as the Sasakawa Award, the Biwako Award, the Tyler Award, the Dubai Award and the Blue Planet Award.

Promotion of Environmental Awareness (International Cooperation)

■ *Junior Eco-Clubs in Japan*

The 1998 Asian Junior Eco Club Conference in Shizuoka, Japan, was attended by a Malaysian team led by Ms. Loke Siew Yean and Tunku Khalkausar Tunku Fathi of DOE, Mr. A.Lasal from World Wide Fund for Nature Malaysia and 2 selected school children, namely Neoh Hor Kee from Penang and Hafizah Ismail from Negeri Sembilan.

■ *UNEP Young Environmental Envoys Project*

DOE facilitated the participation of Mr. Armizan Mohd. Ali, a 3rd Year Law student of International Islamic University, Malaysia in the UNEP Young Environmental Envoys Project in Australia between 23 November – 1 December 1998. Malaysian Airline sponsored the round trip ticket to Bangkok and UNEP sponsored the round trip from Bangkok to Australia.

■ ASEAN Working Group on Environmental Information, Public Awareness and Education

DOE participated at the 8th Meeting of the ASEAN Working Group on Environmental Information, Public Awareness and Education at Bandar Seri Begawan, Brunei Darulssallam on 11-12 September 1998. The meeting discussed and formulated programme activities for promoting environmental education and awareness within ASEAN for approval of ASOEN and ASEAN Ministers of Environment

2nd Junior Eco-Club Asia Conference at Shizuoka, Japan, 17 – 18 January 1998.

Presentation by Mr. Neoh Hor Kee and Ms. Hafizah Ismail at the 2nd Junior Eco-Club Conference, Shizuoka, Japan.

ENVIRONMENTAL INFORMATION

Publications

In 1998, various types of environmental publications were printed for public dissemination as shown Table 5.1. Between 1990–1998 environmental publications were distributed to various categories of readers (Figure 5.1).

From the experience of the 1997 haze episode, steps were taken in 1998 to produce large quantities of booklets, pamphlets and brochures for public information on open burning, air pollution and steps to be taken to reduce air pollution. The pamphlets and brochures were distributed to local communities, police stations, clinics, schools and public places in 6 languages: Bahasa Malaysia, English, Mandarin, Tamil, Kadazan and Iban.

Environmental Information Dissemination

A total of 2221 requests for environmental information were received in 1998 (Figure 5.2). The highest percentage of queries came from library users, followed by letters/emails and telephone calls and through INFOTERRA (Figure 5.3). Such requests for information came from various groups, of which students made up the largest group.

International Referral System for Sources of Environmental Information (INFOTERRA)

INFOTERRA is the global environmental information exchange network of the United Nations Environment Programme.

In 1998, a total of 35 queries were received and processed through the Malaysian INFOTERRA, of which 33 came from Canada, Taiwan, Thailand, Pakistan, Singapore, United Kingdom, Japan, Denmark, India, Hong Kong, Germany, Korea, Kenya, Israel and United States of America. The information sought pertained to urbanization, waste management, air quality, air pollution, solid waste management, wastewater treatment, environmental law, biological diversity, environmentally sound technologies, plastic waste recycling, forestry and resource management, industrial effluent management, environmental policy, eco-labeling, wildlife management and open burning.

DOE Publications.

Table 5.1 Department of Environment: List of Publications, 1998

No.	Title
1.	Fact Sheets (About Our World): ● Marine Ecosystem ● Soil Erosion ● Wetlands ● Forests ● Waste ● Acid Rain ● Air Pollution
2.	Pamphlets: ● Open Burning ● Stop Open Burning ● Keeping Our Air Clean ● Effects of Air Pollution
3.	Brochure: ● 'Jerebu' / Haze
4.	Booklet: ● Air Pollutant Index (API)
5.	Environmental Quality Report 1997
6.	Alam Sekitar, Anugerah Tuhan (The Environment, A Gift of God)
7.	Quarterly Magazines: ● ERA Hijau ● IMPAK
8.	EIA Guidelines: ● Forestry ● Land Reclamation ● Petroleum Industries
9.	Children book : 'Siri Kenali Alam Sekitar' ● Selembut Arusmu ● Pengembaraan Melalui Masa ● Hijau Kasihnya

Enviro-Library Services

By the end of 1998, 30,883 reference materials were catalogued into the Columbia Library System. These included books, reports, seminar papers as well as working papers produced by DOE. Local press coverage of environmental issues increased further compared to the previous year (Figure 5.4). These news reports can be made available for reference through the DOCUMAS computerization system.

Figure 5.5 shows the number of library users since its opening in 1983; 80% of which are students (Figure 5.6), an indication of increasing environmental awareness among students at secondary school level and institutions of higher learning.

Environmental Briefings

Local and foreign visitors to DOE are received and attended to by officers of the Information Services Unit. In 1998, 20 briefings were given to visitors from Hong Kong, Denmark and Japan (APEC Environmental Information Exchange Group) and from secondary schools and institutions of higher learning.

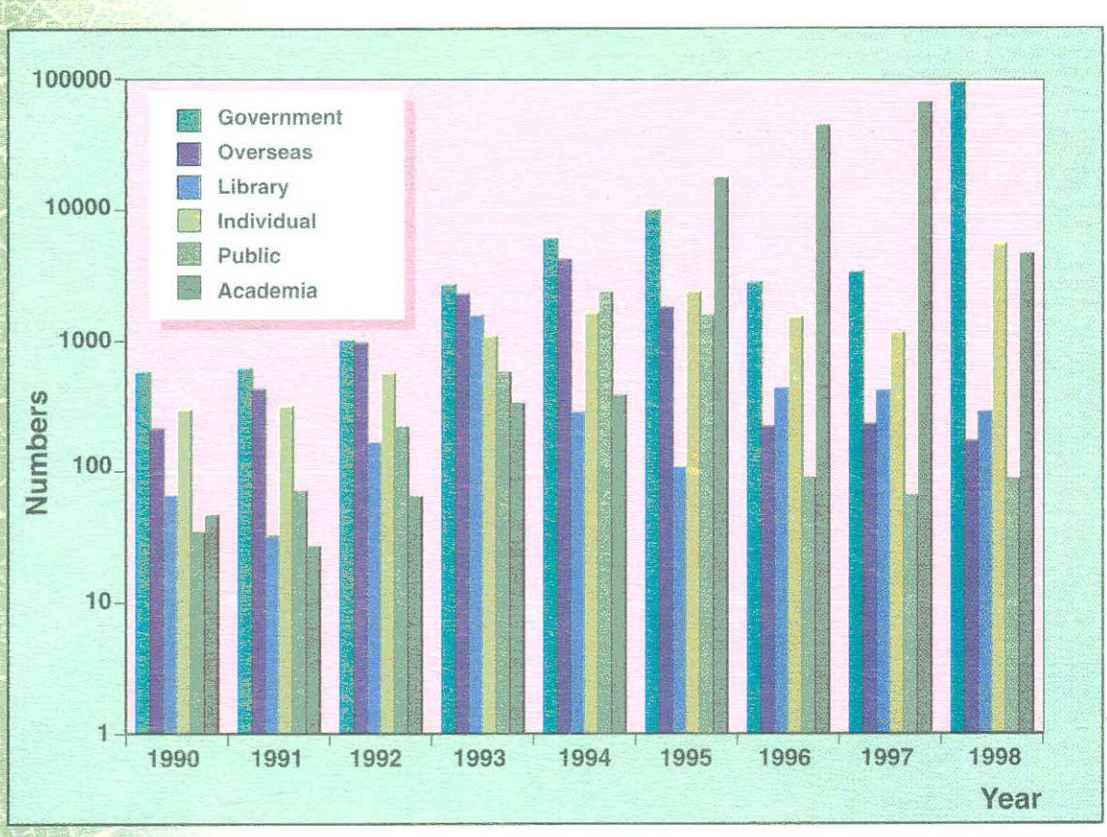


Figure 5.1 Department of Environment: Dissemination of Environmental Publications, 1990 – 1998

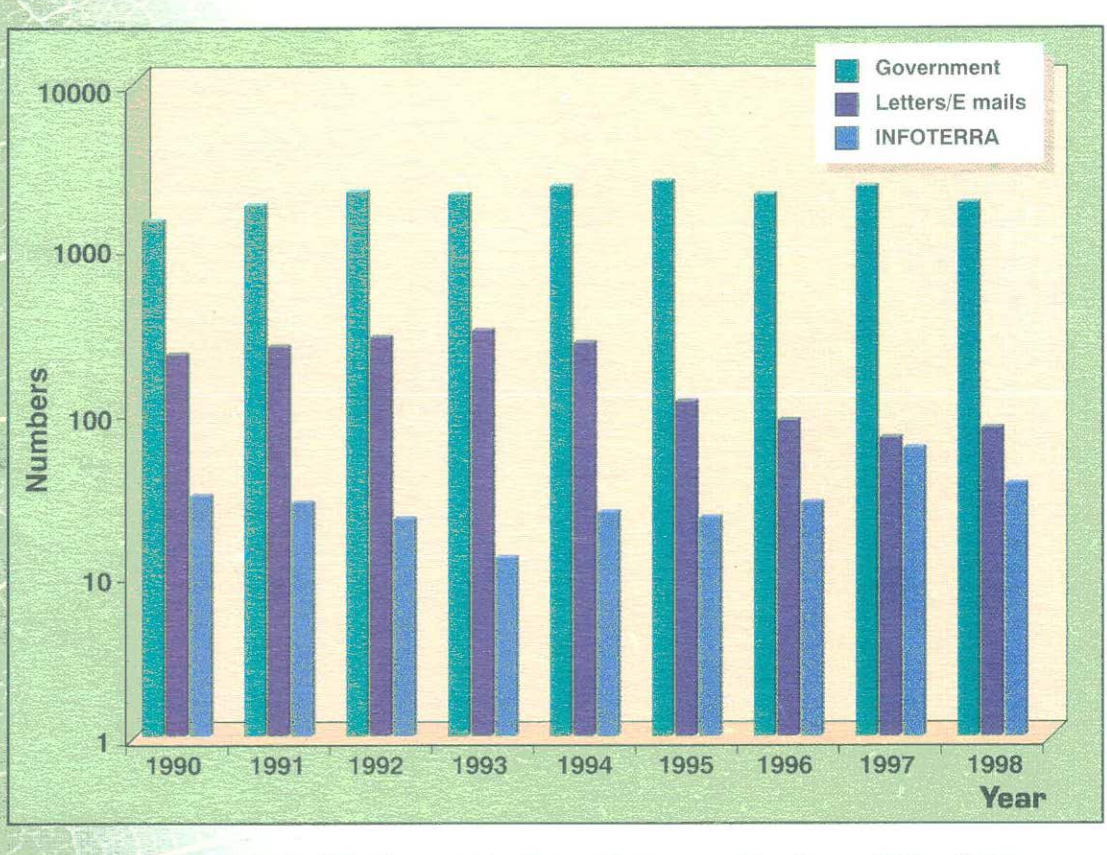


Figure 5.2 Department of Environment: Query-Response Services, 1990 – 1998

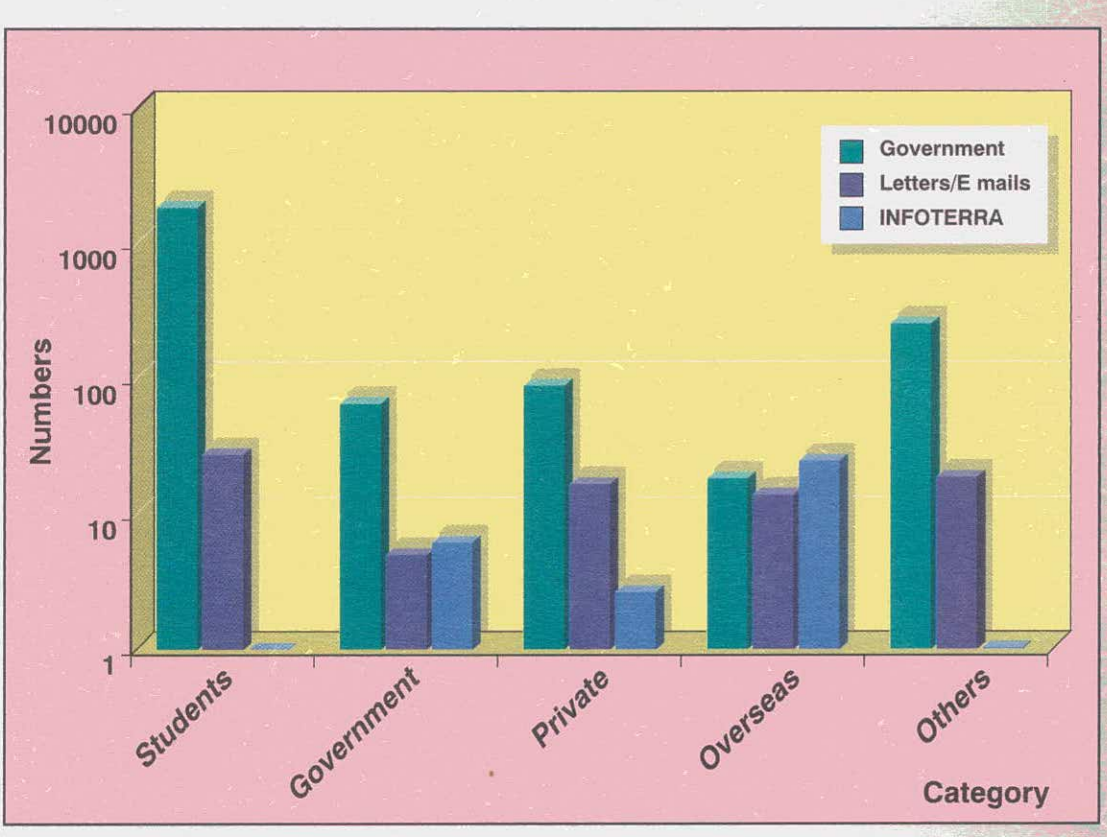


Figure 5.3 Department of Environment: Category of Information Applicants, 1998

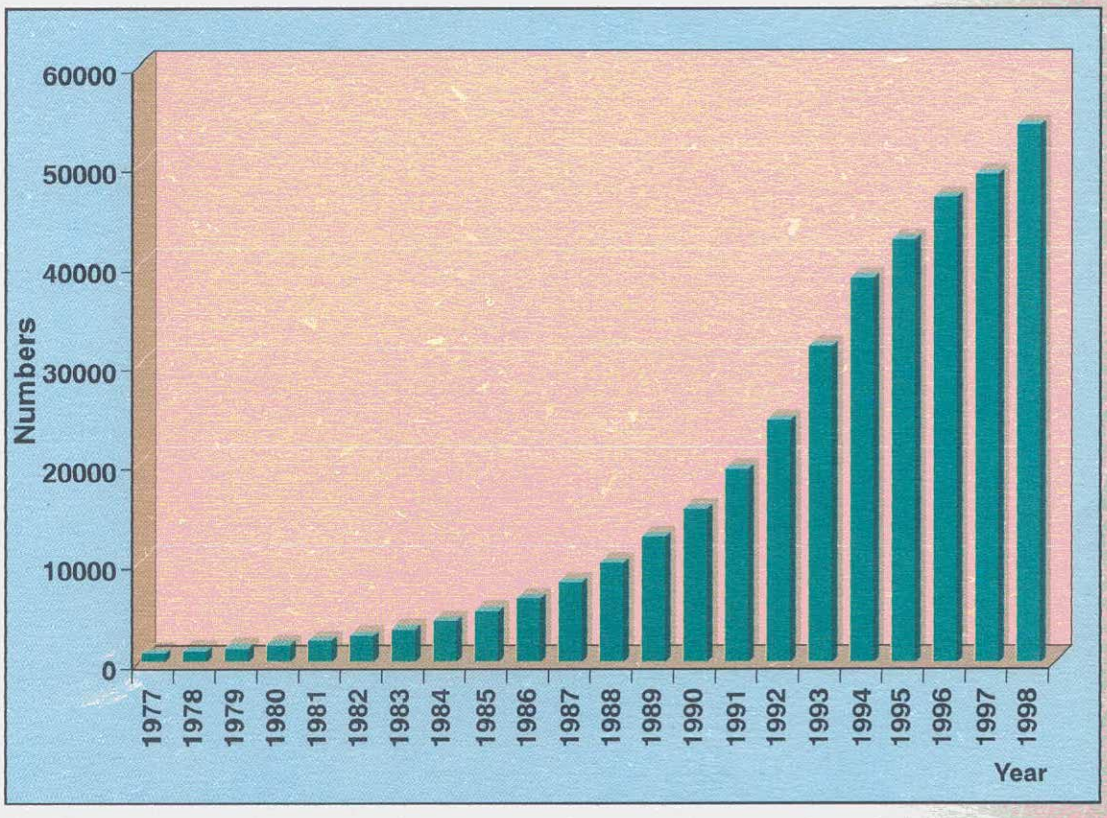


Figure 5.4 Department of Environment: Newspaper Cuttings, 1977 – 1998

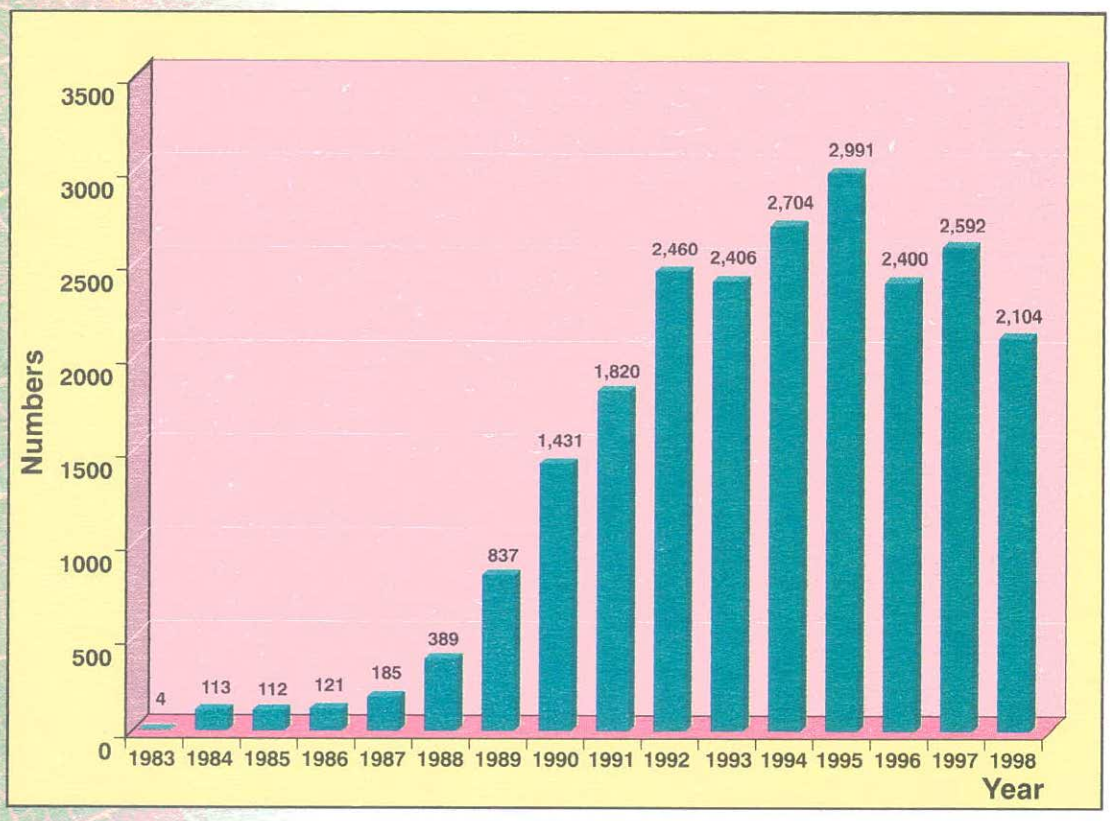


Figure 5.5 Department of Environment: Library Users, 1998

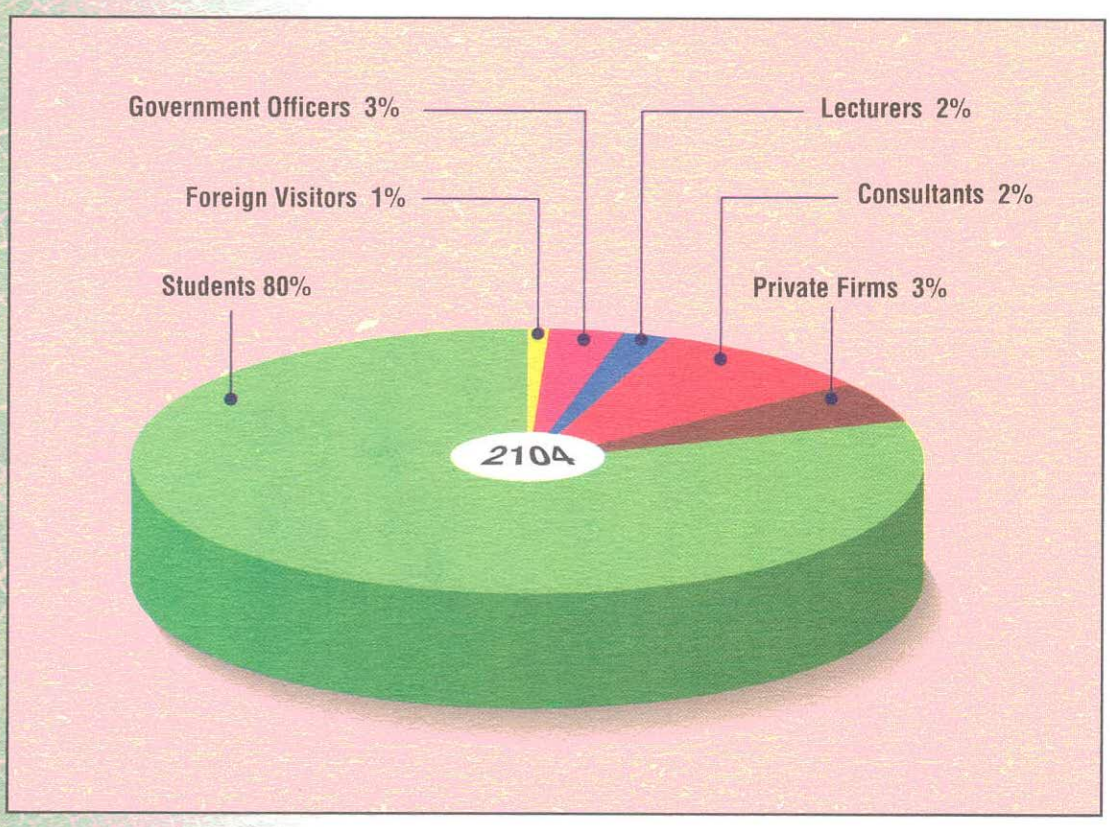


Figure 5.6 Department of Environment: Category of Library Users, 1998

Chapter 6

INTERNATIONAL ENVIRONMENTAL AFFAIRS

INTRODUCTION

Ever since the landmark Stockholm Conference on the global environment in 1972 which highlighted global environmental problems, international, regional and bilateral environmental cooperation have taken on a firm footing, Malaysia responded positively and the Department of Environment was tasked to implement various programmes and activities to facilitate international and regional environmental cooperation since 1975.

From January to December 1998, the Department of Environment facilitated the participation of DOE officials at 41 meetings and conferences, 13 workshops (including seminars and forums) and 5 training courses. Such participation served as beneficial avenues for sharing of experiences and information exchange and more importantly facilitating enhancement of cooperation at the bilateral, regional and international level.

In the same year, DOE received 80 environmental missions from other countries to exchange and share knowledge and experiences on environmental management.

BILATERAL COOPERATION

■ Malaysia – Singapore

The 13th Malaysia-Singapore Joint Committee on Environment (MSJCE) Meeting was held on 11 December 1998. Major environmental issues of mutual concern which were deliberated and acted upon were:

- Control of Motor Vehicular Emissions
- Cleaning up the Straits of Johor
- Water Quality in the Straits of Johor
- Management of Hazardous Chemicals and Waste

The Malaysia-Singapore Second Link which was official opened on 18 April 1998 by the Prime Ministers of Malaysia and Singapore, further facilitates the flow off traffic and transportation of hazardous goods and chemicals between the two countries. An exercise to deal with accidents involving chemical spillage at the Malaysia-Singapore Second Link was held on 14 December 1998 which involved relevant agencies such as DOE, Fire Services and Rescue Department, the Custom Department, the Immigration Department, the Royal Malaysian Police, Ministry of Health as well as Linkedua Sdn. Bhd. and CCM Chemicals Sdn. Bhd. Singaporean counterparts from the Ministry of Environment and the Civil Defence Force also participated in the exercise.

■ Malaysia – Thailand

Under the auspices of the bilateral co-operation on Science & Technology for Malaysia-Thailand, 4 senior officials from the Ministry of Science, Technology and Environment of Thailand headed by Mr. Weera Sakultab, Deputy Director-General of the Department of Environmental Quality Promotion, Thailand visited Malaysia and held several discussions with officials of DOE, particularly with regard to environmental education and awareness activities. Both countries agreed to maintain close cooperation and collaboration by way of regular exchange of information and experiences.

■ Malaysia – Japan

DOE hosted 5 missions from Japan involving 27 delegates in 1998. Major topics of interest were environmental laws and regulations as well as sharing of experiences in the implementation of environmental management in Malaysia.

■ Malaysia – Australia

Australia provided financial and technical assistance in the area of coastal zone environmental and resource management. An oil spill response support system using GIS functions for Negeri Sembilan which

was part of the Coastal Zone Environmental & Resources Management Project supported by the ASEAN-Australian Economic Cooperation Programme was completed in June 1998. The projects enabled Malaysia to gain relevant technical knowledge on coastal zone management from Australia.

Malaysia – USA

On August 25, 1998, a group of high level officials from the US Congress visited DOE and held discussions with the Director-General of Environment specifically on the subject of promoting international environmental cooperation with the US. Areas of cooperation subsequently identified included clean technologies for SMIs, environmental auditing, illegal dumping and remediation of dump sites.

Malaysia – India / Norway / Netherlands

Other missions that visited DOE in 1998 included a delegation of senior members from the Ministry of Urban Affairs and Employment of India; 17 post-graduate students from University of Bergen, Norway as well as 11 post-graduate students from the Institute for Infrastructure Hydraulics and Environmental Engineering, Netherlands. Highlights of the discussion included the monitoring and control of effluent for industries, environmental policy and management in Malaysia.

REGIONAL COOPERATION

ASEAN Environment Ministerial Meeting on Haze (AMMH)

The 2nd and 5th ASEAN Environment Ministerial Meeting on Haze (AMMH) held respectively on 25 February 1998 in Sarawak, and 30th July 1998 in Kuala Lumpur reviewed the progress of implementation of the Regional Haze Action Plan which focused on monitoring, prevention and mitigating measures of forest/land fires in Sumatra and Kalimantan, Indonesia.

ASOEN Haze Technical Task Force Meeting

The 6th Meeting of ASEAN Senior Officials on Environment (ASOEN) Haze Technical Task Force (HTTF) held on 24 February 1998 in Kuching, Sarawak prior to the 2nd AMMH deliberated on implementation issues and difficulties of the Regional Haze Action Plan.

On 29 July 1998, the 9th HTTF Meeting which was held in Kuala Lumpur prior to the 5th AMMH continued to discuss and resolve the technical and financial problems encountered in the implementation of the Regional Haze Action Plan.

Sub-Regional Fire-Fighting Arrangements (SRFAs)

The two Sub-regional Fire-Fighting Arrangements established for Sumatra and Borneo during the 3rd AMMH held in Brunei Darusalam on 4 April 1998 were to plan and operationalize specific components of the Regional Haze Action Plan. The SRFA for Sumatra involving Indonesia, Malaysia and Singapore was to deal with the prevention and combat of fires in Sumatra, while the SRFA for Borneo involving Indonesia, Malaysia and Brunei Darussalam was to monitor and prevent fires in Borneo.

Among the significant activities implemented under the SRFA for Sumatra which is presently chaired by Malaysia were detection of fires through aerial surveillance and the development of fire suppression plan particularly for the fire prone areas in Sumatra. Other activities included fire fighting training programmes for relevant

local authorities personnel and public awareness campaigns through the mass media and distribution of phamplets.

Coordinating Body on South East Asian Seas (COBSEA)

The 13th COBSEA Meeting which was held in Bangkok, Thailand on 15-16 June 1998 to review the progress of on-going East Asian Seas projects discussed the formulation of a Transboundary Diagnostic Analysis and Preliminary Framework for a Strategic Action Programme for South East Asia as well as the Regional Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based activities in the East Asian Seas Region. A contribution equivalent to US$10,000.00 was made by the Government of Malaysia to the Regional Trust Fund for the Implementation of the Action Plan for the Protection and Development of Marine Environment and Coastal Areas of East Asian Seas.

Informal ASEAN Ministerial Meeting on Environment (IAMME)

The Fourth Informal ASEAN Ministerial Meeting on Environment was held on 20 November 1998 in Hanoi, Vietnam. The Ministers exchanged views on issues of mutual interest within ASEAN environmental cooperation programmes such as the Transboundary Haze Pollution, restructuring of ASOEN Working Groups, the Hanoi Plan of Action to Implement the ASEAN Vision 2020 and ASEAN flagship programmes such as the Environmental Forum and Environment Awards.

In addition, the Ministers requested ASOEN to prepare a detailed Strategic Plan of Action for ASEAN cooperation in the environmental sector for the period 1999-2004, consistent with the overall direction and thematic areas in the Hanoi Plan of Action.

ASEAN Senior Officials on the Environment (ASOEN)

The 9th Meeting of ASEAN Senior Officials on the Environment (ASOEN) was held in Singapore from 23-25 September 1998. The meeting agreed to recommend the restructuring of the existing 8 Working Groups into 3 Working Groups and a Task Force as follows:-

- Working Group on Nature Conservation and Biodiversity (to be chaired by Philippines)
- Working Group on Coastal and Marine Environment (to be chaired by Thailand)
- Working Group on Multilateral Environmental Agreements (to be chaired by Malaysia)
- ASOEN Haze Technical Task Force (to be chaired by Indonesia)

The decision to restructure was taken based on the following criteria:

- issue oriented
- flexibility in working group formulation and tenureship
- strategic planning considerations
- immediate response to pressing issues

INTERNATIONAL COOPERATION

Basel Convention on the Control of Transboundary Movements of Hazardous Waste & Their Disposal

The 4th Meeting of the Conference of Parties (COP4) to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste & Their Disposal was held on 23-27 February 1998 in Kuching, Sarawak. About 400 delegates attended the Meeting representing 117 State Parties to the Basel Convention as well as Observers. The Deputy Director-General of Environment, Puan Hajah Rosnani Ibarahim was elected the President for the 4th COP for 1998/99 session. Major issues discussed included the

further steps to control on movement and disposal of hazardous wastes, the protocol on liability and compensation, emergency fund and information exchange system.

Oil Spill Preparedness and Response (OSPAR) Management Committee

The 3rd Oil Spill Preparedness and Response (OSPAR) Management Committee Meeting was held in Manila on 26 – 27 Mac 1998. The Meeting discussed matters pertaining to the management of the OSPAR Project Equipment and the Information Network System.

Intergovernmental Negotiating Committee on Persistent Organic Pollutants (POPs)

Malaysia is in the process of developing a list of POPs in the country and has initiated a study on the current status of POPs in Malaysia in an effort to develop policies and strategies for POPs management in the country.

Prior Informed Consent (PIC) Procedure for Certain Chemicals and Pesticides in International Trade

As a party to the voluntary PIC Procedure, the Department initiated various measures to implement a programme for effective chemical management consistent with its advocacy of the need to step up international control on movements and information exchange on hazardous chemicals.

Agenda 21 for Sustainable Development

On 5 Jun 1998, in conjunction with the commemoration of the 1998 World Environment Day, a children's version of Agenda 21 entitled '*Malaysia Agenda 21: Versi Kanak-kanak*' was officially launched.

Danish Cooperation for Environment and Development (DANCED)

The two and half years DANCED-funded DOE project on Capacity Building which started in August 1997 made substantial progress in 1998 particularly in the development of training programmes. Various training materials on practical enforcement were formulated and the first training course was conducted in July 1998. Other training materials developed were for stack sampling and open burning investigations. The Department's capacity for handling and managing training programmes was further strengthened with the publication of a Training Management System.

Throughout the year 176 officers were trained under 14 training programmes conducted.

The five attachment programmes for 25 officers provided useful exposure in terms of technology, techniques and procedures in environmental management, pollution control and training.

	Training Course	Frequency	No of Participants
1.	Practical Enforcement	2	52
2.	Field Stack Sampling	4	42
3.	Stack Sampling as a Tool for Enforcement	1	16
4.	Awareness Workshops	1	25
5.	Noise Calculation and Measurement	1	16
6.	Attachment Programmes in Denmark	5	25

Chapter 7

ORGANISATIONAL STRUCTURE

HUMAN RESOURCES

The Department of Environment *is headed by a Director General who is appointed under Section 3(1) of the Environmental Quality Act, 1974. The head office in Kuala Lumpur is comprised of 3 Technical Divisions i.e. Control, Assessment and Development Planning; and 2 Supporting Divisions i.e. Administration Division and an Information Technology Division. In addition, there are 13 State Offices located at Johor Bharu (Johor), Alor Setar (Kedah/Perlis), Kota Bharu (Kelantan), Kuala Lumpur (Wilayah Persekutuan), Bandar Melaka (Melaka), Seremban (Negeri Sembilan), Kuantan (Pahang), Ipoh (Perak), Butterworth (Pulau Pinang), Kota Kinabalu (Sabah), Kuching (Sarawak), Kuala Terengganu (Terengganu), two branch offices at Pulau Langkawi and Temerloh and an Environmental Advisory Office at the MIDA Head Office in Kuala Lumpur (Figure 7.1).*

DEPARTMENT OF ENVIRONMENT ORGANISATION STRUCTURE

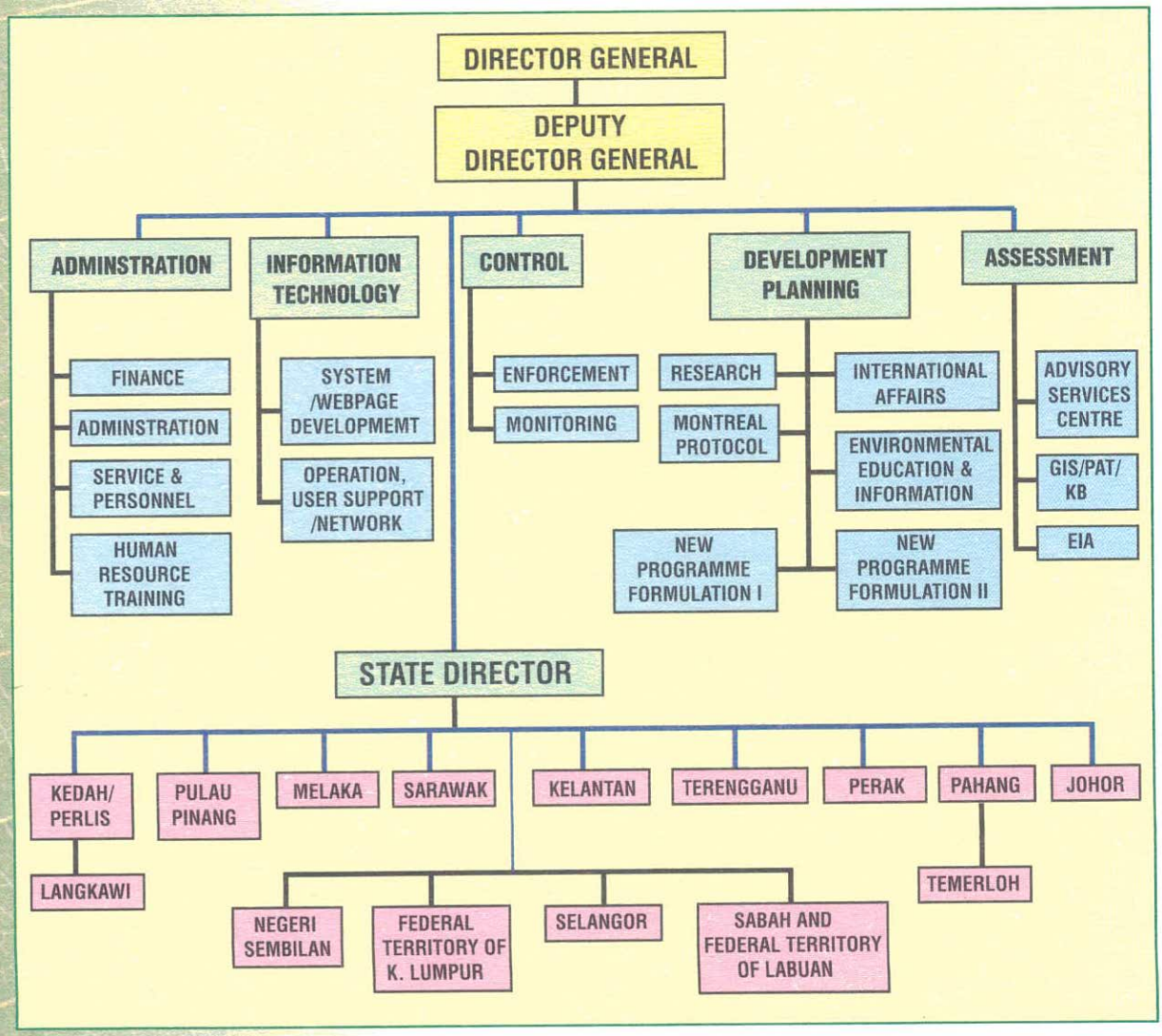


Figure 7.1 Malaysia: Department of Environment Organisational Structure, 1998

HUMAN RESOURCES

As of 31 December 1998 the total personnel strength of DOE was 586 comprising of 122 officers in the management and professional group and 464 in the supportive group (Figure 7.2).

PERSONNEL TRAINING

The training programme of the department is coordinated by a Training Committee to plan and recommend suitable candidates for short and long term courses (exceeding 3 months duration). In-house training such as induction courses for new staff members, courses on law and court procedures as well as enforcement, environmental impact assessment and briefings on the management of the Environmental Quality Act, 1974 were regularly conducted.

Personnel training was given priority in spite of inadequate allocations and a total of 264 officers attended training and capacity building programmes locally while 95 officers went abroad for workshops, courses, seminars and study tours.

FINANCE

The total budget allocations received by DOE for the 1998 were RM 47,572,116.00, an increase of RM 4,852,581.00 (11.36%) over the previous year. From this amount, a sum of RM 40,788,116.00 (86%) was allocated for operational expenditure while RM 6,784,000.00 (14%) was for implementing development projects. (Figure 7.3 and 7.4).

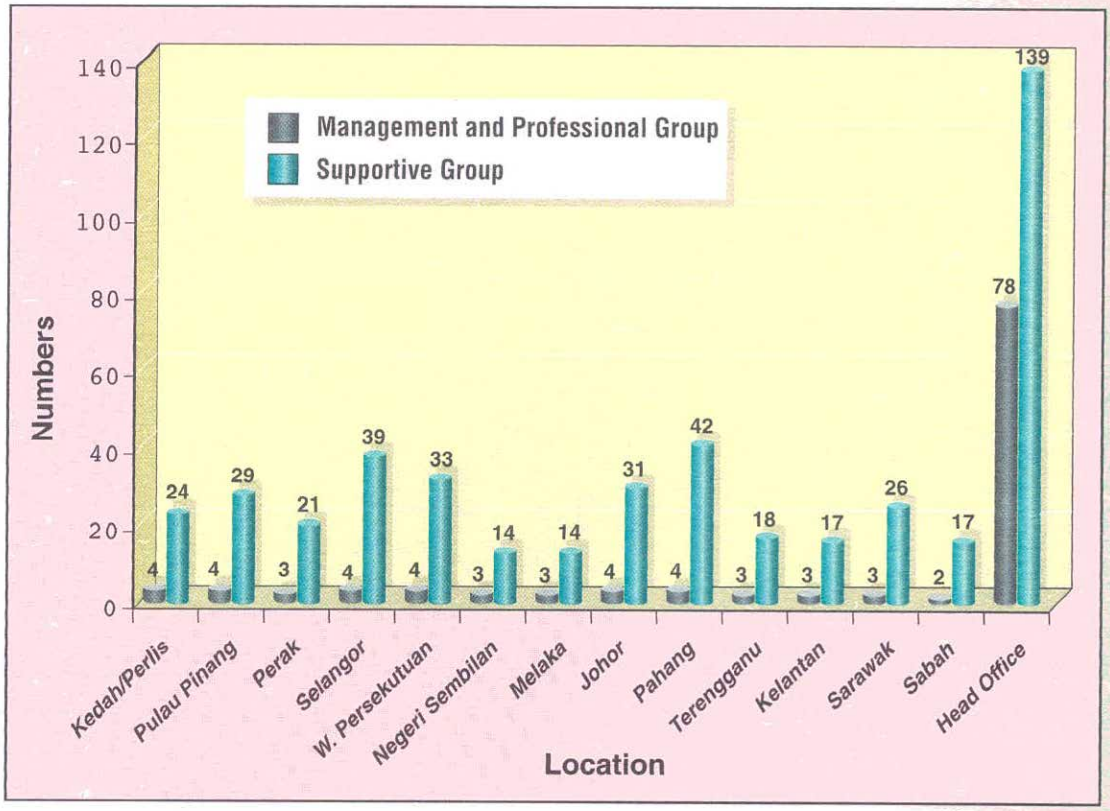


Figure 7.2 Department of Environment: Distribution of Personnel, 1998

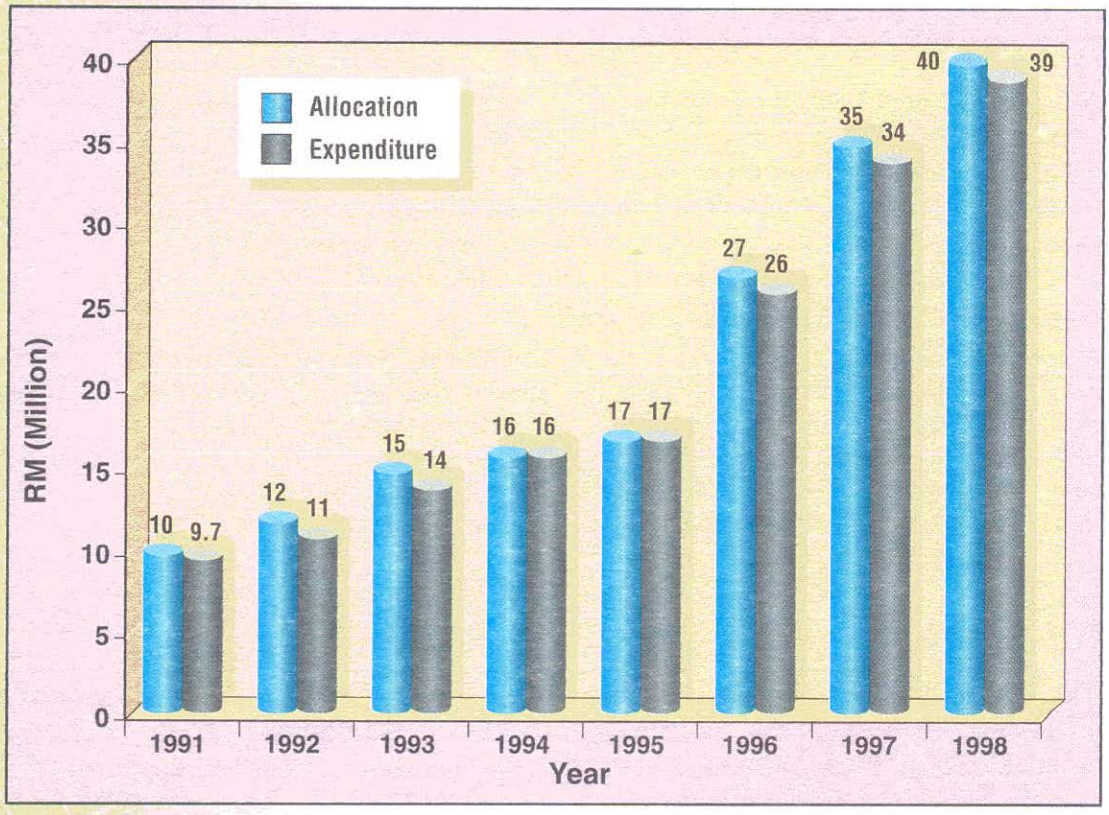


Figure 7.3 Department of Environment: Operational Allocation and Expenditure, 1991 – 1998

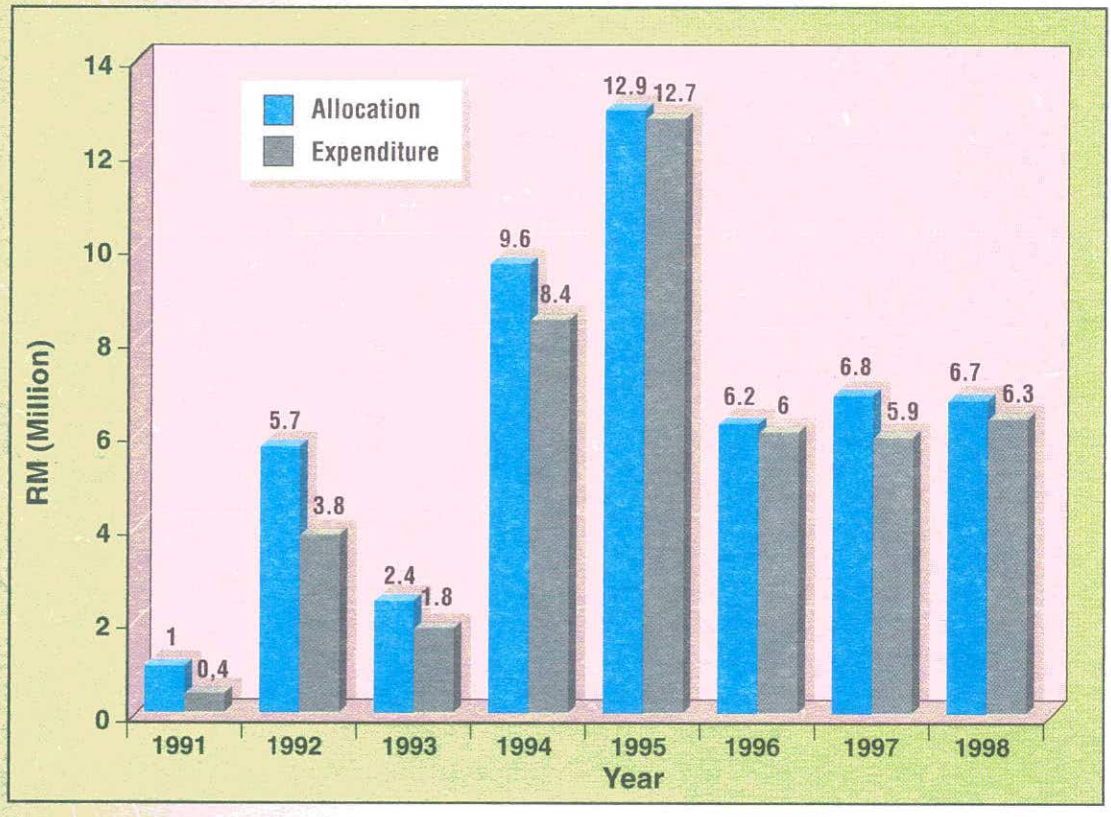


Figure 7.4 Department of Environment: Allocation and Expenditure for Development, 1991 – 1998

ENVIRONMENTAL QUALITY COUNCIL

The Environmental Quality Council (EQC) which is established under Section 4(1) of the Environmental Quality Act, 1974 and launched on 12 April 1977 advises the Minister of Science, Technology and the Environment on matters pertaining to the Act and also on any matter referred by the Minister. In addition, the Council also provides policy guidance to the Department of Environment (DOE) in the formulation of policies and strategies towards a more holistic approach to environmental management.

The Chairman of the Environment Quality Council is Professor Dato' Dr. Mohd. Sham Mohd. Sani and together with other Council Members are appointed by the Minister for a specific term to represent the academia, relevant Federal agencies,the Sabah and Sarawak State Governments, the industrial sector and non-governmental organisations. The Office of the Director General serves as the Secretariat for the Council.

Activities

The Council held four meetings in Kuala Lumpur on March 2, June 9, September 10 and November 3. In addition to providing guidance and advice to DOE on policy and strategy formulation, the Council deliberated and dealt with a gamut of issues put before it. The Council deliberated extensively on enforcement issues and the strengthening of environmental legislation such as amendments to the Environmental Quality Act, 1974. The Council also paid particular attention to activities for promotion of environmental awareness and education and while acknowledgeing the efforts already expended strongly recommended that more resources be given to intensify such activities to complement DOE's enforcement duties ans responsibilities.

The other salient matters which the Council deliberated and dealt with were: -

- Solid waste management and pollution control at landfill sites
- Amendments of the Environmental Quality Act, 1974 to control open burning.
- Operations to control open burning.
- Delegation of powers under the Environmental Quality Act, 1974 to the relevant agencies.
- Environmental auditing.
- Regional haze action plan.
- Climate change.

Composition of EQC in 1998:

Chairman:	Y.Bg. Prof Dato' Dr. Sham Mohd. Sani	Section 4(2)(a)
Members:	Y.Bhg. Dato' Cheah Kong Wai Ministry of Science, Technology & the Environment	Section 4(2)(b)
	Y.Bhg. Dato' Asmat Kamaludin Ministry of International Trade and Industry or his authorized representative	Section 4(2)(c)
	Y.Bhg. Dato' Mohd. Noor Abd. Rahim (up to 15 December 1998) Ministry of Domestic Trade & Consumer Affairs	Section 4(2)(cc)
	Y.Bhg. Dato' Annuar Ma'aruf Ministry of Agriculture	Section 4(2)(ccc)
	Y.Bhg. Dato' Zainol Abidin bin Abd. Rashid Ministry of Human Resources	Section 4(2)(d)
	Y.Bhg. Datuk Othman b. Mohd. Rijal Ministry of Transport	Section 4(2)(dd)
	Y.Bhg. Tan Sri Dato' Dr. Abu Bakar Suleiman Ministry of Health	Section 4(2)(e)
	Ms. Monica Chia Mui Foong Ministry of Tourism & Environment Development, Sabah	Section 4(2)(f)
	Tuan Haji Zaidi Khaldin Zainie b. Haji Abdul Latif Ministry of Resource Planning, Sarawak	Section 4(2)(f)
	Ir. Hussein Rahmat (up to 12 October 1998 and replaced by Tuan Syed Abdullah Aljuned) PETRONAS	Section 4(2)(g)
	Mr. Teo Leng Malaysian Oil Palm Growers' Council	Section 4(2)(gg)
	Y.Bhg Dato' Mohd. Yusof b. Hitam Federation of Malaysian Manufacturers	Section 4(2)(h)
	Mr. D. Selvaraj Malaysian Rubber Producers Council	Section 4(2)(hh)
	Profesor Madya Dr. Muhamad Awang Universiti Putra Malaysia	Section 4(2)(i)
	Y.Bhg. Dato' Dr. Salleh b. Mohd. Nor Malaysian Nature Society (MNS)	Section 4(2)(j)
	Ir. Gurmit Singh K.S Centre for Environmental Technology & Development Malaysia (CETDEM)	Section 4(2)(j)

MEETING BETWEEN THE MINISTER OF SCIENCE, TECHNOLOGY AND THE ENVIRONMENT WITH STATE MINISTERS AND EXECUTIVE COUNCILLORS RESPONSIBLE FOR ENVIRONMENTAL MATTERS (MEXCOE)

The 16th Meeting between the Minister of Science, Technology and the Environment with State Ministers and Executive Councillors responsible for environmental matters (MEXCOE) was held on 22 October 1998 in Kuala Terengganu in conjunction with the launching of the Malaysia Environment Week 1998.

MEXCOE was informed of the initiatives and actions taken to tackle the haze problem both at regional and national level. The Meeting also took note of the amendments to the Environmental Quality Act 1974 for more stringent control of open burning and deliberated on the prescribed activities where open burning could be permitted. The Ministers also agreed on the need for better co-ordination amongst agencies involved in combating oil spills at sea and beach cleanup and directed the Department of Environment to undertake the following:

- Prepare guidelines for the preparation of oil spill contingency plan for port areas with the assistance of the Marine Department
- Prepare guidelines to assist Local Authorities in the implementation of beach cleanup
- Review existing the funding mechanisms and reimbursements for oil spill cleanup operations
- Review the National Oil Spill Contingency Plan to define roles and responsibilities of agencies and to improve communications
- Conduct regular tabletop exercises.

MEXCOE also took note of the National Biodiversity Policy and Sarawak's programmes in biodiversity conservation.

MEXCOE 1998

The 1998 MEXCOE was attended by:

1.	Y.B Datuk Law Hieng Ding	Minister of Science, Technology and the Environment (Chairman)
2.	Y.B Dato' Abu Bakar Daud	Deputy Minister of Science, Technology and the Environment
3.	Y.B Datuk Abdul Rashid Bin Abdullah	Chairman of Agriculture, Fishery and Environment Committee, Pulau Pinang
4.	Y.B. Dato' Beh Heng Seong	Chairman of Transport, Environment and Chinese Association, Kedah
5.	Y.B. Dato' Bahari b. Tan Sri Yahya	Chairman of Public Facility, Housing and Environment Committee, Pahang
6.	Y.B Datuk Wilfred Bumburing	Minister of Tourism And Environmental Development, Sabah
7.	Y.B Puan Che Ah @ Ramlah Bte Long	Chairman of Land, Forestry and Environment Committee, Perlis
8.	Y.B Encik Ch'ng Toh Eng	Chairman of Youth and Sport, Science, Technology and Environment Committee, Selangor
9.	Y.B Dr. Chua Soi Lek	Chairman of Environment and Consumer Affairs Committee, Johor
10.	Y.B Dato' Amar James Wong Kim Min	Minister of Environment and Tourism, Sarawak
11.	Y.B En. Lee Chee Leong	Chairman of Health and Environment Committee, Perak
12.	Y.B Datuk Poh Ah Tiam	Chairman of Tourism, Culture and Environment Committee, Melaka
13.	Y.B Encik Wong Foon Meng	Chairman of Environment Development Health and Consumer Affairs Committee, Terengganu
14.	Y.B Dato' Dr. Yeow Chai	Chairman of Housing and Local Government Environment, Science And Technology Committee Negeri Sembilan
15.	Y. Bhg. Encik Azman b. Abd Rashid	Department of Federal Development, Kelantan
16.	Y.Bhg. Datuk Hj Noordin Hj. Abd. Razak	Director-General, Dewan Bandaraya , Kuala Lumpur

MALAYSIAN INCORPORATED CONCEPT

The Malaysia Incorporated Concept was introduced by the Malaysian Government in 1991 to strengthen cooperation and understanding between the public and the private sector in order to enhance economic growth and national development. The implementation of Malaysian Inc. could be in the form of consultative panels, annual dialogues and social interactions such as sports, carnivals and so on.

Twenty eight Executives from the private sector attended a week's training at the DOE Head Office between 5 – 9 May 1998, making a total of sixty one since DOE initiated the programme. The participants were briefed on the functions and responsibilities of the Department as well as field visits to water, air and noise monitoring stations coordinated by DOE. Such a programme turned out to be a useful platform for participants to exchange views and experiences with DOE officials for better understanding of the objectives of sustainable environmental management. The participating companies in 1998 were:

- Amoco Chemical (M) Sdn. Bhd.
- DIC Compound (M) Sdn. Bhd.
- ESSO Production Malaysia Inc.
- Celcure (M) Sdn. Bhd.
- Pollution Engineering Sdn. Bhd.
- Matsushita Television Co. (M) Sdn. Bhd.
- ICI Paints (M) Sdn. Bhd.
- Mattel (KL) Sdn. Bhd.
- B.Braun Medical Ind.Sdn. Bhd.
- BP (M) Sdn. Bhd.
- Yamaha Electronics Mfg. (M) Sdn. Bhd.
- Hosiden Electronics (M) Sdn. Bhd.
- Aldwich Enviro-Mgmt. Sdn. Bhd.
- South South Group
- Formosa Prosonic Ind. Bhd.
- Prerniurn Vegetable Oils Sdn. Bhd
- Madetill (M) Sdn. Bhd.
- Smithkline Beecham International
- Toyochem Sdn. Bhd.
- Assoc.Pan Malaysia Cement Sdn. Bhd.
- Mustajab Ind. Sdn. Bhd.
- Kian Joo Can Factory Bhd.
- Sarawak Shell Bhd.
- CCM Chemicals Sdn. Bhd.
- Intraco Plastics (M) Sdn. Bhd.
- Clipsal Mfg.(M) Sdn. Bhd.
- Linatex Rubber Products Sdn. Bhd.
- Shell Malaysia Trading Sdn.Bhd.

INFORMATION TECHNOLOGY

Information Technology is widely used for management and administrative purposes at the DOE Head Office and State Offices such as for e-mails, databases and office automation. Four servers (Library System, E-mail, Homepage and Accounting System) were upgraded in 1998. In addition a new server was added, the "JPJ Link System". Updating was done daily especially with the introduction of the Air Pollutant Index (API) (DOE Homepage http://wwwjas.sains.my).

Throughout 1998 the Information System Division conducted 19 training sessions and trained 117 DOE staff, including those in the DOE State offices, on the use of office automation software (Microsoft Office), Internet and E-mail. All these training had undoubtedly increased the level of IT skills among DOE staff.

Y2K compliance was another important major task in 1998. Steps were initiated to replace the Columbia Library System into the ILMU System, a Y2K compliant System for the new millennium. Y2K compliance efforts were also initiated in 1998 to redevelop the main application systems of DOE in use since 1989.

ANNEX

Proposed Interim National Water Ouality Standards for Malaysia

PARAMETERS	CLASSES					
	I	IIA	IIB	111#	IV	V
Ammoniacal Nitrogen	0.1	0.3	0.3	0.9	2.7	2.7
BOD (mg/1)	1	3	3	6	12	12
COD (mg/1)	10	25	25	50	100	100
DO (mg/1)	7	5–7	5–7	3–5	3	1
pH	6.5-8.5	6.5-9.0	6.5-9.0	5–9	5–9	–
Colour (TUC)	15	150	150	–	–	–
Elec. Conductivity (μmhos/cm)**	1000	1000	–	–	6000	–
Floatables	NV	NV	NV	–	–	–
Odour	NOO	NOO	NOO	–	–	–
Salinity(%)**	0.5	1	–	–	2	–
Taste	NOT	NOT	NOT	–	–	–
Total Dissolved Solid (mg/1)	500	1000	–	–	4000	–
Total Suspended Solid (mg/1)	25	50	50	150	300	300
Temperature (ºC)	–	Normal 2	–	Normal 2	–	–
Turbidity (NTU)	5	50	50	–	–	–
Faecal Coliform (counts/100 ml)	10	100	400	5000 (20000) @	5000 (2000) @	–
Total Coliform (counts/100 ml)	100	5000	5000	5000	5000	5000
Al (mg/1)	–	–	–	0.056	0.5	–
As (mg/l)	N	0.05	NR	0.045 (0.44)	0.1	+
Ba (mg/l)	N	1	NR	–	–	+
Cd (mg/l)	N	0.005	NR	0.001 (0.01 1**)	0.01	+
Cr (IV) (mg/l)	N	0.05	NR	0.054 (1 .45)	0.1	+
Cr (III) (mg/1)	N	–	NR	– (2.53)	–	+
Cu (mg/l)	N	1	NR	0.01 (0.012*)	0.2	+
Hardness (mg/l)	N	100	NR	–	–	+
Ca (mg/l)	N		NR	–	–	+
Mg (mg/l)	N	0.05	NR	–	–	+
Na (mg/l)	N	–	NR	–	3 SAR	+
K (mg/l)	N	–	NR	–	–	+
Fe (mg/l)	N	0.3	NR	1	1 (Leaf) 5 (Others)	+
Pb (mg/l)	N	0.05	NR	0.01 (0.014*)	5 –	+
Mn (mg/l)	N	0.1	NR	0.1	0.2	+

PARAMETERS	CLASSES					
	I	IIA	IIB	111#	IV	V
Hg (mg/l)	N	0.001	NR	0.0001 (0.004)	0.002	+
Ni (mg/l)	N	0.05	NR	– (0.9*)	0.2	+
Se (mg/1)	N	0.01	NR	0.037 (0.25)	0.02	+
Ag (mg/l)	N	0.05	NR	– (0.0002)	–	+
Sn (mg/l)	N	NR	NR	0.05	–	+
U (mg/l)	N	NR	NR	–	–	+
Zn (mg/l)	N	5	NR	– (0.35)	2	+
B (mg/l)	N	I	NR	3.4	0.75	+
Cl (mg/l)	N	200	NR	–	79	+
C12 (mg/1)	N	–	NR	0.022	–	+
CN (mg/l)	N	00.2	NR	0.0023 (0.058)	–	+
F (mg/l)	N	1	NR (11)	–	1	+
NO3/NO2 (mg/1)	N	7/3	NR	0.028 (0.37)	5	+
P (mg/l)	N	0.1	NR	0.1	–	+
Silica (mg/l)	N	50	NR	–	–	+
SO_4 (mg/1)	N	200	NR	–	–	+
S (mg/l)	N	0.05	NR	0.001	–	+
CO_2 (mg/1)	N	–	NR	–	–	+
Gross- (Bql)	N	0.1	NR	–	–	+
Gross- (Bql)	N	1	NR	–	–	+
Ra-226 (Bql)	N	+0.1	NR	–	–	+
Sr-90 (Bql)	N	+0.1	NR	–	–	+
CCE (µg/l)	N	500	NR	–	–	+
MBAS/BAS (µgl)	N	500	NR	200	NR	+
O & G (Mineral) (mg/l)	N	40;NF	NR	NL	NR	+
O & G (Emulsified edible) (µg/l)	N	7000;NF	NR	NL	NR	+
PCB (mg/l)	N	0.1	NR	0.044 (6.1)	NR	+
Phenol (µg/l)	A	10	NR	– (9900)	NR	NR
Aldrin/ Dieldrin (µg/l)	A	0.02	NR	0.08 (0.2)	NR	NR
BHC (µg/l)	A	2	NR	0.13 (9.9)	NR	NR

PARAMETERS	CLASSES					
	I	IIA	IIB	111#	IV	V
Chlordane (µgl/l)	A	0.08	NR	(2.2) 0.004	NR	NR
t-DDT (µg/l)	A	0.1	NR	(1)	NR	NR
Endosulfan (µg/l)	A	10	NR	($\bar{0.01}$)	NR	NR
Heptachlor/	A	0.05	NR	0.06	NR	NR
Epoxide (µg/l)	A	–	NR	(0.91)	NR	NR
Lindane (µg/l)	A	2	NR	0.38 (2.9)	NR	NR
2,4-D (µg/l)	A	70	NR	(450)	NR	NR
2,4, 5-T (µg/t)	A	10	NR	(160)	NR	NR
2,4, 5-TP (µg/l)	A	4	NR	(850)	NR	NR
Paraquat (µg/l)	A	10	NR	(1800)	NR	NR

Notes:

CLASS I : Conservation of natural environment water supply I - practically no treatment necessary
Fishery I - very sensitive aquatic species

CLASS IIA : Water Supply II- conventional treatment required
Fishery II- sensitive aquatic species

CLASS IIB : Recreational use with body contact

CLASS III : Water Supply III- extensive treatment required
Fishery III- common, of economic value, and tolerant species livestock drinking

CLASS IV : Irrigation

CLASS V : None of the above

NV : No Visible floatable materials or debris

NOO : No Objectionable odour

NOT : No Objectionable taste

** : Related Parameters, only one recomended for use

@ : Maximum not to be exceeded

NR : No Recommendation

* : At hardness 50 mg/1 $CaCO_3$

: 24-hr average and maximum (bracketed) concentrations are shown

NF : Free from visible film, sheen, discoloration and deposits

NL : Free from visible layer, discoloration and deposits

N : Natural levels

+ : Levels above Class IV

A : Absent

MALAYSIA ENVIRONMENTAL
QUALITY REPORT 1998

ISSN 0127-6433