LAPORAN TAHUNAN KUALITI ALAM SEKELILING 1980

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ENVIRONMENTAL POLICIES AND ADMINISTRATION

INTRODUCTION

An increasingly noticeable phenomenon characterising the 20th. century has been the harnessing of advances in science and technology for accelerated development to meet the diverse and increasingly complex needs of the world population expected to reach 6 billion by the year 2000. The convenience and comfort of modern housing, transportion and communications, the creation and expansion of sizeable productive capacity in industry and agriculture, the prevention and cure of many chronic diseases which one exacted a heavy toll on human life and dictated shorter life expectancy can all be attributed to gains made possible through application of advances in science and technology.

Such progress and development reinforced by the need to meet rising expectations fuelled by improved knowledge exacted a heavy toll on the resource base, not least in terms of energy demands not as a prerequisite of development but rather as a consequence. Man's increasing capacity to adversely influence the environment, even capacity for destruction implied by the arms race among the superpowers really underscores that the problems of today have no parallel in history. The imperatives of environmental protection and enlightened environmental management, and of ensuring adequate supplies of energy, fuel and food; the due investigation and rational use of the resources of the world's oceans, and of combatting squalor, poverty, malnutrition and disease brook no delay and are all inescapable facets bearing on society's interaction with the environment. Fortunately, some of the advances in science and technology can be harnessed in the interests of environmental protection and rational resource use, given the will to do so in the face of inexorable political pressures for yet more development to meet rising aspirations. Man has but little margin for error and has to come to terms squarely with the deleterious effects of some of his innovations. The carrying capacity of nature cannot be trifled with indefinitely for the outer limits can be reached and act as a brake on growth. In this sense, environmental pollution of today whether it be of air, land or water, rather reflects failure to use and manage science in ways that fragile ecosystems are not improverished or imperilled.

It therefore, becomes increasingly necessary for society to operate in harmony with nature through integrating environmental concerns into socio-economic planning. In this respect, the performance indicators of economic development should place a premium on economic growth in the framework of a high quality environment and rational resource management. Only then can the true requirements of Man and society be said to be realised in terms of peoples' aspirations to a life of material well-being, spiritual harmony and oneness with nature as the focus of development.

The problems of degradation and pollution of the environment are complex problems for in the final analysis environmental problems are part of a complex web linked to population growth, resource availability and pace of urbanisation and industrialisation, whether in manufacturing industry or in agriculture-based industries or extractive ones like mining and development of infrastructure facilities.

70% of Malaysia's population is in a predominantly rural setting where a good proportion have to contend with problems of inadequate water supplies and sanitation, sub-standard housing and nutritional deficiency. Therefore, accelerated development continues apace on a national scale to help generate the resources for sustained development.

In the urban centres, the pressure of population and development on resources and provision of basic needs has been compounded by the so-called rural-urban drift. This phenomenon increasingly evident in Malaysia's major cities of Kuala Lumpur, Georgetown, Ipoh, Johor Bahru, Melaka, Kuantan, Kuching and Kota Kinabalu is an understandable development in that the economic activities and outlets for social and cultural pursuits are not sufficiently developed in the rural areas which impels a good proportion of the younger and more educated and hence more vigorous and more mobile sections of the population to take a chance on migrating to the urban centres in search of job openings and advancement, if not the bright lights. Needless to add such a trend exacerbates congestion and adds to the burden on basic services already under strain. Such pell-mell growth exerts inexorable pressure on transportation, housing, sanitation and other basic services. In addition to subjecting to severe strain the resource capacity of a given area, it can aggravate pollution, overuse recreational facilities, increase incidence of crime and addiction to dadah, (drug) put paid to open spaces, and render it difficult for the restorative capacity of nature to work in optimum fashion. While the movement of people to the urban centres has been impelled largely by understandable human aspirations for the better things in life and amenities such as schools and health services and cultural amenities plus that particular aura of excitement associated with life in an urban setting, the consequences are nonetheless real and pose tremendous problems for planners and decision-makers to come to grips with.

If the hopes which have drawn the people in the first instance to the city and subsequently some of this number from the city core to the suburbs prove all too often illusory, to do nothing to ameliorate the negative aspects of urban life can mean increasing resort to dadah (drug) and a rising crime rate. The challenge, therefore, is to find ways and means to promote the quality of life amidst urban development; in short to make urban life more fulfilling and wholesome rather than let poverty, squalor, disease and frustration hold away. Along with the essentials of jobs, housing, and health care, it is necessary to provide open spaces and outdoor recreational opportunities, maintain acceptable levels of air and water quality, reduce unwholesome noise and eliminate rampant littering and develop an atmosphere and in general an environment that both delights the eye and uplifts the spirit so that the urban environment is truly meaningful.

By the same token, on the other side of the equation, rural life itself should be made more attractive, thus promoting orderly growth in rural areas. The creation of greater economic, social, cultural, and recreational opportunities in rural areas accompanied by the development of an efficient network of modern communications cannot but contribute to the strengthening of small cities and towns. To this end, the establishment and underpinning of new growth centres in strategic locations throughout the nation is timely and worthy of encouragement through appropriate incentives.

Malaysia as a developing country has little choice but to forge ahead with economic growth to meet the aspirations of the people for an acceptable standard of living. In the process, necessarily some problems of damage to the human environment have emerged and these could well assume serious proportions if neglected without timely action to harness advances in modern science and technology for the benefit of man and the integration in holistic fashion

of social and cultural goals into the development process; in short, to find ways and means of effectively meeting the peoples' clamour, indeed their right to a clean, healthy and safe environment.

APPROACH TO ENVIRONMENT AND DEVELOPMENT

A distinctive feature of the recent past has been the growing recognition by developing countries that the once extant view that held environmental protection and conservation to be the antithesis of development is really not valid. Indeed development carefully planned and managed is needed to help generate the resources needed for conservation and environmental upgrading. By the same token, it is not true that taking environmental factors into account in making decision-making must necessarily add to the costs and delay development unduly.

The environmental policies of developing countries, on the other hand, must necessarily address themselves to effectively cope with both categories of problems, namely, the lack of development as well as the disruption and damage which is a consequence of haphazard and ill-planned development. There is, therefore, a need for the harmonisation of goals and policies of economic development with those of environmental protection and improvement. Developing countries today have the opportunity – and in some cases the means – for better allocation of their environmental resources learning and profiting from the experiences of their counterparts in the developed countries in the past who are presently paying a high price to restore and enhance environmental quality. Environmental protection is eminently an area of human endeavour where the developing countries have the potential of maximising social benefits for present and future generations through sound planning and policy formulation here and now making judicious use of technology and scientific knowledge to which there is access.

This has, in recent years, led to some serious rethinking both among the developed and developing countries alike as to the directions and thrust future course of development should assume. A view increasingly gaining ground in the developing countries holds environmental decisions as organically linked to development decisions. While pollution and conservation are not unimportant from the point of view of environmental management, the thrust of major concern has to do with optimal resource use, resource maintenance and enhancement in the interests of sustainable development. Indeed development with sound environmental management can help to generate the resources and the means for accelerated development, given rational use and timely application of advances in science and technology.

It is important, therefore, that environmental policy is holistic in nature focussed on sound management both of renewable and non-renewable resources so that their enjoyment is not accompanied by deleterious side-effects on the environment. The capacity of the environment to produce essential renewable resources must be maintained, restored or improved, as otherwise counter-productive side-effects on the environment will result with realised benefits from development being significantly less than hoped for.

It is, therefore, imperative that environmental factors are integrated into development planning and regarded as part and parcel of the overall framework of economic and social planning. Environmental concerns should be integrated as yet another dimension in the pursuit of accelerated development in the developing countries and not viewed separately or in isolation from overall development.

In the Malaysian context, it can be said that the objectives of environmental management in developing countries perforce have to be pursued within the context of generating economic growth and employment opportunities and a fairer distribution of income to all within the context of generating economic growth and employment opportunities and a fairer distribution of income to all within the framework of improving the quality of life. In the past the major thrust of most projects has been economic growth, and assessments of ranking order in terms of desirability have centred mostly on comparisons of the economic costs and measurable benefits expected.

There has been rapid evolutin of methods and techniques to evaluate such costs and benefits, and choices have no doubt since improved. With greater experience, more thorough investigation of past projects and increased understanding of natural systems, it is now apparent many development projects can and do have significant, and often unanticipated, effects on the natural environment and that these effects can add to the real costs or real benefits of the undertaking. In this sense, integrating environmental concerns can result in smoother impelementation and optimisation of flow of benefits from investment outlays.

Increasingly, it is now being recognised that, even if the direct and measurable economic costs and benefits of projects remain of prime importance for the majority of projects, the effects on the natural environment which are not included in the economic sums cannot be ignored if allocative efficiency is to be attained. It is, therefore, crucial for developing countries to protect the source of their wealth, both that currently available and of the future, on the principle that renewable resources can best be drawn from a healthy environment. In addition, these countries must be constantly aware that, because of their limited size, their most basic resources are finite and fragile, and thus, farsighted resource husbandry is of paramount importance. It is also important for developing countries to pay due attention to the social costs of development to help ensure truly meaningful development.

In the light of this concept of environment and development, Malaysia has adopted an environmental management strategy involving an integrated approach consisting of both preventive and restorative measures through a combination of sound environmental planning and pollution control measures systematically enforced.

PRIORITY TASK

The Environmental Quality Act, 1974 has now been in force for five years. Its provisions are rather wide in scope and hence a strategy providing for systematic and selective implementation has been adopted. The environmental mandate has progressively become more acceptable to all concerned, for in the final analysis, it is geared towards improving the quality of life of our people in line with stated Government policy and national socio-economic objectives. Since the environment is complex and Man's activities both influence and are influenced by the environment, inter-disciplinary action on a broad front is required to cope effectively with environmental problems. To be effective, such inter-disciplinary endeavours need the closest rappott among all actors on the environmental scene. There are encouraging signs that this is steadily being achieved through the stimulating experience of working together in defence of an environment we share in common and will in time bequeath as a legacy to succeeding generations.

A priority task has been to contain and deal with environmental problems that had accumulated over the years through restorative measures backed by systematic enforcement of

the various Regulations under the Environmental Quality Act, 1974 while developing strategies and planning mechanisms to forestall and avert future problems.

Logically it would be sensible to work out a proper environmental plan to be carried out within the general planning framework before any pollution control work is carried out. However, in the Malaysian context, having due regard to the necessary lead time required to evolve a sound plan (data collection, resources, trained manpower etc.) and the urgency of enforcing anti-pollution measures, immediate action was called for.

In this sense, pollution control has become the 'punch-line' activity in the Environment Division's programme for environmental conservation and enhancement of environmental quality. Important as they are for controlling existing and future environmental problems, these measures have been planned and designed within the framework of the growth targets incorporated in successive development plans, and take into account administrative procedures at both Federal and State levels.

Priority was given to controlling the most chronic sources of water pollution from agro-based industries, primarily palm oil and rubber. On the advice of the Environmental Quality Council, two important sets of Regulations were made – Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977 and Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978, both directed at controlling the discharge of effluents from the two major industries which between them, account for some 90% of the industrial pollution load. 149 palm oil mills and 215 rubber factories respectively throughout Malaysia were subject to these Regulations and concomitant licensing and surveillance by virtue of being designated "prescribed premises".

Similarly, effluent discharges from manufacturing industries such as food processing, textile, chemical and a whole spectrum of others as well as discharge of domestic sewage are controlled by the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979. These Regulations came into force on 1st January 1979 and all factories established after this date were subject to these Regulations with immediate effect. Those factories which had been in existence prior to the coming into force of these Regulations were given two years' time till 31st December 1980 to comply with these Regulations. In all some 3600 factories were subject to these Regulations.

As regards sewage discharge, the degree of control turned on the progress of water-borne sewerage system which in turn was dependent on the quantum of allocations from public funds which continued to be low relative to actual needs.

In coping with marine pollution problems, the Environment Division relied upon a four-pronged strategy as a matter of priority:–

(i) The National Contingency Plan for Mitigation and Control of Oil Spills in the Straits of Melaka, the allocation for which under the Fourth Malaysia Plan slated to be increased from $23 million to $35 million.

(ii) Due enforcement of provisions in the Environmental Quality Act, 1974 for the control of pollution from sea-based sources.

(iii) Control of pollution from land-based sources.

(iv) Monitoring and Surveillance.

Air pollution in the main town centres and suburbs through smoke, dust and gaseous emissions from factories, industrial activities generally and from the fast-growing (annual rate of increase in Peninsular Malaysia: about 12%) motor vehicles population generated increasing concern. Environmental Quality (Clean Air) Regulations, 1978 and Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977 were directed at alleviating these problems.

Another noteworthy landmark was the enactment by Parliament of the National Parks Act, 1980, providing for the establishment and control of additional national parks in Peninsular Malaysia over and above the existing National Park straddling the States of Pahang, Kelantan and Terengganu, which continues to attract many visitors, both locally and from overseas.

ENVIRONMENTAL QUALITY COUNCIL

The Environmental Quality Council established under Section 4 of the Environmental Quality Act, met twice during the year under the Chairmanship of Yang Berbahagia Tan Sri Datuk Hamzah bin Sendut, D.M.P.N., P.G.D.K., P.S.M., D.J.N., P.P.T.

Ever since the Council was inaugurated on 12 April 1977, it had contributed significantly to galvanise the public sector, industry and the scientific community including researchers to exert best endeavours to minimise environmental degradation and increasingly harness energies of all concerned to the task of environmental improvement.

A notable feature of the year, was the lauching of the second Environmental Quality Council on 23 December 1980 by the Honourable Minister of Science Technology and Environment, Malaysia, Tan Sri Ong Kee Hui following the expiry of the term of office of members of the first Council. Tan Sri Datuk Hamzah Sendut was reappointed as Chairman.

Among other things, the Council considered and endorsed the Draft Handbook on Environmental Impact Assessment Procedure and Guidelines.

ORGANISATIONAL SET UP

The organisational structure of the Environment Division continued with Encik S.T. Sundram JSM, PTD as its head as Director General of Environmental Quality during 1980 was as given in Appendix A.A notable feature was the establishment of six Regional Offices one each in Northern, Central, Eastern, Southern Regions and one each covering Sabah and Sarawak respectively, in addition to the two special units in DARA (Lembaga Kemajuan Pahang Tenggara) and Ketengah (Lembaga Kemajuan Terengganu Tengah). The States covered by each of the regional Offices are as follows:—

Northern Region	:	Penang, Perak, Kedah and Perlis.
Central Region	:	Federal Territory, Selangor, Negeri Sembilan and Malacca.
Eastern Region	:	Pahang, Terengganu and Kelantan.
Southern Region	:	Johore.
Sarawak Region	:	Sarawak.
Sabah Region	:	Sabah.

The Division had a substantial increase in staff, namely professional strength increased to 38 and sub-professional strength to 91 and expanded secretariat with support services, particularly in view of the regional offices set-up. During the year under review, preparatory work for the physical establishment of the regional offices was put in hand, including identification of suitable office space in each of the five centres with locations outside Kuala Lumpur.

Each regional office is headed by an Environmental Control Officer supported by Assistant Environmental Control Officers Technicians, and Clerical Staff.

The major activities of the Division during the year were essentially the same as in the previous year and included the following:—

- Baseline studies, and monitoring of water and air quality including marine environment.
- Development of water and air quality criteria and standards.
- Protection of groundwater and soil environment.
- Compilation of source inventory.
- Presiting evaluation of new industrial sources and licensing.
- Development of regulations and guidelines.
- Enforcement of regulations.
- Data processing.
- Development and co-ordination of the National Contingency Plan to combat oil spills.

CONCLUSION

Assaults on the environment are many and varied arising from the wide range of activities in a rapidly developing economy undergoing structural changes as well. Appropriate control measures have been taken, within the constraints of competing policy priorities and claims on resources, as well as Federal/State dichotomy of powers. Priority is given to arresting the existing pollution through the enforcement of the Regulations which apply in full to all new facilities. The Regulations have been carefully structured as to afford adequate time for existing industries to bring down their pollution load progressively by installation of pollution abatement devices and process modification.

As a long-term measure, the Environment Division is taking steps towards proper environmental planning which is the most effective approach to curbing and containing environmental problems. To this end, the establishment, although initially with modest staff manning them, of a nation-wide network of Regional Offices represents significant progress both in terms of forging closer rapport with the State Governments over a whole spectrum of common environmental concerns and also in manifesting a physical presence at grassroots level close to the scene of action. This welcome development and the strengthening of the network over time should stand the Division in good stead in implementing in truly dynamic fashion, the various strategies for sound environmental management developed since 1978.

CHAPTER II

STATE OF THE ENVIRONMENT — 1980

WATER RESOURCES

Annual rainfall over Malaysia is estimated at 990 billion m^3. Of this, 360 billion m^3 returns to the atmosphere through evapo-transpiration. The balance is accounted for by surface runoff (566 billion m^3) and while 64 billion m^3 goes towards groundwater recharge.

Water for paddy irrigation accounted for the largest amount of water consumed in 1980. Some 7.4 billion m^3 was needed for a cultivated area of 546,000 ha. of wet paddy. In addition, domestic and industrial water demand was estimated to account for a further 1.3 billion m^3. Other minor areas where water was required include that for fish culture and irrigation for crops other than paddy. There was high demand of water for hydro-power generation but this demand was essentially of a non-consumptive nature.

Projected figures show that water demand for domestic and industrial water supply will likely reach 2.6 billion m^3 by 1990 and 4.8 billion m^3 by 2000. Similarly, expansion of irrigated paddy areas will see the demand for water increase to 11.6 billion m^3 by 1990 and 15.2 billion m^3 by 2000. With more hydropower generation projects in the pipeline, water demand in this area is expected to increase substantially in the not too distant future.

STATUS OF WATER QUALITY IN PENINSULAR MALAYSIA

The trend in water quality of rivers in Peninsular Malaysia in 1980 was determined by comparing the water quality to the situation in 1979 using the Water Quality Index (WQI)[1] *. The computed WQI for the years 1979 and 1980 were compared as shown in FIGURE 1. The trend of water quality for each river basin was catergorised as follows:—

- River basins whose water quality improved
- River basins whose quality deteriorated, and
- River basins whose water quality remained unchanged or showed no definite trend either way.

The categorization of river basins according to the above is as shown in FIGURE 2.

Overall rivers in the east coast of Peninsular Malaysia were of better quality as compared to rivers in the west coast. The differences in water quality between rivers in the east and west coast are attributable to differences in the rate of development and the distribution of population between the two regions, given that the west coast is more highly developed in terms of industries, agriculture, urban and infrastructure facilities. In addition, population concentration is predominantly on the west coast.

1* The WQI is a numerical expression of the water quality based on the sum of the computed weighted countributions of five parameters analysed, Biochemical Oxygen Demand, Chemical Oxygen Demand, pH, suspended solids and ammoniacal nitrogen. A higher WQI indicates better water quality.

Several river basins showed improvement in overall water quality including the Perlis, Merbok, Kerian, Buloh, Kelang, Melaka, Benut, Pahang and Kemaman. Four river basins, however, showed a significant deterioration in water quality, viz the Muda, Perak, Batu Pahat, Johor and Terengganu river basins.

Whilst overall water quality of rivers may have improved or deteriorated, these changes did not necessarily reflect similar changes for all the parameters analysed. For instance, a decline in overall water quality was not necessarily accompanied by an increase in the Biochemical Oxygen Demand (BOD)[2]* or an increase in the levels of suspended solids (SS). A case in point is Sungai Buloh where improvement in overall water quality was reflected by improvements in both the concentrations of BOD and Ammoniacal Nitrogen[2]* although there was a deterioration in terms of suspended solids. Many rivers continued to be affected by silt and other suspended matter. This was expecially so for rivers influenced by tin mining and land development activities. Rivers such as the Kinta and Bidor (tributaries of the Sungai Perak), Bernam, Selangor, Kelang and Langat showed high suspended matter in their waters and the situation has not changed significantly over the past two years.

An analysis of the distribution of average WQI for all the stations monitored in 1980 showed more than 70% of the stations as having index values above 58 (FIGURE 3). For the purpose of relating the value of WQI to the degree of pollution involved, the following classification was used:—

Degree of Pollution	WQI Range
Grossly Poluted	0 — 31
Moderatedly Pollutedt	32 — 57
Slightly Polluted	58 — 78
Clean	79 — 100

The cumulative frequency distribution of the average WQI of the stations monitored in 1980 expressed as the degree of pollution is displayed in FIGURE 4, which showed that most stations fell within the satisfactory range of 'slightly polluted' to 'clean'.

From the foregoing the inference can be made that there were stretches of rivers or their tributaries which were moderately to grossly polluted. FIGURE 5 and FIGURE 6 display the location and names of such rivers the above two categories during the period 1979 and 1980 respectively. The rivers concerned were largely polluted by discharge from the agro-industries as palm oil and rubber processing and suger refining and domestic sewage from urban centres. However, control measures in relation to the two major agro-industries have brought about significant improvements in many of the once polluted rivers. In consequence, fewer rivers or tributaries fell in the moderately to grossly polluted range in 1980 compared to in 1979.

Suspended Solids, Ammoniacal Nitrogen, Phosphate and Nitrate In Rivers

Suspended matter represents one of the most severe problems in Malaysian rivers (FIGURE 7). High suspended matter is more serious in west coast rivers as compared those in the east coast of Peninsular Malaysia.

2* The Biochemical Oxygen Demand is a measure of organic pollution. The higher the level the more polluted the water.

3* Ammoniacal-nitrogen is used as a measure of organic pollution especially that from nitrogeneous susbtances.

The continued high rate of development in the country coupled with the frequent occurrence of high intensity tropical rains enhances the occurence of soil erosion and subsequent siltation of rivers. The rapid removal of forest cover for agriculture and timber and the absence of good management practices for land conservation aggravates the problem even further. Overall ammoniacal-nitrogen, nitrate and phosphate concentrations in rivers remain relatively low and presently pose no problem (FIGURE 8, 9, 10). However, certain rivers or their tributaries have reached levels which are of concern particularly where these streams are used for abstraction of potable water supply.

Arsenic In Rivers

Arsenic is a contaminant of water which is of common occurence in some Malaysian rivers. However, it is of natural origin mainly derived from rocks containing arsenic found in the country. Studies have shown that it is often associated with tin bearing soils where arseno-pyrites are present. Monitoring results seem to indicate that rivers or river basins where tin mining activity is significant commonly show high arsenic content (FIGURE 11). Levels of arsenic, however, remain within safe levels.

Heavy Metals[4]

Mercury content in river waters was found to be significant in areas associated with mining activities namely the Sungai Perak, Sungai Bernam, Sungai Klang, Sungai Sepetang, Sungai Kurau, and Sungai Sekudai.

In the west coast of Peninsular Malaysia, particularly in the northern regions, lead content was found to be at significant levels. The source (s) of the contaminant cannot as yet be scientifically established but the use of leaded petroleum fuel and the use of lead in chemical and other industries is suspected to have something to do with this situation.

Similarly for chromium, the level was found significant only in the west coast rivers mainly in Sungai Kelang, Sungai Langat, Sungai Sepang, Sungai Linggi, Sungai Bernam, Sungai Sepetang, Sungai Kurau, Sungai Kerian, Sungai Sekudai and Sungai Benut. The main source of this contaminant is probably the industries located within the river systems such as the electroplating, electronic and chemical industries.

Cadmium level was found significant in Perai and Juru rivers mainly due to industrial discharges mainly from industries in the industrial estates of Prai and Mak Mandin. The Sungai Kurau, Sungai Sepetang, Sungai Perak, Sungai Bernam, Sungai Kelang, Sungai Linggi, and Sungai Sekudai were also found to be contaminated with cadmium.

Other heavy metals were found to be insignificant in Malaysian waters and even, if detected, present only in negligible trace quantities.

AIR

INTRODUCTION

Air quality in Malaysia can be characterised as generally good. This is particularly so in rural areas. The air deteriorates and the temperature rises as one approaches the urban and industrial

4* Obtained from the 1980 monitoring data based on the maximum concentration detected in the river basins concerned.

areas where polluting sources such as industries and motor vehicles are significant. The deteriorating trend of air quality in the vicinity of a factory like a sawmill, an iron and steel plant, a chemical plant, a quarry, a rubber factory, a palm oil mill or a rice mill generates public complaints from time to time. There are more than 5000 industrial air pollution sources while the tally of number of vehicles registered in Peninsular Malaysia the end of 1979 stood at 2.4 million at the end of 1980 out of which about 7.5% were diesel powered.

While rainfall does help to flush out some of the pollutants present in the atmosphere thus providing moments of reprieve for those staying close to polluting industries, the humid atmosphere during and after a shower also acts as a wet blanket, trapping the pollutants below it and increasing their ground level concentration.

CURRENT PROBLEMS

An emission inventory conducted by the Environment Division estimated that in 1980 in Peninsular Malaysia alone some 2.3 million tonnes of air pollutants (assuming no pollution control equipment whatsoever was installed) were emitted into the atmosphere as a result of fuel combustion processes. Percentage breakdown of the pollutants yielded 69.93% carbon monoxide, 9.6% sulphur oxides, 8.07% oxides of nitrogen, 10.57% hydrocarbons and 1.75% grit and dust.

About 82.1% of the pollution load was accounted for by transportation (mainly from motor vehicles), about 11.4% was derived from burning liquid fuel in boilers and power plants and about 6.5% form the burning of solid wastes and agricultural wastes such as wood wastes.

Petrol-powered vehicles accounted for about 90% of the 1.6 million tonnes of carbon monoxide and some 86% of the 244,000 tonnes of hydrocarbons while industrial boilers and thermal power plants were responsible for more than 90% of the 223,000 tonnes of sulphur oxides emitted besides an estimated 20,000 tonnes of particulates and 190,000 tonnes of carbon monoxide generated from six (6) iron and steel works assuming no control equipment was used.

STATUS OF AIR QUALITY IN PENINSULAR MALAYSIA

Ambient monitoring conducted in typical residential, urban, and industrial areas of Klang Valley for total suspended particulates and showed that annual mean values at a number of areas Kuala Lumpur Petaling Jaya were above the World Health Organisation (WHO) recomended long term goal (40-90 ug/m^3). A mean value of 227 ug/m^3 was recorded at Pudu Road Kuala Lumpur while mean values of 176 ug/m^3 and 116 ug/m^3 were obtained in the Petaling Jaya Industrial Area and Damansara Utama Residential Area respectively.

Measurements of dust fallout in specific areas throughout the country registered fairly low levels of dust in rural areas. However, values obtained in typical urban centres and industrial areas ranged from a low 61 $mg/m^2/day$ to about 945 $mg/m^2/day$. The ambient air quality standard for deposited dust proposed by the Malaysia Environmental Quality Standards Committee for industrial areas was 392 $mg/m^2/day$. Of the total of 281 air pollution complaints received in 1980, 35.2% were due to dust pollution while 18.1% were attributable to smoke.

Among the significant generators of dust pollution were numbered quarries, sawmills, cement plants and iron and steel works. Other activities contributing to dust pollution include vehicles moving along dusty roads as well as earth moving activities. Smoke problems are caused by open burning of domestic refuse, industrial wastes and agricultural wastes including trees and other forms of vegetation. Smoke also results from fuel combustion in industrial boilers, furnaces, incinerators or other fuel burning equipment due to imcomplete combustion of the fuel. Yet another significant source of smoke is diesel powered vehicles which emit visible dense dark smoke when not properly maintained and serviced.

Another indicator of ambient air quality is the level of sulphur dioxide in the air. Sulphur is present in the industrial fuel oil (sulphur content 3-3.5%) and in the diesel oil (sulphur content up to 1.0%) used in industrial applications as well as in diesel powered vehicles. In 1980, total industrial fuel oil consumed was 3107 tonnes while total diesel consumed was 1099 tonnes. Measurements of sulphur dioxide using the West Gaeke method carried out at a residential area (Damansara Utama) and at an industrial area (Petaling Jaya) showed that the mean level were in the region of 30 ug/m^3 respectively. Total acidity measurements using the acidimetric method at an urban area (Johore Bahru) and at two typical industrial sites (Pasir Gudang and Prai) showed that the mean acidity levels were 26 ug/m^3, 55 ug/m^3 and 60 ug/m^3 respectively. The World Health Organisation (WHO) recommended long term goals for acid gases/sulphur dioxide are 40-60 ug/m^3 (annual arithmetic mean).

NOISE

CURRENT PROBLEMS

There is a growing awareness among members of the public on noise nuisance. The total number of complaints rose from about 27 cases in 1979 to 92 in 1980. Most of the complaints (69) came from residents staying near factories including engineering workshops, wood based industries, rice mills and iron and steel works. Fourteen (14) complaints were on comunity noise – noise from next door neighbours, from dogs and from business premises. Seven complaints were on traffic noise, one on aircraft noise and one on construction noise.

NOISE LEVELS IN KUALA LUMPUR

Measurements of urban noise conducted by researchers from Universiti Teknologi Malaysia in the 1979/80 session in Kuala Lumpur, showed that the sound level was high in the central area of the city. The mediam value (L50) was 70-75 dB(A), and the upper value of the 90% range (L5) was 75-80 dB(A), a level at which conversation is just barely possible in some areas. The equivalent continuous sound level (Leq) values are also rather high, and in general the sound levels were strikingly high at measuring points near major roads.

Even in the central area of the city, however, these was a trend for sound levels to decline some distance away from the main roads.

In areas where there are parks or in the vicinity of the National Museum, both L50 and Leq were some 20 dB(A) below the sound levels in the city's central area.

The study concluded that the environmental noise in Kuala Lumpur results mainly from motor vehicles moving along the streets and in the central area, from loud speakers and human

voices. In the parks and other areas of greenery, there is very little influence from motor vehicles and the primary source of environmental noise is human chatter. The study also pointed out that the sound level in the central area of the city is roughly equivalent to that in downtown Los Angeles or New York.

MARINE ENVIRONMENT

On the basis of the results of monitoring during 1980, sewage can be in pinpointed as the major source of pollution of the marine environment as evidenced by the high levels of coliform and E. Coli bacteria recorded in most stations surveyed, particularly in the West Coast of Peninsular Malaysia.

The waters of the East Coast can generally be said to be clean. Samples taken from the Coastal Waters at Pantai Cinta Berahi, Pantai Teluk Cempedak indicated very low values for E. Coli which ranged from 0-5 MPN per 100 ml.

In the West Coast of Peninsular Malaysia E. Coli values ranging from 0-35,000 MPN/100 ml were observed.

In the Penang Coastal waters E. Coli values ranging from 0-1,800 MPN/100 ml were observed in samples taken from 22 stations.

In Port Dickson E. Coli values ranging from 0-18,000 MPN/100 ml were observed in samples taken from 9 stations.

In the Straits of Johore samples taken at 10 stations had E. Coli values ranging from 0-3,000 MPN/100 ml.

Beach tar monitoring during the year indicated that 42% of the 68 stations monitored in the recreational beaches of the West Coast of Peninsular Malaysia were found to be contaminated with oil residues. In the East Coast of Peninsular Malaysia tar residues ranging from 30-90 grams/meter strip in the stations monitored at Pantai Irama Bachok, Pantai Sabah in Kelantan, Pantai Seberang Takir in Terengganu, Pantai Nenasi and Pantai Air Papan were observed.

FORESTRY

FOREST RESOURCES

Malaysia has a total land area of 33 million ha. of which approximately 61.8% or 20.4 million ha. are under forest. The estimated forested areas in Peninsular Malaysia, Sabah and Sarawak are as follows:–

Forest Resources and Major Forest Types (million ha.)

Region	Dipterocarp	Swamp	Mangrove	Total
Peninsular Malaysia	5.5	0.8	0.1	6.4
Sabah	4.0	0.2	0.4	4.6
Sarawak	7.7	1.5	0.2	9.4
Malaysia	17.2	2.5	0.7	20.4

CONSTITUTIONAL PROVISIONS

Under the Malaysian Constitution "land" is a subject area falling within the State List and hence land use is a matter for the individual States. Similarly in respect of forests and water, each State is empowered to enact laws on forestry and to formulate forest policy. The executive authority of the Federal Government only extends to the conduct of research and maintenance of experimental and demonstration stations, training and the provision of advice and technical assistance to the States.

To facilitate the adoption of a co-ordinated and common approach to forestry, the National Forestry Council (NFC) was established by the National Land Council (NLC) with effect from 20th. December, 1971. The NLC is empowered under the Malaysian Constitution to formulate a national policy for the promotion and control of the utilization of land for mining, agriculture and forestry. The NFC serves as a forum for the Federal and the State Governments to discuss and resolve common issues and matters pertaining to forestry policy, administration and management. All decisions of the NFC have to be endorsed by the NLC. The responsibility for implementing the decisions of NFC lies with the State Governments except those falling clearly within the authority of the Federal Government.

The Permanent Forest Estate (PFE) to be established in Malaysia is estimated to be 11.6 million ha., of which 7.9 million ha. are identified as productive and the remaining 3.7 million ha. as protective and amenity forests. The PFE is to be managed on sustained yield basis. The annual coupe is 75,000 ha. for Peninsular Malaysia, 48,000 ha. for Sabah, and 50,000 to 52,000 ha. for Sarawak. The annual coupe for Sabah is expected to be reduced to 32,000 ha. from 1990 onwards. In Sarawak, the annual coupe consists of 40,000 ha. of Mixed Dipterocarp Forest and 10,000 to 12,000 ha. of Peat Swamp Forest.

POLICY AND LEGISLATION

A National Forest Policy was accepted by the National Forestry Council and endorsed by the National Land Council on 10th. April, 1978. The policy consists of 12 statements of which the following are significant from an environmental viewpoint:–

(a) To dedicate as Permanent Forest Estate sufficient areas of land strategically located throughout the country, in accordance with the concept of rational landuse, in order to ensure:–

(i) the sound climatic and physical condition of the country, the safeguarding of water supplies, soil fertility and environmental quality and the minimization of damage by floods and erosion to rivers and agricultural land: such forest lands being known as: PROTECTIVE FORESTS;

(ii) the supply in perpetuity at a reasonable rates of all forms of forest produce which can be economically produced within the country and are required for agricultural, domestic and industrial purposes and for export; such forest lands being known as:– PRODUCTIVE FORESTS; and

(iii) the conservation of adequate forest areas for recreation, education, research and the protection of the country's unique flora and fauna; such forest lands being known as: AMENITY FORESTS.

(b) To manage the Permanent Forest Estate with the object of maximising social, economic and environmental benefits for the Nation and its people in accordance with the principles of sound forest management.

(c) To pursue a sound operations programme of forest development through regeneration and rehabilitation operation in accordance with approved silvicultural practices in order to achieve maximum productivity from the Permanent Forest Estate.

(d) To ensure thorough and efficient utilisation of forest resources on land not included in the Permanent Forest Estate, prior to the alienation of such land, by means of proper coordinated planning by land development agencies in order to obtain maximum benefits for the people through complete harvesting and processing of such resources, adhering strictly to the optimum need of local processing industries.

(e) To promote efficient harvesting and utilization of all forms of forest produce and to stimulate the development of appropriate wood-based industries with determined capacities commensurate with the resource flow in order to achieve maximum resource utilization, create employment opportunities and earn foreign exchange.

(f) To undertake and support an intensive research programme in forest development aimed at achieving maximum yield from the Permanent Forest Estate, maximum direct and indirect benefits from harvesting and utilization and above all maximum financial return on investment in forest development activities.

(g) To foster close cooperation among all in order to achieve optimum utilization of the valuable natural resources of the country.

(h) To foster, by education and publicity, a better understanding among the community of the multiple values of forests to them and their descendants.

Following the adoption of the above forest management strategy, the Selective Management System (SMS) was formulated. The SMS is designed to optimize the management objectives of economic harvesting, sustenance of the forest and minimum forest development cost, under prevailing conditions. The system is based on a preliminary assessment of the forest resource base and its characteristics, the socio-politico-economic situation and a common sense approach to resource management. It requires the selection of a management (felling) regime based on inventory data rather than an arbitrary prescription equitable to both logger and forest owner which ensuring ecological balance and environmental quality.

SILVICULTURE AND REFORESTATION

Silvicultural practices in Malaysia are aimed at the improvement of stand composition by release treatment and regeneration of the desired species by canopy manipulation and enrichment planting. Under the Malayan Uniform System (MUS) attention was originally focussed on the seedlings and saplings which were expected to form the bulk of the succeeding crop. As such silvicultural treatments were aimed at favouring these groups, often at the expense of bigger trees and advanced growth. This led to a much heavier poison girdling of trees than was necessary and, in some cases, to too drastic opening of the canopy. However, the emphasis was shifted in the seventies from the seedlings and saplings to advance growth. This led to a more discriminating use of the poison girdling technique and a strengthened conservational approach in silvicultural treatments. The shift in emphasis was due to the recognition of the sensitive environment of the Hill Dipterocarp Forest, the uneven nature of exploitation and the necessity to curb wastage that was incurred in poison girdling standing trees and advance growth of good form.

The rate of reforestation by silvicultural treatment compared to rate of forest harvesting has been rather low. However, with the implementation of the contract work system in reforestation activities, the rate of reforestation has improved significantly.

FOREST PLANTATION

In 1973, two major forest plantation projects in Kemasul (Pahang) and Ulu Sedili (Johore) were initiated after the completion of the FAO/UNDP-assisted 'Pilot Plantation for Quick Growing Industrial Trees". **Pinus caribae P merkusi** and **Araucaria** special were planted in Peninsular Malaysia. To date over 2,500 ha. of **caribaea** have been established. The total area of pine plantations scattered throughout Peninsular Malaysia is estimated to be 6,000 ha.

However, the recent shortage of timber and the impending 'timber crisis' situation in Peninsular Malaysia have prompted the implementation of the Compensatory Plantations Project to grow and provide general utility timber for the nation. It is envisaged that, by 1995, the project will have established 189,000 ha. of plantations of trees of quick growing species such as **Gmelia arborea, Acacia mangium, Eucalyptus camaldulensis,** and **Albizzia falcataria.** These plantations will be managed on a 15-year rotation.

In Sabah, the Sabah Forest Development Authority (SAFODA) had plans to establish about 122,000 ha. of plantations of quick growing species. The Sabah Softwoods Sdn. Bhd., a joint-

venture private company had successfully established more than 20,000 ha. of plantations of Albizzia falcataria, Eucalyptus deglupta and Gmelina arborea since 1974.

In Sarawak, apart from the plantations established for species provenance trials and the 'Engkabang' plantations in Semengoh Forest Reserve, there are no large forest plantations. It is also unlikely that large-scale forest plantations will be established apart from those established to rehabilitate shifting cultivation areas in the Parmanent Forest Estate.

CONSERVATION AND PROTECTION

Logging activities, particularly the construction of logging roads, have been identified as a major source of soil erosion in the hill environment. This is particularly prevalent in granitic soils where the soil structure is easily eroded. Measures which have been taken to minimise the problems include strict specifications on road alignment and construction, close control of felling and skidding and imposition of a higher minimum felling firth where necessary. Recognising the need to protect and safeguard the forest environment comprehensive studies have been initiated to monitor and evaluate the effects of logging on the quality and the yeild of water in the hill forests. These studies, now know as the "Forest Experimental Basin Studies", were established with technical assistance from New Zealand.

Currently, several departments and government agencies are involved in watershed and environmental management in the country. Existing pieces of legislation which have a major bearing on watershed management, the environment and conservation include the National Land Code, Land Conservation Act, Water Enactment, Forest Enactment, Mining Enactment and the Environment Quality Act. These laws are considered adequate for suitable measures to be taken in soil and water conservation.

In order to cordinate the work of various agencies which are associated with watershed management, a National Water Resources Committee comprising representatives of the relevant agencies has been set up. This Committee has organised working groups to study specific problems such as standardisation of hydrological equipment and formats for publication of data. It is also responsible for studying reports related to watershed management prepared by foreign consultants and advising the Government accordingly.

Apart from these watershed conservation measures, efforts have been made to conserve pockets of virgin forest. These pockets, known as Virgin Jungle Reserves (VJR), were established to serve as permanent nature reserves and natural arboreta, controls for exploited and silviculturally treated forests and undisturbed natural areas for general ecological and botanical studies. Since its inception in 1950, a total of 100 such VJRs were established throughout Peninsular Malaysia. These VJRs represented samples of many types of virgin forest in every part of the country. Represented forest types include Mangrove forest, Beach Strand Forest, Health Forest, Peat Swamp Forest, Lowland Dipterocarp Forest, Hill Dipterocarp Forest, Upper Hill Dipterocarp Forests and Montane Forests. A survey carried out between 1974 to 1976 showed that 86 of the original 100 VJRs covering about 19,000 ha. were still intact. Apart from these VJRs, 460,000 ha. are permanently reserved as the National Park or Taman Negara. Another 900,000 ha. in Peninsular Malaysia have been proposed as national parks, nature reserves, and wildlife sanctuaries.

Sabah has about 146,000 ha. gazetted as national parks and wildlife sanctuaries. In 1978 there was a proposal to establish another 200,000 ha. as National Parks. In Sarawak there are

NATURAL LANDSCAPE:
Limestone Hill.

Photo by courtesy of: Jabatan Perlindungan Hidupan Liar dan Taman Negara.

FORESTRY MANAGEMENT:
A typical example of reforestation programme by the Jabatan Perhutanan Semenanjung Malaysia.

Photo by courtesy of Jabatan Perhutanan Semenanjung Malaysia.

five gazetted national parks covering an area of 73,000 ha., with another three in various stages of being gazetted. Apart from these, there are three wildlife sanctuaries namely, the Samunsam Wildlife Sanctuary established to protect the Proboscis monkey, and a proposed sanctuary for Orang Utan covering 185,000 ha. in the Gunung Lesong, and the Lanjak-Entiman areas.

The rapid but uncoordinated development of forest industries in the past has had a disturbing effect on forest management and upset the organisation of wood supply. In order to rationalise the activities of the forestry sector in the economy and to increase all round efficiency the concept of Integrated Timber Complexes (ITC) with long term concessions was introduced. It was also felt that besides maximising utilization and productivity, the ITCs could also play an important role in controlling and implementing better harvesting methods in their own concessions areas. During the course of the year, 12 such complexes with a total concession area of 782,000 ha. and an annual coupe of 25,300 ha. have been established.

RESEARCH

Several preliminary research projects have been carried out by the Forest Research Institute mainly to study the impact of forest activities (for example logging and road construction, etc) on the environment especially on water quality due to siltation and sedimentation within the water catchment areas. So far, the studies undertaken on two catchment areas i.e. in Kedah and Selangor indicated that there are some significant changes in terms of silt content in the logged catchment areas compared to undisturbed forest. It was reported that at the time of low flow and storm flow, mean concentration of sediment are 400% and 1300% respectively higher than sediment found in the undisturbed forest. The studies also showed that mean concentration of silt examined from controlled logging activities are 114.5 mg/l compared to the uncontrolled logging operation, that was found at the level of 1594.9 mg/l. The conditions prescribed for logging operation as a result of the above study are as follows:—

(a) As far as possible, logging activities be carried out at a distance of 40.2 meters or more from any river;

(b) Only trees with diameter not less than 1.83 meter permitted to be cut;

(c) Areas with the relies of 500 meter high are not suitable for any logging and road construction; and

(d) Bridges must be constructed only at the necessary places.

Follow-up research is being carried out by the Forest Research Institute and other government bodies to supplement data related to forest activities namely:—

(i) Jengka Experimental Basin, or Sungai Tekam experimental Basin in Pahang;
(ii) Berembun Experimental Basin in Kuala Pilah, Negeri Sembilan; and
(iii) Representative Basins Network.

Research On Sungai Tekam Experimental Basin[1]

This is a joint research study by the University of Malaya, Drainage and Irrigation Department, Federal Land Development Authority, Department of Agriculture, Forest Research

Institute and the Environment Division. The study expected to be completed in the year 1985, is to monitor the effects of land-use changes (from forest to agricultural crops) on the water balance, water yield, water quality, peak discharge, baseflow and the stream sediment loads. The data obtained from the study would provide the basis for quantitative evaluation of possible changes as a result of deforestation and conversion to agricultural tree-crops and also useful for river basin development planning terms of landuse zoning, the maintenance of minimum forested areas as water catchment areas and sustaining clean water supply. Currently, two catchment areas were logged and one catchment acts as a control in the basin, and topography, vegetation and soil, the streams etc. are calibrated from time to time.

Jengka and Bukit Berembun Experimental Basin

A study was carried out by Forest Research Institute to determine the effects of controlled timber harvesting/logging operations on water quantity and water quality. This study hopefully aims to provide the basic data required for preparation of guidelines in logging operations and formulation of a rational forest management policy especially in water catchment areas.

Representative Basins Network

The Representative Basin Network is established by Drainage and Irrigation Department, and consists of five drainage basins, namely the Sungai Parit Madirono Basin, Sungai Anak Keroh Basin, Sungai Lui Basin, Sungai Chalok Basin and the Sungai Kipis Basin. Those basins are selected based on the dominant land-use in the basin[2]. Data obtained from each basin would provide comparisons of basins run off response (run off, sediments, etc.) under varying land-use.

ENERGY

ENERGY CONSUMPTION AND ENVIRONMENTAL IMPACT

* The world energy crunch has led to moves to conserve on usage of fossil fuels in the main consumer countries and a trend to switch to cheaper or more cost-effective conventional sources of energy more often than not accompanied by adverse environmental impacts. In Malaysia, the Lembaga Letrik Negara Tanah Melayu is reportedly exploring wider use of fuel oils with high sulphur content while some industrial establishment have switched from diesel to heavier industrial fuel oils. While monitoring results indicated sulphur dioxide levels to be still within tolerable limits prudence dictates that the situation is kept under close surveillance.

* Energy recovery from biomass continues to remain very insignificant. To encourage enhanced recovery, DOE continued to permit the traditional smoky charcoal making process so long as sites were located well away from residential areas. There has been improvement in dark smoke and dust emissions arising from boilers and furnaces using wood waste and oil palm shell fibre for fuel.

* Encouraging initial steps have been taken by some research institutions in Malaysia to examine the prospects for utilisation of agricultural waste for energy generation. A project had been initiated by a plantation agency group to generate biogas from palm oil mill effluent, with a pilot plant due to be commissioned shortly.

* The vast majority of rice mills requiring energy to dry paddy continued to resort to heavy dependence on fuel oil while the potentially exploitable paddy husk was disposed of through open burning in contravention of the prohibition under the Environmental Quality (Clean Air) Regulations, 1978. This practice caused problems of a nuisance nature to nearby residents through smoke and dust pollution which in turn generated complaints to the authorities. In this respect, there seems a compelling need for the dryers to be converted to use paddy husk as an energy source.

* The intensified search for oil and gas associated developments in exploitation can be expected to result in more environmental significant impacts calling for more careful and systematic monitoring and environmental control measures. In this respect, an encouraging feature has been the constructively helpful response to date from Petroleum Nasional Berhad (PETRONAS) its subsidiaries and contractors, in particular in carrying out Environmental Impact Assessment on a voluntary basis.

ENERGY CONSUMPTION PATTERN

Malaysia's national energy consumption in 1980 was of the order of 63.3 million barrels of oil equivalent. The contribution of various sources of primary energy to the total demand is as follows, with oil pre-eminently the single major source of energy:—

Energy Consumption

Primary energy	*Mn B	Percentage %
Oil	58.6	92.6
Gas	0.7	1.1
Hydroelectricity	2.3	3.6
Coal	0.2	0.3
Others	1.5	2.4

*million barrels of oil equivalent

Sectoral breakdown of the total energy consumption is as shown in the table below:—

Consumption by Sector

Sectors	Percentage
Electricity	29
Transport	20
Manufacturing	19
Commercial	8
Mining/Quarrying	7
Household	7
Agriculture	6
Others	4

The electricity sector by far constitutes the largest energy consuming sector at 29% of the total energy consumption followed by the transport and the manufacturing sectors.

TRENDS IN ENERGY DEMAND

Several scenarios of our energy consumption for the next decades can be postulated based on certain economic parameters. If the economic growth rate for the period 1980-2000 can be projected at 8.1 percent per annum on average and our total energy consumption is similarly projected to increase at a relatively higher average rate of about 8.4 percent the projected energy demand for the next two decades is as follows:—

Energy Demand Projections 1980-2000

Year	Energy Demand *(bdoe)
1980	170,000 (actual)
1985	248,000
1990	374,00
1995	563,000
2000	849,000

*bdoe: barrel per day of oil equivalent

ENERGY CONSERVATION

A three-month long publicity campaign exhorting energy conservation was launched towards the end of the year under review aimed at promoting awareness among the general public on the need to rid themselves of wasteful patterns of energy consumption. The campaign with stress largely on visual material, was carried out through civics courses and spot announcements over radio and television and attempted to impress upon all concerned that simple good housekeeping measures in the domestic, transportation, industrial and manufacturing sectors can go a long way and yield energy savings of between 5 to 20 percent.

NON-CONVENTIONAL ENERGY

In the strategy for mitigating air pollution, the potential for cutbacks on the pollution load through a systematic resort to non-conventional sources of energy should not be lost sight of. Ongoing research and development activities on non-conventional energy sources through universities and research institutes examples of which are University Sains Malaysia (USM), University Kebangsaan Malaysia (UKM), University Pertanian Malaysia (UPM) and Standards and Industrial Research Institute of Malaysia (SIRIM) are promising. These include solar energy, agricultural wastes such as paddy husk, palm oil mill effluent and sawdust. A noteworthy feature is that palm oil mills are self-sufficient in energy using fibre, fresh fruit banches and kernels in addition to the biogas production already mentioned.

CHAPTER III

POLLUTION ABATEMENT AND CONTROL

WATER POLLUTION CONTROL

During the year, the Environment Division directed its efforts towards controlling pollution from point sources, namely from the discharge of industrial effluents and sewage from the domestic or household sector. Control was effected through the enforcement of the following Regulations under the Environmental Quality Act, 1974:–

(i) Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977. (P.U. (A) 342/1977).

(ii) Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978. (P.U.(A) 338/1978).

(iii) Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. (P.U.(A) 12/1979).

For control purposes, sources of water pollution are classified into three broad groups, namely palm oil mill effluent, natural rubber processing effluent and sewage and effluent from manufacturing industries.

WATER POLLUTION LOAD BY SOURCES

In formulating Malaysia's industrial wastewater control programme initial efforts had to be directed towards the task of obtaining adequate baseline information relating to industrial pollution sources, to enable the quantification of wastewater discharges and pollutant loads on a country-wide basis. In addition, information was also needed as type, nature and location of the important pollution sources, their wastewater characteristics, existing conditions of water quality in rivers and the present and possible future beneficial water uses and water demands. The analysis of such information was considered not only essential to provide a rational basis for the industrial wastewater control plan and its objectives, but also to help establish priorities and appropriate control strategies.

Information gaps obviously existed in the initial pollution source inventories. These could only be rectified by detailed surveys which have since been put in hand to enable the progressive upgrading of the inventories. The most difficult area of information collection was the manufacturing sector of industry where wastewater and other pollution-related data were still limited.

Since the latter half of the decade of the seventies and more recently, the situation with regard to industrial wastewater information has generally improved with the coming into force of wastewater regulations. More detailed area-based data has also been obtained in conjunction with the increasing number of "sewerage master plan and urban feasibility" studies for the major centres and various 'water resource' studies. Information from these sources, as well as the Environment Division's own inventory surveys are being used to upgrade the existing pollution inventories.

However, pollution source inventories on a national basis have been more readily established for the crude palm oil and raw natural rubber industries. In the case of the manufacturing sector, initial approximations based on the use of rapid assessment methodology for determining pollution loads has been inevitable, and this will require upgrading progressively.

Palm Oil Industry

Between 1970 and 1980, the planted area of oil palm increased from 308,800 to 890,000 hectares, with corresponding increase of palm oil production from 431,000 tonnes to 2.59 million tonnes, averaging growth of 19.6% per annum.

By the ends of the year 1980, a total of 149 mills were in operation, ranging in capacities between 10 tonne/hour and 60 tonne/hour in terms of the fresh fruit-bunches (F.F.B) processed. Distribution of the mills is as shown in Figure 12. The total BOD load generated amounted to nearly 1330 tonne/day having a population equivalent of 26 million, while the total wastewater discharge amounted to approximately 64,500 cubic metres/day. The total BOD loads and their respective population equivalents for the period 1978-1980 are shown in Table I.

The production of crude palm oil involves a purely mechanical extraction process in which the fresh fruit bunch (FFB) undergoes sterilisation, digestion, oil extraction and clarification, resulting in the generation of about 1.5 cubic metres of wastewater per tonne FFB processed, with an average BOD concentration of 25,000 mg/l. A typical analysis of palm oil mill wastewater is shown in Table II. The highly polluting effect of palm oil mill wastewater is clearly reflected when considering that a 20-30 tonne/hour mill generates a BOD load equivalent to that from a population of about 200,000 persons, a sizeable urban population.

The Rubber Industry

Planted acreage of rubber in the estate sector declined over the decade, from 647,200 hectares in 1970 to 507,100 hectares in 1980. However, total planted area in 1980 remained at 2,100,000 hectares due to increases in smallholder schemes. During the decade rubber production grew by only 2.3% per annum and increased from a total of 1.27 million tonnes to 1.6 million tonnes.

During 1980 a total of about 375 rubber factories (45 latex concentrate; 150 SMR: and 180 conventional grade) distributed as shown in Figure 13, were estimated to generate about 90,000 cubic metre/day of wastewater with a BOD load of approximately 208 tonne/day (population equivalent of nearly 4.16 million). These are shown in Table III.

Typical analyses of latex concentrate and SMR block rubber wastewaters are shown in Table IV and V respectively.

The Manufacturing Industries

The Principal Statistics of Manufacturing Industries – By States, compiled and published by the Department of Statistics showed a total of 4,499 establishment in Malaysia in 1978, of which 37% were located in the Klang Valley (State of Selangor/Federal Territory of Kuala Lumpur), 14% in Johore, 13% in Penang and 16% in Perak. Distribution of the Industrial estates is as shown in Figure 14.

A survey of various sources of information on manufacturing industries in Malaysia resulted in a listing of a total of 2,013 industries in Peninsular Malaysia within the following industrial categories: food and beverage; manufacture of chemicals and other chemical products, textiles; paper and paper products; basic metal industries; electronics and battery manufacture.

For the purpose of establishing a first approximation of the total pollution loads discharged by the manufacturing sector, methodology for rapid assessment of water pollution sources, which is currently being promoted by the W.H.O. for use in developed countries, was adopted. A summary of the total wastewater volume, BOD and Suspended Solids loads derived on the basis of 1979 production date for the manufacturing sector is shown in Table VI.

The estimated total wastewater volume was 123,600,000 cubic metres per year or 412,000 cubic metre/day. The estimated BOD load was 37,250 tonne/year or 124 tonne/day. The population equivalent of this BOD load from the manufacturing sector was approximately 2.48 million persons (1980 estimated population of Malaysia was 13.8 million).

Table VII shows the industrial wastewater profile by type of industry. It appears that nearly 97% of the wastewater discharge is from 3 manufacturing categories, namely Food Manufacturing (40.4%), Industrial Chemicals and other Chemical Products (35.2%) and Textiles (21.2%). The same 3 categories of industries together were estimated to discharge 96% of the total BOD load, with their respective individual loads not varying significantly between them.

Using the rapid assessment method it was difficult to obtain a meaningful estimate of the pollutant loads for toxic substances. However, a pollution study of the Juru River Basin, which receives waste discharge from the Prai Industrial Estate in Penang showed discharges of toxic heavy metals such as mercury, lead, zinc, chromium and cadmium amounting to about 23 kilogram/day – (Maheswaran and Godwin Singam 1976). Similar toxic heavy metals discharged into the Kelang River Basin from industrial estates in Kuala Lumpur, Petaling Jaya and Shah Alam amounted to approximately 3,600 kilogram/day (Balfour and Sons, 1973). There represent two of the most industrialised areas of the country.

Domestic Wastes

The 1980 population of Malaysia was estimated at 13.8 million persons. Approximately eleven percent of the urban population were estimated to be using facilities connected to community water-borne sewerage systems. Based on the above information and appropriate factors used in rapid assessment, pollutant loads were calculated for domestic sources. The estimated total liquid wastes amounted to 76,830 cubic metres per year or 210,500 cubic metre per day. The BOD, COD, and SS loads amounted to the equivalent of 220 tonnes/day, 538 tonnes/day, and 618 tonnes/day respectively.

Comparison of Domestic and Industrial Pollution Loads.

Table VIII shows relative BOD loads from domestic sources, the crude palm oil industry, the raw natural rubber industry and the manufacturing sector.

Both the wastewater volume and the BOD load contributed by the sum total of industrial sources are more than 2.5 times that of the domestic sources. In the event, an examination of the relative BOD contributions of the Palm Oil Industry (62.7%), the Rubber Industry (7.4%) and Manufacturing (4.4%), shows only too clearly the justification for the ordering of priorities adopted by the authorities to control these industrial sources.

The BOD load generated by the sum total of industrial sources amounted to a total population equivalent of nearly 35.8 million persons, ie. 2.6 times Malaysia's actual 1980 estimated population.

APPROACH AND STRATEGIES

In the 1979 Annual Environmental Quality Report, the initial strategies and long-term approach for pollution control and water quality management proposed for adoption in Malaysia were clearly described. It was pointed out that Malaysia being a developing economy, could ill afford to pursue the ideal situation of maintaining or restoring water to the highest level of purity, beyond even the quality requirements demanded by beneficial use considerations. Thus, in deciding on a suitable practical approach to industrial wastewater control, the two popular modes, namely that based on the "effluent-standards" approach and the other based on 'stream-standards' were both carefully explored.

In view of the obvious constraints posed by the otherwise environmentally more sound 'stream-standards' approach, such as the enormous trained manpower requirements, the comprehensive water quality data demands, and the considerable immediate expenditure needed, its full adoption in the short-term had to be ruled out. Instead, it was decided to adopt initially an approach somewhat in intermediate between the two, incorporating useful elements of both systems and taking into consideration not only water quality protection needs, but also the techno-economic constraints of industry in Malaysia. For example, in the Sewage and Industrial Effluents Regulations, applicable to industry at large (excluding the palm oil and rubber primary industries), due to purely environmental grounds it was inevitable to set fixed discharge standards or limits (ANNEX A) for those pollutants that display bio-accumulative properties in the aquatic food-chain, and acute or chronic forms of toxicity such as in the case of some 'Black List' and 'Grey List' heavy metals. The need to curb the discharge of these substances and limit them to low ambient levels with a sense of urgency are perhaps obvious.

However, for parameters relating to 'non-conservative' substances like simple biodegradable organics which do not exhibit any of the above properties variable limits have been permitted. Limits for such pollutant parameters listed under a separate schedule in the Regulations are determined, taking into consideration prevailing conditions of the water-receiving watercourse and beneficial uses to be protected.

On the other hand, given the lack of appropriate wastewater treatment technology which was techno-economically viable initially faced by the economically significant palm oil and rubber industries, the approach of imposing a pre-scheduled set of progressively more stringent wastewater standards, commensurate with research and development progress had to be adopted. ANNEXES B, C and D, show these standards as applied to the palm oil and rubber industries (latex concentrate and SMR block rubber), which have been incorporated into their respective regulations; i.e. Crude Palm Oil and Raw Natural Rubber Regulations.

It should also be noted that where fixed wastewater discharge standards have been incorporated into Regulations, judicious application of enabling provisions of the principal Act permit granting of temporary relief or even extended sanction for contravention in genuine and justified cases of techno-economic or other difficulties. However, this involves the imposition of wastewater-related licence fees, with rates charged based on industry and pollutant-type category, so devised as to discourage frivolous applications devoid of serious merit.

In the particular case of the Palm Oil Industry, higher 'prohibitive' rate charges based on BOD load discharge were applied in the first year of control (1978). This was in view of the fact that the applicable BOD standard of 5000 mg/l was not made 'mandatory' to allow the industry the choice of implementation or otherwise of the then 'limited available wastewater treatment technology'. The industry's response to the 'polluter-pays-principle' is worth noting and is briefly described later in the report.

While efforts have been directed at arresting pollution from existing industries, even greater care has been exercised to ensure that new industrial establishments or even new sources of discharge comply with the acceptable conditions stipulated in the various regulations. This has been done through regulating requirements that new industrial applications must seek prior approval of the Director General of Environment in relation to new sources of discharge. In the case of major industrial projects, efforts are in hand to formalise the requirement for Environmental Impact Assessment (EIA), for which purpose a draft handbook detailing the procedure and guidelines proposed for adoption in Malaysia has already been finalised.

PROGRAMME PERFORMANCE

The response of Malaysian industry to wastewater control to date can be considered as moderately favourable and thus progress towards pollution control and water quality improvement has been satisfactory. This can mainly be attributed to the successful technological 'breakthrough', in the late seventies in palm oil mill and rubber factory wastewater treatment involving relatively low-cost biological treatment systems of the lagoon type.

The improvements appear particularly significant in view of the previously relatively large contributions to the total organic pollution load by both industries. In the case of industries in the manufacturing sector, a definite assessment of status of compliance with respect to wastewater standards is yet to be determined, owing to the large number of industries involved and the date of effective enforcement for existing industries viz. 1st. January 1981 which is yet to be reached.

The Crude Palm Oil Industry

As already indicated, for the palm oil industry the first year 'guideline' standard for BOD of 5,000 mg/l, was not 'mandatory'. The wastewater being basically organic, BOD load-related fees were charged and the rate was M$10.00 per tonne for BOD loads where concentrations are below 5000 mg/l. However, a surcharge of M$100.00 per tonne was payable for BOD loads in excess of that corresponding to the 5,000 mg/l concentration.

These rates were set such that fees payable for raw wastewater discharge (per annum) would significantly exceed, at least 'the capital cost of implementing newly developed anaerobic lagoon' treatment technology. Earlier reluctance on the part of some sections of the palm oil industry to actively join in timely implementation of the above proposed treatment scheme could be attributed to either initial scepticism of its success or the view that it would only satisfy initial standards and did not constitute the total and final system. Indifference in some cases and genuine constraints of land space in others were also observed.

Table IX represents the response of the industry and shows the range of fees paid by various mills. At least 54% of the initial 130 palm-oil mills responded positively by paying fees

amounting to about M$10,000.00 per mill. Response by a large number of others appeared gradual until the first 'mandatory' BOD standard of 2000 mg/l came into force. A total of M$3.5 million were paid in wastewater-related fees for the first year.

The overall progressive reduction in the total BOD load discharged by the industry over the period 1978-1980 is shown in Figure 15. Although palm oil production had steadily increased with the number of mills increasing from 130 in 1978 to 149 by 1980, the rate of BOD reduction increased from 76% in the first year (BOD Standard – 5,000 mg/l) to approximately 96% in 1980. The total BOD load generated in 1980 was 1,330 tonne/day (population equivalent to 26 million) while the discharge amounted to approximately 58 tonne/day (population equivalent of 700,000). This is expected to be reduced to less than 5 tonne/day by 1.1.1984 (population equivalent of less than 100,000), when the BOD standard of 100 mg/l becomes effective.

The various treatment alternatives for palm oil mill wastewater with cost estimates are shown in Figure 16.

Raw Natural Rubber Industry

The total estimated BOD load reduction in the rubber industry over the period 1979 – 1980, is shown in Figure 17. The total BOD load of 280 tonne/day generated by the industry in 1979 (population equivalent of 4.16 million), did not change significantly over the period and was reduced to approximately 39 tonne/day by the end of 1980 and is expected to be further reduced to less than 5 tonne/day (comparable population equivalent of less than 100,000), when the 50 mg/l BOD standard becomes fully effective for the industry with effect from 1.4.1983.

The Manufacturing Industries

As already indicated the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979 would be applicable to existing industries only as of 1.1.1981 and a longer period has to elapse for a meaningful assessment of pollution load-reduction to be made.

Domestic Sewage

Sewage which is a combination of sullage and excreta wastewater is a significant pollutant discharged into the Malaysian environment. The estimated Biochemical Oxygen Demand (BOD) load was 715 metric tons per day or about 25.5% of the total organic waste generated in the country.

Inadequate sanitation and sewage treatment continues to contribute to the prevalence of water-borne communicable diseases such as cholera, dysentry, and diarrhoea. To date only three towns are partially served with centralised sewerage facilities, these being Kuala Lumpur, Georgetown and Kota Kinabalu.

At the end of 1980 only about 6.28% of the total population was served by centralised sewerage facilities. The population served by flush toilets connected to septic tanks, pour flush toilets and pet, bucket and other indiscriminate system is shown below:

Disposal System	% Population Served		
	Peninsular Malaysia	Sarawak	Sabah
(a) Flush toilet/ septic tank	33.31	20.61	19.21
(b) Pour-flush toilet	26.16	28.25	11.23
(c) Pit, bucket, river, etc.	35.25	51.12	69.56

As observed from the table, a large proportion of the population especially in the rural areas is inadequately served with sewage disposal facilities. Flush toilets connected to septic tanks continue to be used for new urban areas although it is well known that treatment afforded by such facilities are inadequate particularly from the water pollution and health view aspects.

The basic responsibility for sewerage rests with the local authorities who are empowered under two sets of legislation as follows:—

(a) Streets, Drainage and Building Act, 1974 — to construct and maintain sewers and sewerage works and to recover the cost from beneficiaries.

(b) Local Government Act 1976 — to establish, maintain and carry out sanitary services and to charge and collect rates for providing sewerage services.

The standard for discharge of sewage into watercourses is prescribed by the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979.

Status of Compliance with the Regulations

As of 1st. July 1980, 149 palm oil mills throughout Malaysia were required to meet the third generation set of effluent discharge standards with a BOD parameter limit of 1000 mg/ litre. 103 of the mills (70% complied and of the total number of mills not complying, i.e. 46 mills, 6 cases were found to warrant prosecution in court for not having any reasonable or satisfactory grounds for non-compliance. A sum of $17,500 was collected by way of fines.

As at 1st April 1980, 170 SMR and Conventional Grade Rubber factories were required to meet a BOD limit of 200 mg/litre and 45 latex concentrate factories on BOD of 450 mg/litre of the total of 215 factories. 145 of the factories (70%) complied, while one of the remaining 70 factories was found to warrant prosecution in court for not having any satisfactory or reasonable grounds for non-compliance.

The status of compliance with respect to the manufacturing industries which are subject to the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 remained to be clearly determined.

AIR POLLUTON CONTROL

The enforcement of the Environmental Quality (Clean Air) Regulations 1978 and the Motor Vehicle (Control of Smoke and Gas Emission) Rules 1977 gathered momentum during the year under review. Turnover of staff especially at the sub-professional level (Assistant

Environmental Control Officer grade) placed great constraints in the face of growing public awareness of and sensitivity to environmental pollution problems.

Highlights of activities in enforcement are summarised.

(i) **Control and Abatement of Air Pollution from Stationary Sources**

During the year, enforcement officers continued inspections to various industrial facilities to ensure compliance and provide advice with regard to the Regulations, with a total of 363 inspections carried out. A total of 129 industrial establishments were issued warning letters. In addition, a total of 33 industrial establishments were issued directives to improve or upgrade control systems or provide information in writing. 46 factories which were found to repeat offences had their cases compounded.

One foundry which persistently ignored directives to provide information and adopt pollution control measures was brought to court. Upon conviction, it was fined $1,500.00. Cases were filed against a further 6 industrial establishments arising out of their ignoring written directives and continuing to violate with impunity specific provisions of the Act or Regulations.

During the year, a total of 9 licences were issued to 9 sawmills in the State of Pahang, Terengganu and Kelantan to contravene provisions under the Environmental Quality (Clean Air) Regulations 1978. The duration of the licences varied from 3 to 6 months. The contravention sanctioned was the open burning of wood wastes.

A CHANGING SKYLINE:
Looming ominously over it is discernible the build-up of pollutants.

INDUSTRIAL POLLUTION:
A familiar sight in the Kelang Valley.

(ii) **Control and Abatement of Air Pollution from Mobile Sources**

Control on excessive smoke emissions from diesel powered vehicles and hydrocarbon emission from petrol vehicles crankcase blow-by was enforced through provisions under the Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977.

The DOE with the assistance of the Police carried out 58 campaigns in major towns in Peninsular Malaysia. Altogether 10,272 vehicles were stopped and given visual and meter tests. Out of these 3119 vehicle owners were summoned. Compound fees collected amounted to $110,926,000. The campaigns conducted were more of an educational nature and indicated the need to increase public and motorist awareness on better diesel vehicle maintenance.

All new petrol vehicles introduced this year were equipped with necessary anti-blowby device to minimise hydrocarbon emission from engine crankcase.

OTHER ACTIVITIES IN ENVIRONMENTAL POLLUTION CONTROL

PRESITING EVALUATION OF NEW INDUSTRIAL SOURCES

Emission and discharge controls alone are inadequate to cope with the wide-ranging nature of environmental problems. Suitable location of industry plays an important part as a preventive measure in pollution control. Most of Malaysia's environmental problems are attributable to haphazard location and incompatible siting of industries.

The installation of in-plant control equipment and adoption of control measures would limit the discharge of pollutants to a certain level but not necessarily totally eliminate it, and as much as 5% to 10% of the 'residual pollutants' may still be discharged into the environment from each polluting source.

As the degree of control becomes more stringent, the cost tends to increase exponentially. If the polluting sources could be located well away from populated areas, control measures need not be as stringent as would otherwise be necessary. In the ultimate analysis, pollution control cost would be borne by the consumers, hence the reduction of control cost would reduce the burden on the people and the country as a whole.

In the light of the above factors, the presiting evaluation of new industrial sources adopted by the Division is an important step in pollution control. The Regulations require that all new industries obtain written permission from the Director-General of Environmental Quality prior to commencing construction of the factories. Compliance with this requirement would enable the Environment Division to assess the suitability of the site which would help to generate options with respect to location of the industry and in turn result in cost-effective pollution control measures in the long term.

In discharging this responsibility, the Environment Division has given priority to the formulation of the Guidelines for the Siting and Zoning of Industries which have already been approved by the National Land Council for implementation.

During the year under review, a total of 271 applications were received for the establishment of factories which necessitated presiting evaluation.

MONITORING AND SURVEILLANCE

WATER QUALITY MONITORING

Water quality monitoring of Malaysian rivers by the DOE was started in March 1978 although the Drainage and Irrigation Department maintains some 60 stations where water quality of rivers are also monitored. Monitoring has so far been confined to Peninsular Malaysia and plans are in hand to extend the monitoring network to cover the states of Sabah and Sarawak.

Monitoring of rivers during the period 1980 covered all the 49 river basins in the Peninsular (FIGURE 18: River Basin Map of Peninsula). The distribution of sampling stations relative to the catchment of the river basins is shown in FIGURE 19. Performance of water quality monitoring improved in 1980 compared to 1979 and 1978 (FIGURE 20). Performance, as measured by the number of samples taken relative to the number planned, improve from 55% in 1978 to 80% in 1979 and neared 90% in 1980. Several factors inhibited better performance. These included the continued lack of manpower as a result of the inability to fill vacant posts, the problem stemming from inadequate transport and weather conditions especially during the monsoon periods which prevented monitoring.

Water quality monitoring during the period was confined to surface waters only. Groundwater, though not extensively used as a source of water except in the North-Eastern and North-Western states in Peninsular Malaysia including some areas of Sabah and Sarawak but mostly in the rural areas, is expected to play a greater role as a source of water in certain

areas in the future. In view of this monitoring of groundwater is being planned for the immediate future. In addition, the increasing number of man-made lakes created as a result of dam construction for purposes of water-supply, hydroelectric power generation, irrigation or flood mitigation has wrought changes to the natural surface water resources in the country. It is envisaged that certain degree of attention in the monitoring of water quality would need to be focused on this particular aspect of water resources.

AIR MONITORING AND SURVEILLANCE

Two types of air monitoring stations namely long term and short term continued to be in operation during the year under review.

The objectives of long term stations are:—

- To determine in the light of air pollution concentration levels, trends in ambient air quality.
- To provide basic data for evaluating the effects of development projects in a specific areas.
- To evaluate the effectiveness of air pollution control programmes.

The objectives of short term stations are:—

- To conduct air quality studies and investigations of specific pollution problems.

At the beginning of the year a number of activities were scheduled for implementation in long term air monitoring and surveillance programmes.

- To measure the concentration levels of pollutants in the atmosphere such as dust fallout, total suspended particulates, sulphur dioxide, total acidity and smoke at predetermined sites throughout the country known as the national air quality network.
- To analyse samples collected (other than those analysed by Chemistry Department) such as total suspended particulates and smoke.
- To compile and evaluate air quality data.
- To conduct servicing and maintenance programmes of monitorng equipment.

The national air quality network was programmed to cover all States. However due to constraints such as shortage of manpower and non-availability of equipment; stations were not set up in Perlis and Melaka and only a few stations were maintained in states like Sabah, Sarawak, Kedah, Negeri Sembilan, Pahang, Terengganu and Kelantan. Klang Valley on the other hand has a high density of polluting sources and is in close proximity to DOE office which is situated in Kuala Lumpur. For these reasons about one-third of the total monitoring stations were located in the Klang Valley.

By the end of the year a total of 132 stations were recorded as long term monitoring stations. These include 4 High Volume Sampler (HVS) stations, 62 Dust Deposit Gauge (DDG) stations, 2 Three Gas Sampler (TGS) stations, 6 Eight Port Sampler stations, 54 Huey

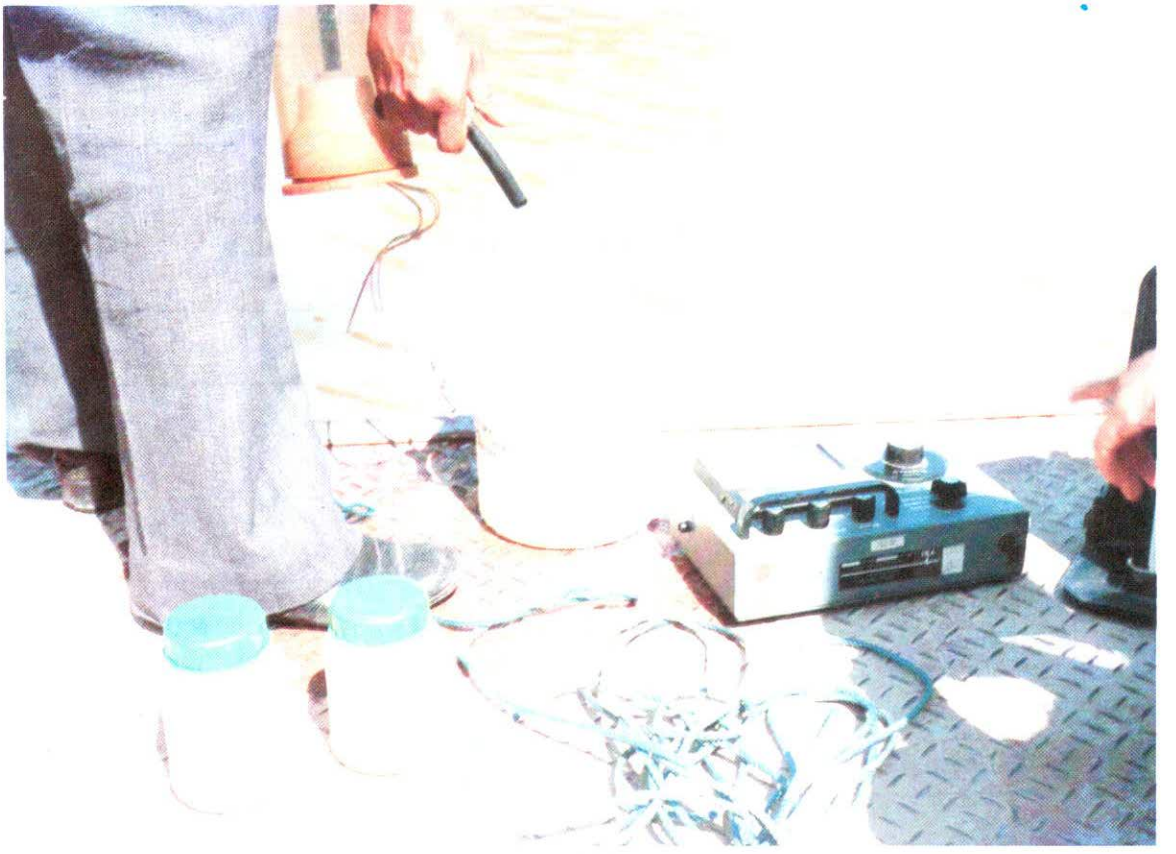
Sulphation Plate (HSP) stations and 4 Lead Candle stations. Table X gives the distribution by states the long-term monitoring stations in the national air quality network and Table XI summarises the types of pollutants monitored by these stations.

In addition 7 short term studies were conducted around two quarries, two sawmills, an asphalt plant, a cement plan and a project development site to determine dust levels of the areas concerned. These studies arose mainly out of pollution complaints.

New Equipment

In December 1980, 64 units of HVS and 9 units of Carbon Monoxide (CO) monitors were purchased. These units are for installation in the ensuing years.

AIR QUALITY MONITORING EQUIPMENT IN OPERATION: High Volume Sampler for particulate measurement.



WATER QUALITY MONITORING:
In situ measurement for salinity, conductivity and temperature.

Results of Air Quality Monitoring

Table below provides data on WHO environmental health criteria of long term goals and HS National Primary Ambient Air Quality Standard long term goals and to be compared with measured values.

Pollution	World Health Organisation (WHO) Long Term Coal	US National Primary Ambient Air Quality Standard
Dust fallout	–	–
Total Suspended Particulates (HVS)	150 – 230 ug/m^3 (24 hour – mean) 60 – 90 ug/m^3 (annual arithmetic mean)	75 ug/m^3 (annual geometric mean)
Acid Gases/ Sulphur Dioxide (British Standard)	100 – 150 ug/m^3 (24 hour – mean) 40 – 60 ug/m^3 (annual arithmetic mean)	–
Smoke	100 – 150 ug/m^3 (24 hour – mean) 40 – 60 gu/m^3 (annual arithmetic mean)	–

(a) Total Suspended Particulates

Suspended particulates were measured using the US Environmental Protection Agency (US EPA) method which collects dust particles with diameter size ranging from 0.1 to 100 ug. Four HVS located at four different sites were used to collect the particulates.

A residential area close to an urban center in Klang Valley namely Damansara Utama recorded an annual mean value of 116 ug/m^3 with a range of 64 – 299 ug/m^3. A Monitoring station located at Pejabat Pos Pudu near a busy road intersection in the City of Kuala Lumpur recorded an annual mean value of 227 ug/m^3 with a range of 46 – 386 ug/m^3. Petaling Jaya Industrial area in Klang Valley monitored 176 ug/m^3 as an annual mean value with a range of 137 – 208 ug/m^3 while Ulu Klang/Ampang Free Trade Zone light industrial area close to a residential area also in Klang Valley recorded an annual mean value of 88 ug/m^3 with a range of 73-99 ug/m^3.

(b) **Sulphur Dioxide**

Three methods were used to measure sulphur dioxide in the air – West and Gaeke method, a method using Huey Sulphation Plates and a method using Lead Candles.

(i) **West and Gaeke Method**

Sulphur dioxide annual mean value recorded at a residential area close to an urban center was 30 ug/m^3 with a range of 1 – 69 ug/m^3 with a range of 8 – 204 ug/m^3 was recorded.

(ii) **Huey Sulphation Plates Method**

Annual average values of sulphur dioxide recorded in typical urban and residential areas throughout the country were less than 0.01 ppm while those in industrial areas were within the range of 0.01 – 0.1 ppm.

(c) **Lead Candles Method**

Four sites in the Klang Valley were measuring sulphur dioxide using lead candles. The annual mean values recorded were approximately 0.01 ppm.

(d) **Total Acidity**

Total acidity was measured by acidmetric method using hydrogen peroxide as an absorbing solution. Measurements conducted in an urban station recorded an annual average value of 26 ug/m^3 with a range of 16-35 ug/m^3. Stations located in two typical industrial area monitored an average values of 55 and 60 ug/m^3. A station sited close to an acid producing plant and a smelter registered annual average values of 87 ug/m^3 and 101 ug/m^3 respectively.

(e) **Dust Fallout**

The monthly averages of dust fallout in typical rural areas measured were within a range 21 – 107 ug/m^2 and an annual average value of 55 mg/m^2/day was recorded. Annual average values of stations located in urban centres and industrial areas in the country ranged from 58 – 431 mg/m^2/day and 61 – 945 mg/m^2/day respectively.

MARINE MONITORING AND SURVEILLANCE

Efforts to monitor the coastal waters continued throughout the year. Water samples were collected from about 196 monitoring stations and beach tar samples from about 68 stations. The samples were analysed for physical, chemical and biological parameters.

Besides the above monitoring programme, regular monthly monitoring was carried out in the Straits of Johore under a data exchange programme between Malaysia and Singapore. Under this programme 10 stations were established on the Malaysian side and another 10 on the Singapore side, water samples analysed for common parameters and results were exchanged regularly for comparative study.

The Marine Pollution Sub-Committee under the aegis of the National Council for Scientific Research and Development (MPKSN) continued to function actively and identified areas of research with respect to the protection of the marine ecosystem.

INVESTIGATION OF COMPLAINTS

Investigation into complaints featured as an important activity of the Environment Division during the year. Since the establishment of the Division, complaints with respect to air, water and noise pollution and odour problems giving rise to disruption of normal condition of living and affecting the means of livelihood of the less privileged sections of society have served as useful pointers or indicators of the State of the Malaysian environment. All the complaints channelled to the Division were investigated and appropriate action taken against those responsible.

Water Pollution Complaints

During 1980, 45 complaints arising from 47 sources were received from the public in relation to water pollution. Fig. 21 shows the distribution of complaints State by State and Fig. 22 according to the sources. Palm oil mills and rubber factories continued to be the major sources of complaints and accounted for about 42% of the complaints. This was followed by siltation, manufacturing industries and piggery wastes.

Table XII shows the Water Quality Regions that were involved in the complaints and those that were free from complaints. Table XIII shows the number of water pollution sources according to sources and the palces affected.

Besides public complaints, a total of 14 complaints were received through the newspapers as shown in Table XIV.

It can be reasonably concluded that due enforcement of the Regulations resulted in a considerable reduction in the pollution complaints particularly with respect to palm oil mills and rubber factories. Piggery wastes, and siltation are emerging as major problem areas in dire need of purposeful action.

Air Pollution and Noise Complaints

The number of air pollution complaints (including noise) received during 1980 totalled 347. Most of the complaints were reported by individuals and groups of residents. Others came from community leaders in the affected areas, non-governmental organisations (NGOs) and through press reports. Each case received the attention of the Division and was investigated.

The complaints received could be classified according to the nature of pollutants (smoke, dust etc.) and the type of industrial source causing it.

A breakdown of the 1980 complaints according to the nature of pollutants and the type of industries giving rise to the complaints is given in Table XV and Table XVI.

In relation to the long standing dust pollution complaint in the Batu Caves area due to the blasting and operation of quarries, the State Govenrment odered the blasting at the three quarries namely the JKR Quarry, the Kenneison Brothers Sdn. Bhd. Quarry and the Dolomite Industries Quarry should cease by 31st December 1980.

RESEARCH INTO EFFLUENT TREATMENT TECHNOLOGY

The Environment Division continued its catalytic and coordinating role in the development of treatment technology.

With the stepping up of research activities in the treatment of technology of palm oil mill and rubber factory effluent a major breakthrough has been achieved in finding economically viable treatment methods for the reduction of the Biochemical Oxygen Demand (B.O.B.) of these effluents to meet the limits stipulated in the Regulation namely 1000 ppm for palm oil mill effluent and 200 for rubber factory effluent. Efforts are under way to meet the desirable target of 50 ppm and in the case of palm oil emphasis is on achieving zero discharge through the ideal process of waste utilisation. The Palm Oil and Rubber Research Institute of Malaysia (PORIM) entrusted with this responsibility has already initiated research in this direction.

Another source fast emerging as a major polluter is piggery wastes. Research efforts are being catalysed by a task force comprising Standards and Industrial Research Institute of Malaysia (SIRIM), the Department of Environmental Studies of the Agriculture University of Malaysia, the Department of Veterinary Services Malaysia and the Environment Division to develop treatment technology suitable to the local situation. Budgetary provision amounting to $500,000.00 has already been made under the Fourth Malaysia Plan for this project.

MARINE POLLUTION CONTROL

The customary pollution from ships continued to rank high among other sources in terms of complexities as it is not easily subject to control.

During the year under review a total of 15 oil spills were reported and clean up action was instituted by the Environment Division together with the Marine Department. A sum of $115,500.00 was claimed and collected in respect of clean-up costs.

Besides oil spills, complaints with regard to contamination of beaches by oil residues in the form of tar in Port Dickson, Kelantan and Kuantan were received.

In dealing with the problem of marine pollution, the Government has devised a two-fold strategy:—

. Pollution Control.

. Protection and Conservation of the marine resources.

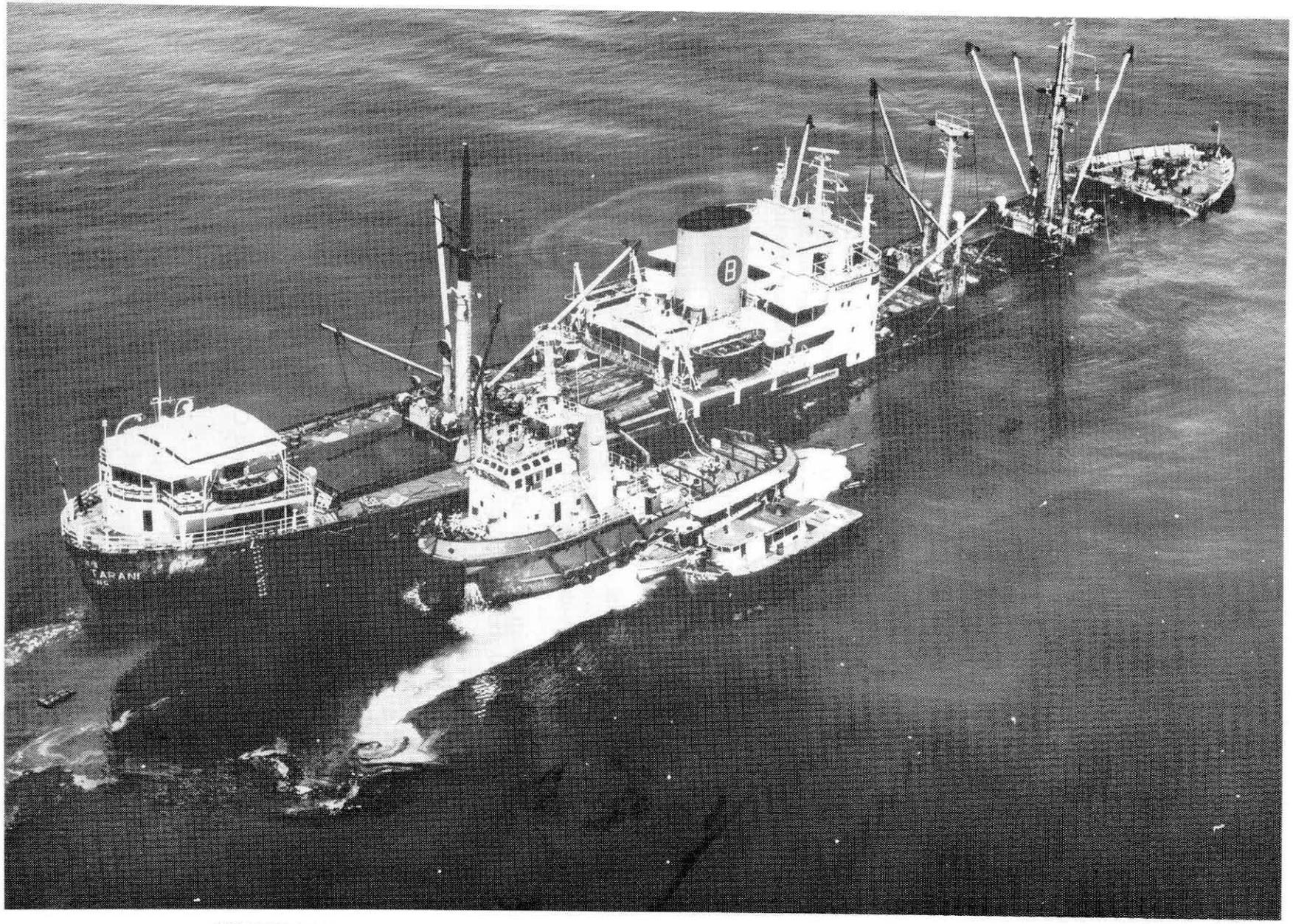
Activities in pollution control comprised the following:—

. National Contingency Plan for the Mitigation and Control of Oil Spills in the Straits of Melaka;

. Control of pollution from sea-based sources;

. Control of pollution from land-based sources;

. Monitoring and surveillance.



MARINE POLLUTION:
Fire and Oil Spill incident in may 1980 near Tanjung Api off the coast of Kuantan.
Name of Vessel – M.V. Bangla Tarani.

The National Contingency Plan

During the year the first and second phase of the plan was implemented and two of the centres at Port Kelang and Port of Johore became operational with the acquisition of the following equipment:

6 units of oil booms;
2 units of oil skimmers;
6 barges; and
2 large work boats, "Lang Siput" and "Lang Tiram".

Control of Pollution From Sea-Bed Sources

While efforts were under way to formulate draft Regulations for the control of oil discharges and disposal of wastes from ships and the dumping of wastes into the marine environment, the main control was effected through the enforcement of the provisions of the Environmental Quality Act 1974 relevant to marine pollution control. In addition regular patrolling of the coasts is also being planned to be intensified in the wake of the declaration of the Exclusive Economic Zone (EEC) of 200 miles.

Control Of Polluton From Land-Based Soruces

The Environment Division has developed a strategy encompassing short-term, medium term and long-term programmes designed to ensure by dint of environmental planning in advance that our development projects avoid costly remedial and control measures and do not add to the catalogue of environmental woes.

Under the short-term measures, various Regulations have been enforced successfully to control effluent discharges and air pollutant emissions from existing and new factories.

The medium term measure is to provide environmental guidelines for planning and development agencies including State Governments in order to assist them in integrating environmental factors into their development plans. To date, Guidelines for the Siting and Zoning of Industries have been finalised. Other guidelines relating to the control of silt from land clearing and mining activities as well as guidelines on solid waste management are also being prepared.

The third measure which is a long-term measure is to ensure the protection and enhancement of environmental quality including the quality of the physical environment and the quality of life of the people affected by development. To achieve this objective the Environment Division is coordinating a programme to develop and implement an Environmental Impact Assessment Procedure beginning from the Fifth Malaysia Plan.

NOISE POLLUTON CONTROL

The National Committee on Noise Polluton Control set up in July 1979 continued its deliberations during the year. A number of status reports were prepared by members of the committee. They included a report on Motor Vehicle Noise by the Road Transport Depart-

ment, a report on Town Planning and Noise Polluton submitted by the Town and Planning Department, a report in Transportation Noise by the Highway Planning Unit of the Ministry of Works and Utilities, a report on Noise and Occupational Health problems submitted by the Factories and Machinery Department and a report on the provisions of the Penal Code on nuisance noise by the Police Department.

From the status reports the Committee was able to identify and review the provisions under the existing laws and legislations pertaining to noise control. For example, under the Penal Code, there is provision for the prosecuting of persons causing nuisance noise. Under the Motor Vehicles (Construction and Use) Rules 1959, there is statutory requirement for motor vehicles to be equipped with silencers and for their maintenance thereof. There is also provision for presecuting motorists for making excessive noise that results from a defective vehicle or from faulty packing or adjustment of the vehicle or from the dust of vehicles on the road. Similarly, under the Factories and Machinery Act 1967 and its amendments, there is provision for protecting workers from loss of hearing due to exposure to noise at the work place. Under the various Town Board Enactments and the Local Government Act 1976, there are provisions for prosecuting owners of public and private premises that cause nuisance noise. Finally under the Civil Aviation Act, owners of aircrafts and air-craft authorities are absolved from paying compensation for nuisance noise if the aircrafts are operated in accordance to standard aviation procedures. However, the Committee was of the view that because the existing laws and legislations do not have specific noise standards, enforcement was made very difficult.

During the year, the Working Group on Aircraft Noise completed its work on theoretical noise contours around airports in Malaysia. The Working Group on Motor Vehicle Noise initiated a survey on muffler systems used in motor vehicles, while the Working Group on Industrial Noise initiated noise measurements around the mixed industrial-residential area in Petaling Jaya.

The Committee produced its First Interim Report July 1979 – August 80 during the year and compiled a list of noise measuring equipment available in various Government Agencies as well as in the Universities.

In early Jun 1980, physical measurements of sonic booms triggered by supersonic Concorde flights were conducted in Port Dickson and Morib.

However, the results were inconclusive due to the rather short monitoring period. Long-term monitoring was not possible due to the cessation of Concorde flights over the Malaysian air space as from 1st. November, 1980.

CHAPTER IV

ENVIRONMENTAL PLANNING

INTEGRATING ENVIRONMENTAL FACTORS INTO DEVELOPMENT PLANNING

Against the backdrop of the progress in curbing and overcoming accumulated pollution problem, a stage has been reached for Malaysia to move resolutely in the direction of preventing pollution through sound environmental planning. To this end, the Environment Division made plans accordingly through entering prposals in its 1981 estimates of operating expenditure for the establishment of three additional units within the agency namely:–

(i) Resource Management Monitoring Unit.

(ii) Environmental Impact Assessment Unit.

(iii) Environmental Information and Education Unit.

The Resource Management Unit would be responsible for providing the necessary environmental inputs for national and regional water resources studies, sewerage master plan studies, urban transport studies vis-a-vis master plans (such as the K.L Master Plan) and structure plans in conjunction with urban and regional development studies.

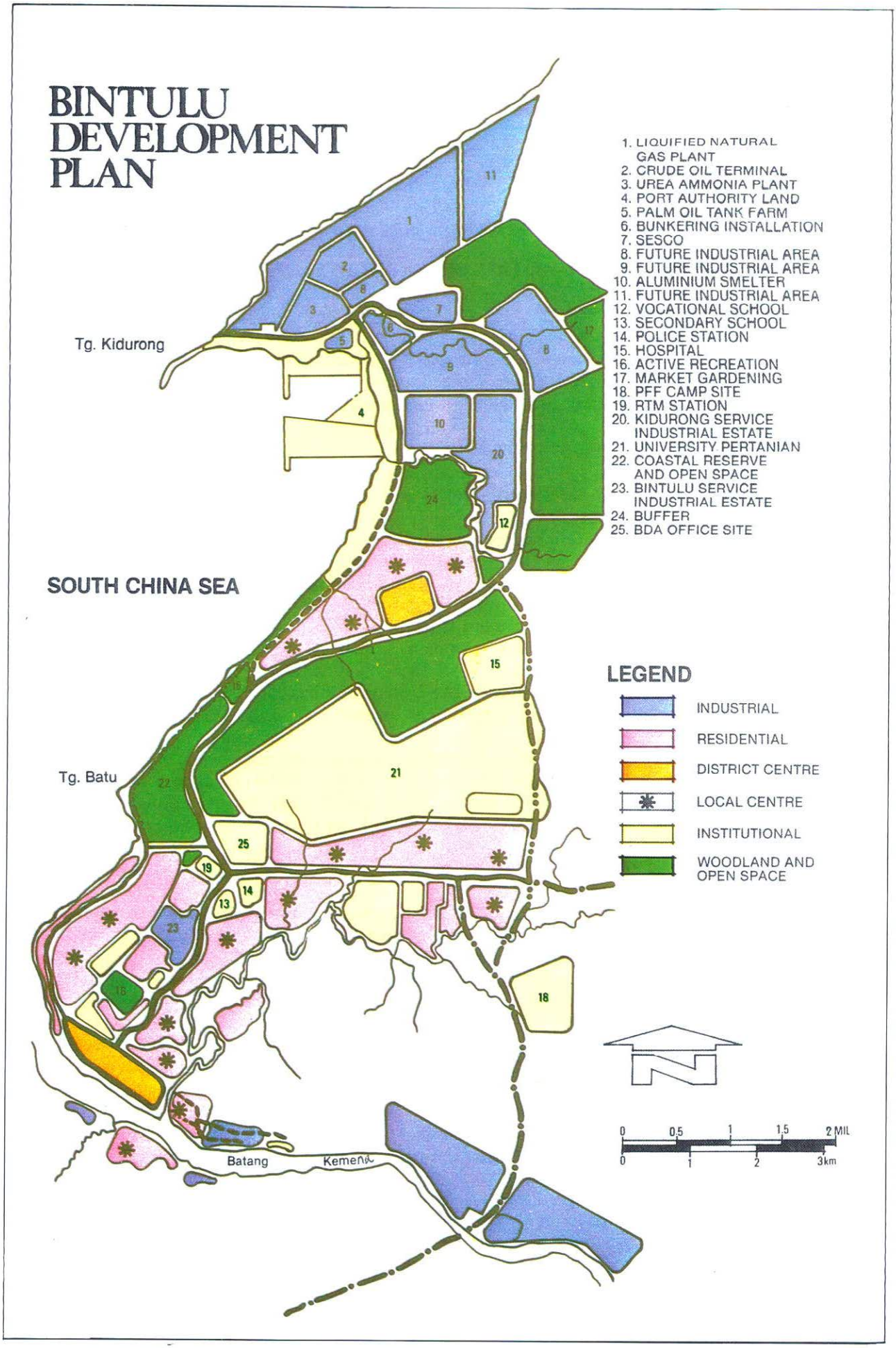
The Environmental Impact Assessment (EIA) Unit would function as the secretariat to the Review Panel on Environmental Impact Assessment reports.

The Environmental Information and Education Unit would be responsible for the development of comprehensive environmental information system as well as bringing about environmental awareness throughout society, and in particular, to key target groups comprising decision-makers and planners.

ENVIRONMENTAL IMPACT ASSESSMENT

Another notable development in environmental planning was the continued development and application of Environmental Impact Assessment (EIA) procedure as a useful tool in integrated project planning. The EIA procedure is illustrated in Figure 23 while the integration of environmental impact assessment into somewhat generalised sequence of project planning is illustrated in Figure 24.

Table XVII is a summary description of the Environmental Impact Assessment Procedure. The matrix used for Preliminary Assessment is given in Figure 25. This is a two-way matrix. On the vertical axis are tabulated environmental characteristics of the physico-chemical environment, the biological environment and the human environment and they are further subdivided into environmental components. Project activities are listed on the horizontal axis of the matrix, and are grouped according to the stages of the project implementation in which they occur, namely, site investigation stage, site preparation and construction stage, and operation and maintenance stage. Project activities for the 19 types of projects which were identified after close consultation with Federal Departments and Agencies concerned are given in the Draft Handbook on Environmental Impact Assessment – Procedure and Guidelines prepared by the Environment Division.



SOUND ENVIRONMENTAL PLANNING:

Bintulu Regional Development Plan Sarawak prepared for the Bintulu Development Authority (BDA) by an international consulting firm.

The main activities in the development of an EIA procedure during the year were:—

(i) Interaction with project proponents as a follow-up of the year-long assignment in 1979 of the New Zealand Colombo Plan adviser, Mr. John O'Brien.

(ii) Application of the EIA Procedure to:—
  (a) Malaysian Liquified Natural Gas (MLNG) Bintulu.
  (b) Port Kelang Power Station (Phase I).
  (c) Kenyir Dam Project, Ulu Terengganu.

(iii) Participation in the UNEP/ASEAN Workshop on EIA, Baguio City, Philippines, 23 – 25 June, 1980, by officials of the Environment Division and the Bintulu Development Authority.

(iv) One-day National Seminar on EIA conducted with the services of Mr. B.D. Clark of the University of Aberdeen, Scotland by courtesy of the British Council.

RESOURCE MANAGEMENT MONITORING

During the year, the Division of Environment had been requested by various planning authorities both at the Federal as well as at the State levels to provide environmental inputs to various socio-economic plans including interalia:

(i) Kelang Valley Review;
(ii) Kuala Lumpur Master Plan;
(iii) Bintulu Regional Centre Study;
(iv) Terengganu Coastal Regional Study;
(v) KETENGAH township development plan and water supply;
(vi) DARA Water Resources Management;
(vii) National Water Resources Study
Kedah/Perlis Water Resources Study;
(viii) Structure Plan for Johore Baru – Feasibility Study for Johore Baru Sewerage System.

GUIDELINES ON SOLID WASTE MANAGEMENT

The ad hoc national committee on Solid Waste Management formed by the Environment Division in 1979 continued its work of development of guidelines for solid waste management. In addition to the Guidelines or Code of Practice for the Disposal of Solid Waste on Land which had been developed earlier, the following draft guidelines were prepared:—

- Guidelines for the Sampling of Solid Wastes.
- Guidelines for the Storage, Collection, Transportation and Handling of Household Refuse and General Wastes.
- Guidelines for the Storage, Collection and Handling of Toxic and Hazardous Wastes.
- Guidelines for the Collection, Handling, Transportation and Disposal of Hospital and Clinical Wastes.

POLICY GUIDELINES FOR THE DISPOSAL OF TOXIC WASTES

A priority task that emerged during the year under review has been the need to gear the relevant authorities to address the problem posed by the generation of toxic and hazardous wastes which had gradually gained in significance in line with the increasing tempo of industrial activities in recent years. Accordingly plans were initiated for a joint study by the Environment Division and an Australian firm of consultants under Commonwealth of Australia Technical Cooperation arrangements. The terms of reference of the proposed joint study are reproduced below:—

Data Collection —

* Collect and collate all existing data on hazardous and toxic wastes generated within the Kuala Lumpur, Petaling Jaya and Shah Alam, Johor and Penang study areas.

* Establish if sufficient and suitable data is available to complete the study and if not, arrange for augmentation of the data base.

* Provide a comprehensive inventory for industries of type (nature) and quantities of toxic and hazardous waste materials generated in the study area.

Data Assessment —

* Assess the collected data and quantify the amounts and specify the types of hazardous waste generated.

* Arrange for physical and chemical testing and analysis of wastes where inadequate data is available.

* Define "hazardous waste" and rank severity of hazard by categorisation of industry, taking into consideration toxicity, volume and quantity.

* Access collected data and consider development of analytical model for extrapolation of study area to National scope.

* Review and predict trends in the rate of generation of hazardous wastes.

Technology Review — Treatment Processes —
Review and schedule all technology appropriate to local conditions for treatment and disposal of the various waste classifications, including inter alia:

* chemical treatment;

* physical-chemical treatment processes followed by biological oxidation of certain aqueous wastes;

* incineration of combustible wastes;

* ocean dumping or land burying in sealed containers;

* disposal in abandoned mines, deep wells or especially excavated repositories in suitable geological formations;

* distillation;

* solidification/fixation, i.e. chemical fixing or structurally isolating hazardous materials in a solid, crystalline or polymeric matrix so that the resulting monolithic solid mass can be safely handled and disposed of using established landfill or burial methods.

Waste Storage and Transportation Review –

Investigate current and possible future facilities for storage, handling and transport of specific hazardous wastes, viz.

* tankering – permits rapid discharge of waste with minimum manpower resource;

* drums – increased manpower resource use and disposal of empty drums an additional problem;

* laboratory sized jars – contents are frequently highly reactive;

* pressurised cylinders – may pose problem in cylinder with malfunctioning valve that cannot be opened.

Review of Waste Collection and Disposal Strategies –

* Prepare a strategic plan for hazardous waste collection, treatment and disposal for the study area – after consideration of all related regional, geographical, economic and appropriate technology factors.

* Where relevant recommend appropriate site requirements and locations for treatment and disposal facilities based upon land-use consideration, location of waste generation centres and transportation economics.

* Prepare a report at pre-feasibility study level for design and cost estimates associated with one site.

Institutional and Management Procedures – Examine the institutional and management requirements for the selected strategy and make appropriate recommendations.

Preparation of Waste Acceptance and Disposal Guidelines –
Based upon the respective hazardous waste classifications and technologies appropriate to the region, prepare guidelines for future waste acceptance and disposal.

CHAPTER V

ENVIRONMENTAL EDUCATION, TRAINING AND INFORMATION

ENVIRONMENTAL EDUCATION –

Since the bringing into force of the Environmental Quality Act, 1974 in mid-April, 1975 the priority task of the Environment Division has centred around overcoming accumulated pollution problems through a policy of curbing and containment while acting resolutely to forestall emerging environmental problems. To this end, sources of pollution have been identified and several sets of control regulations under the Act as well as administrative guidelines formulated and issued to help State Governments and other planning and operating agencies to better integrate environmental concerns into their work. The sustained environmental efforts have contributed significantly to overcoming environmental problems and set the country squarely on the road of sound environmental management. To build upon the foundation for sound environmental management thus laid, it is imperative to bring home to the public at large, including the key target group of planners and decision-makers, the need to make rational choices at every turn so that development proceeds apace but in harmony with the environment – at any rate without transgressing the limits of biospheric tolerance.

To this end, a priority task ahead is to promote awareness and an informed understanding of environmental issues and interrelationships among population, resources, development and environment with a view to developing a robust environmental conscience and value system conducive to positive pattern of caring conduct vis-a-vis the environment.

In line with this appraisal the Environment Division enhanced its activities during the year under review in the broad area of environmental education mainly through the mass media, seminars, lectures and talks, and its quarterly publication 'SEKITAR' of which three issues were produced in the course of 1980. The following paragraphs outline some of the more important activities.

Seminars

Three national seminars were organised or participated actively during the year under review as follows:–

* Symposium on Industrial Wastewater Control (July 7-11).

* Seminar on Environmental Control and the Malaysia Iron and Steel Industry (July 17).

* Seminar on Advances in Palm Oil Effluent Control Technology (November 18).

Observance of World Environment Day

As in the previous years the main thrust of programmes for observance of World Environment Day was awareness oriented as represented by:–

* Message by the Honourable Minister of Science, Technology and Environment over the radio.

ENVIRONMENTAL EDUCATION:
Prize winning poster by Wee Kheng Yan aged 10 in conjunction with International Year of the Child, adjudged in 1980.

* Message by the Honourable Minister to Secondary Schools.

* Pedestrian Malls in strategic locations in several towns throughout the country.

* Book Exhibitions on Environmental Topics in the main public and university libraries.

* Distribution of sets of posters in colour to Government agencies, universities and libraries for display in public areas.

* Exhibition at Muzium Negara.

* Free entry to Zoo and Akuarium Negara for school children.

* Special documentary feature on the environment jointly produced with Radio and Television Malaysia and telecast in the: "Peristiwa" slot.

TRAINING –

The first formal course offering at tertiary level in environmental education structured to produce environmental managers and planners commenced in 1979 when Universiti Pertanian Malaysia admitted a first batch of 17 students for its Bachelor of Environmental Science Programme B.S. (Env.). Of this number, 11 students subsequently graduated during the year under review and 5 of them cast their lot with the Environment Division by joining as Environmental Control Officers.

In addition, in-service training for serving officers of the Environment Division was continued through attendance at international and national workshops and courses as well as through lectures provided by guest lectures.

A list of meetings, workshops, courses and seminars attended by members of the staff of the Environment Division is given in Appendix 'B'.

ROLE OF NON–GOVERNMENTAL ORGANISATIONS –

Non-governmental organisations (NGOs) played an increasingly pivotal role in promoting public awareness of environmental issues and supplemented the efforts of the government and the mass media in environmental education through the following activities:–

* Publication of brochures, newsletters and articles on environmental aspects.

* Participation in conferences, seminars, dialogue sessions.

* Conducting awareness compaigns, pollution surveys and environmental studies.

* Talks to schools, universities, trade unions and societies.

INFORMATION –

Following enforcement of the Environmental Quality Act, 1974 and the various Regulations under the Act, the need for reliable, relevant and up-to-date information has become more

crucial for sound environmental management. It has been found that considerable environment-related information is already available within the country and hence a national committee under the aegies of the Environment Division was formed comprising representatives from environment-related agencies with a view to developing a National Environmental Information System. The first task of the committee was to identify through a questionnaire survey the organisations/institutions which could become possible sources for the proposed information system. Some 236 organisations and institution were found to be involved in the fields of environmental education, research, data collection/evaluation and regulatory/enforcement activities.

A special unit was approved during the year for handling information and education and, plans were under way for its establishment in 1981.

INFOTERRA –

The Environment Division was designated the National Focal Point (NFP) of INFOTERRA, the International Referral System for Sources of Environmental Information, in July 1979. It could not become fully operational due to shortage of staff and other pressing priorities and commitments. Despite the constraints, 11 queries were received and processed during the year by the NFP as part of its query-response service. In all cases, NFP not only referred the queries to INFOTERRA Programme Activity Centre and carried out a directory search but also contacted the selected sources on behalf of the users.

With a view to publicising the activities and services of INFOTERRA, the Malaysian NFP published an article entitled 'Information Exchange – INFOTERRA and IRPTC' in 'SEKITAR', the quarterly publication of the Environment Division. This was widely circulated to all Government agencies, universities, institutions, libraries, secondary schools and other environment-related organisations.

The Malaysian NFP participated in the UNEP/INFOTERRA Regional Seminar for Asian and Pacific Countries held in Dahlien, China from 13-15 August.

INTERNATIONAL REGISTER OF POTENTIALLY TOXIC CHEMICALS (IRPTC)

IRPTC is specifically concerned with the dissemination of information on toxic chemicals. It operates through an international network of National Correspondents designated by governments. The Environment Division was designated the Malaysian National Correspondent in August 1978 and has been maintaining close contact with those involved in the control of chemicals. A national committee comprising representatives of agencies involved in the control of chemicals have been formed with a view to establishing a national register of potentially toxic chemicals.

IRPTC has been publishing its bi-monthly bulletin regularly and copies of these bulletins have been regularly received by the Environment Division and distributed to the members of the National Committee as part of the service of the National Correspondent. The bulletin contains useful information on banned hazardous chemicals and pharmaceutical products, IRPTC and UNEP activities, general legislation on chemicals, national and international activities on the control of chemicals and news about chemicals.

CHAPTER VI

INTERNATIONAL AND REGIONAL AFFAIRS

With the approach of the initial year of the United Nations Third Development Decade, preparatory activities by way of providing inputs towards the formulation of guidelines gathered momentum. For example, the United Nations Environment Programme (UNEP) organised in co-operation with the Regional Economic Commissions during 1979 and 1980 a series of five regional seminars focussing attention on development alternatives and lifestyles of relevance to each region. In the course of the preparatory work, it became evident that (a) that each region had its own specific problems and (b) that the international community as a whole was facing an unprecedented and novel situation which had become increasingly hard to resolve through traditional approaches and existing institutions, but there was still scope for integrated analysis, planning and forecasting in major areas of social concern.

The series of seminars helped to drive home three central aspects of development strategies and lifestyles: first, they must be conceived and built on a basis of popular participation; second, they must be weaned away from imported and imitative consumer patterns and third, serve as a reminder to the developed countries to initiate actions to critically review and evaluate their own lifestyles and development patterns.

Another noteworthy landmark development was the signing in early 1980 by a number of international and regional development banking institutions, including the World Bank Group and the Asian Development Bank of the "Declaration of Environmental Policies and Procedures Relating to Economic Development". This document commits them to a duty of care to avoid serious and irreversible damage to the environment in the promotion of socio-economic development, and in particular to ensure systematic environmental analysis of development projects in the various stages of the project cycle. An encouraging feature is the prompt action taken to translate this commitment into practice through developing mechanisms whereby environmental protection and enhancement measures are incorporated into technical assistance or loan projects and thus contribute to sound development. As experience is gained over time, it seems logical to expect that new and improved procedures would be adopted to ensure that environmental and natural resource dimensions get integrated into the planning and management process in conjunction with economic and other criteria applied in determining rational development.

A third development of global significance was the publication in May, 1980 of the "World Conservation Strategy" showing that development – the satisfaction of human needs and the improvement of the quality of human life – depends upon conservation and that conservation depends equally upon development. The Strategy, prepared by the International Union for Conservation of Nature and Natural Resources (IUCN) with the advice, co-operation and financial assistance of the United Nations Environment Programme (UNEP) and the World Wildlife Fund, aims to help advance the achievement of sustainable development through the conservation of living resources. For heightened impact on the general public, the Strategy document was presented to heads of States and heads of government in a synchronised manner. Here in Malaysia, the presentation was to the Honourable the then Deputy Prime Minister (Y.A.B. Dato' Seri Dr. Mahathir bin Mohamad) by Encik Mohd. Khir Johari as President of World Wildlife Fund, Malaysia.

In sum, Malaysia moved in step with these international developments taking national actions consonant with them. In addition, Malaysia continued to serve on the 58-nation Governing Council of the United Nations Environment Programme while its Director General of Environmental Quality (Encik S.T. Sundram, JSM) provided leadership within ASEAN in environmental management and conservation through continued service as Interim Co-ordinator of the Experts Group on the Environment until its Third Meeting held in Manila. On a global basis, another UNEP priority would be to find effective ways and means to reach out more effectively to ordinary people as they go about their lives and induce them to keep in mind at all times the welfare of the environment as they develop individually, as communities and as nations. In the final analysis, the prospects for sustainable development turn largely on how they exercise their rights and responsibilities in using the environment and the earth's resources, preferably in a fashion evocative of the underlying philosophy of a line in the World Conservation Strategy:

We have not inherited the earth from our fathers; we have borrowed it from our children.

The World Health Organisation – Asia and Western Pacific Regions's Centre for Promotion of Environmental Planning and Applied Sciences (PEPAS) situated at Serdang, Selangor, Malaysia within the campus of the Agricultural University of Malaysia in the course of the year under review worked jointly with UNEP in a number of areas of mutual interest beneficial to environmental management.

REGIONAL AFFAIRS

At the regional level Malaysia participated actively in the ASEAN Sub-Regional Environment Programme (ASEP) developed by the ASEAN Experts Group on Environment with assistance from UNEP. ASEP is an ongoing programme covering several priority areas for action. It contains the following salient characteristics:

(a) ASEP is realistic based as it is on the existing situation and needs of the region. It has identified *specific priority areas* which could benefit from regional collaboration.

(b) The nature and scope of ASEP are *comprehensive* covering major regional environmental issues and aiming at achieving both short-term and long-term results.

(c) ASEP emphasizes *regional self-reliance.* This can be achieved through technical co-operation among its member countries with complementary inputs, wherever necessary, from external sources.

(d) ASEP is *action-oriented.* It is expected to lead towards concrete governmental actions. Its intention is to transform the agreement of regional meetings into national programmes of action drawing, wherever appropriate, upon full cooperation of governmental agencies, non-governmental organizations, private sectors and related international agencies.

(e) ASEP is dynamic in *nature.* It is designed as a flexible programme with room for incorporating new emerging issues which would merit regional attention.

The following represent some of the more important environmental activities and developments in the ASEAN region during the year under review: –

* Government Nominated Experts Meeting organised by UNEP at Baguio City from 17-21 June, 1980 and at Bangkok from 8-12 December, 1980 to consider and refine the Draft Action Plan for the East Asian Seas.

* Workshop on Environmental Impact Assessment (EIA) for decision-makers in the ASEAN Region was held at Baguio City, Philippines from 23-25 June, 1980.

* A national symposium on "Industrial Wastewater Control" held at Universiti Pertanian Malaysia, Serdang, Selangor from 7-11 July, 1980 jointly organised by the Environment Division of the Ministry of Science, Technology and Environment, Faculty of Science and Environmental Studies of Universiti Pertanian Malaysia and PEPAS, some 200 participants attended the Symposium. The objectives of the Symposium were to highlight the recent progress in industrial wastewater treatment technology and to examine the technical and management problems associated with the control of industrial effluents in Malaysia.

* The Fourth Meeting of the ASEAN Committee on Science and Technology was held in Singapore from 26-29 August, 1980.

* A Workshop on "Nature Conservation" was held in Bali from 19-23 September, 1980 with support from IUCN and UNEP. As a follow-up of this Workshop an IUCN Consultant helped to formulate a Draft ASEAN Convention on Nature Conservation.

* Malaysia hosted the WHO/UNEP Regional Workshop on "Planning for Control of Emissions from Motor Vehicles" from 1-14 November, 1980 at PEPAS, Universiti Pertanian Malaysia Campus.

* The first issue of the "ASEAN Environment Newsletter" made its welcome appearance in December 1980 as a means of information exchange among ASEAN countries as well as between ASEAN and the rest of the world.

At the bilateral level, Malaysia hosted the second annual Ministerial level inter-governmental meeting on the environment between Malaysia and Singapore. The meeting exchanged information on a number of environmental topics of mutual interest.

TABLE I

BIOCHEMICAL OXYGEN DEMAND (B.O.D.) LOAD REDUCTION IN THE CRUDE PALM OIL INDUSTRY
(1978 – 1982)

YEAR	1978	1979	1980	1981	1982
B.O.D. Standard, mg/l: (as at 1st. July)	5,000	2,000	1,000	500	250
Number of Mills:	130	135	149	163	176
B.O.D. Load Generated/ Day (Tonne):	920	1,130	1,330	1,460	1,600
Population Equivalent	18,400,000	22,600,000	26,600,000	29,200,000	32,000,000
B.O.D. Load Discharged/ Day (Tonne)	222	130	58	35	19
Effluent Discharged/ Day (Cubic Metres):	44,500	54,500	64,500	70,500	77,500
Population Equivalent	4,400,000	2,600,000	1,160,000	700,000	380,000
Percentage Reduction:	76	88	96	97	99*

TABLE II

TYPICAL ANALYSIS OF PALM OIL MILL WASTEWATER

PARAMETER	Range	Mean
Biochemical Oxygen Demand (BOD); 3-day, 30°: mg/l	10,250 – 47,500	25,000
Chemical Oxygen Demand (COD): mg/l	15,500 – 106,360	53,630
Total Solids; mg/l	11,450 – 164,950	43,635
Suspended Solids; mg/l	410 – 60,360	19,020
Oil & Grease; mg/l	130 – 86,430	8,370
Ammoniacal-Nitrogen; mg/l	0 – 110	35
Total Nitrogen; mg/l	180 – 1,820	770
pH	3.8 — 4.5	

TABLE III

ESTIMATED BIOCHEMICAL OXYGEN DEMAND (BOD) LOAD REDUCTION IN THE RAW NATURAL RUBBER INDUSTRY

Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978 – P.U. (A) 338/78, and Environmental Quality (Prescribed Premises) (Raw Natural Rubber) (Amendment) Regulations 1980 – P.U. (A) 74/80.

Estimated B.O.D. Pollution Load Reductions (1979 – 1982)

(i) No. of Factories Under Consideration: 375*.
(ii) Total Estimated B.O.D. Load Generated/Day (Tonne): 208
(iii) Estimated Population Equivalent of B.O.D. Load Generated: 4,160,000
(iv) Estimated Quantity of Effluent Discharge Per Day, Cubic Metres: 90,000

YEAR	1979	1980	1981	1982	1983^P
Applicable B.O.D. Standard, mg/l (as at 1st. April)	$300^+/(-)$	$200^+/(450)$	$50^+/(300)$	$50^+/(200)$	$50^+/(50)$
B.O.D. Load Discharged to Watercourses/ Day (Tonne)	98	39	10	8	less than 5
Population Equivalent of B.O.D. Load Discharged	1,960,000	780,000	200,000	160,000	less than 100,000
Percentage Reduction in B.O.D. Load Discharged (%):	53	81	95	96	–

* No significant change in rubber production and/or number of factories

\+ B.O.D. standard for S.M.R. and Conventional Grade Factories

( )
B.O.D. standard for Latex Concentrate Factories

P: Projected

TABLE IV

TYPICAL ANALYSIS OF LATEX CONCENTRATE WASTEWATER

Parameter	Range	Mean
pH	5.0 – 7.5	6.2
BOD, mg/l	202 – 7205	2704
COD, mg/l	596 – 10 212	4626
Total solids, mg/l	579 – 10 889	2821
Suspended Solids, mg/l	253 – 3860	1177
Total Nitrogen, mg/l	50 – 1015	369
Ammoniacal Nitrogen	42 – 570	205

TABLE V

TYPICAL ANALYSIS OF SMR BLOCK RUBBER WASTEWATER

Parameter	Range	Mean
pH	5.2 – 6.5	5.7
BOD, mg/l	370 – 3 575	1 747
COD, mg/l	633 – 5 803	2 740
Total solids, mg/l	738 – 3 540	1 915
Suspended solids, mg/l	136 – 330	237
Total Nitrogen, mg/l	37 – 301	147
Ammoniacal Nitrogen	24 – 118	66

TABLE VI

ESTIMATED POLLUTION LOADS GENERATED BY THE MANUFACTURING SECTOR (1979)

Total Effluent Discharges Cubic Metres/Year: 123,600,000
Cubic Metres/Day: 412,000

Parameter	Quantity	
	Tonne/Year	Tonne/Day
B.O.D.	37,250*	124
C.O.D.	110,050	366
Suspended Solids	43,250	144

*Population equivalent of B.O.D. load is 2.48 million.

Note:
Estimated based on rapid assessment methodology and industrial manufacturing data for 1979.

TABLE VII

INDUSTRIAL WASTEWATER PROFILE BY TYPE OF MANUFACTURING INDUSTRY (1979)

TYPE OF INDUSTRY	Wastewater* volume		*BOD		SS	
	10^3 m^3/y	Contribution	t/y	Contribution	t/y	Contribution
Food Manufacturing	49,960	40.4%	12,120	32.5%	15,050	34.8%
Manufacture of Industrial Chemicals and Other Chemical Products	43,460	35.2%	10,430	28.0%	16,900	39.0%
Manufacture of Textiles	26,230	21.2%	13,270	35.6%	8,300	19.2%
Beverage Industry	2,390	1.9%	1,170	3.1%	1,380	3.3%
Manufacture of Paper & Paper Products	920	0.7%	140	0.4%	390	0.9%
Basic Metal Industries	740	0.6%	120	0.3%	1,230	2.8%
TOTAL:	123,600	100%	37,250	100%	43,250	100%

TABLE VIII

COMPARISON OF ESTIMATED DOMESTIC AND INDUSTRIAL POLLUTION LOADS GENERATED AND DISCHARGED (1981/1982)

Water Pollution Source	Total Effluent Discharge (Cubic Metres/ Day)	%	B.O.D. Load Generated (Tonne/Day)	%	B.O.D. Load Discharged (Tonne/Day)	%
Domestic Sewage	210,500	27	715	25.5	220	70
Crude Palm Oil Mills	70,500	9	1,460	62.7	35	11
Raw Natural Rubber Factories	90,000	11	208	7.4	10	3
Manufacturing Industries	412,000	53	124	4.4	50*	16
Sub-Total	572,500	73.0	1,792	74.5	95	30
Grand Total	783,000	100.0	2,507	100.0	315	100

*Estimated 60% B.O.D. reduction achieved by 1.1.1981

TABLE IX

RESPONSE OF THE PALM OIL INDUSTRY
TO THE 'POLLUTER – PAYS – PRINCIPLE'

RANGE OF FEES $	PERCENT OF MILLS*				
	1978	1979	1980	1981	1982
	(5,000)	(2,000)	(1,000)	(500)	(250)
0 – 1,000	19	63	73	68	75
1,001 – 10,000	35	37	24	31	25
10,001 – 50,000	24	–	3	1	–
50,001 – 100,000	15	–	–	–	–
100,001 –	7	–	–	–	–
	100	100	100	100	100

* Based on original 130 mills
( ) BOD standard applicable

Note: Estimated Fees Payable

Mill Capacity	BOD/5,000 mg/l	Raw Effluent
1) 10 – 20 t/hr	$ 2,500	$100,000
2) 30 – 40 t/hr	$ 5,000	$300,000
3) 50 – 60 t/hr	$10,000	$600,000

TABLE X

Distribution of Monitoring Stations By States
– Long-Term Stations

Monitoring Stations States	HVS	DDG	TGS	EPS	HSP	Lead Candles	Total
Northern Region							
Perlis	–	–	–	–	–	–	–
Kedah	–	6	–	–	–	–	6
Pulau Pinang	–	8	–	2	8	–	18
Perak	–	3	–	1	3	–	7
Central Region							
Selangor/ W. Persekutuan	4	12	2	1	13	4	36
Negeri Sembilan	–	2	–	–	4	–	6
Melaka	–	–	–	–	–	–	–
Southern Region							
Johor	–	8	–	2	5	–	15
Eastern Region							
Pahang	–	6	–	–	7	–	13
Terengganu	–	4	–	–	4	–	8
Kelantan	–	4	–	–	3	–	7
DARA	–	4	–	–	–	–	4
KETENGAH		DDG Stations Maitained by KETENGAH					
Sabah Region	–	1	–	–	1	–	2
Sarawak Region	–	4	–	–	6	–	10
TOTAL:	4	62	2	6	54	4	132

TABLE XI

	Types of Pollutants Measured
HVS – High Volume Sampler	Total Suspended Particulates
DDG – Dust Deposit Gauge	Sulphur Dioxide
TGS – Three Gas Sampler	Sulphur Dioxide
PPS – Eight Port Sampler	Total Acidity
HSP – Huey Sulphation Plate	Sulphur Dioxide
Lead candles	Sulphur Dioxide

Jadual XII Aduan Pencemaran Air
(Januari – Disember 1980)

Wilayah Kualiti Air Yang Ada Aduan			Wilayah Kualiti Air Yang Bebas Dari Aduan	
WKA	Sungai Utama	Jumlah	WKA	Sungai Utama
18	Kelang	11	01	Perlis
13	Perak	7	02	Kuar
6	Perai/Juru	5	11	Bruas
25	Muar	4	12	Air Tawar/Raja Hitam
29	Johor	3	14	Bernam
3	Kedah	2	15	Tengi
4	Merbok	2	16	Selangor
5	Muda/Ketil	2	17	Buluh
7	Jejawi	2	19	Langat
8	Krian	1	21	Linggi
9	Kurau	1	22	Melaka
10	Sepetang	1	23	Duyong
20	Sepang/Jimah	1	24	Kesang
32	Endau	1	26	Batu Pahat
35	Pahang	1	27	Benut
48	Kelantan	1	28	Pontian/Tebrau/Sekudai
			30	Sedili
			31	Mersing
			33	Rompin
			34	Bebar/Merchong
			36	Kuantan
			37	Balok/Cherating
			38	Kemaman
			39	Chukai/Kerteh
			40	Paka
			41	Dungun

Jadual XIII: Sebab-sebab Aduan Pencemaran Air, 1980

Jenis Punca Pencemaran	Jumlah Kawasan Yang Terlibat	Kawasan	Wilayah Kualiti Air
Kilang Kelapa Sawit	10	(1) Bagan Buaya, Nibong Tebal	7
		(2) Kg. Teluk, Seberang Perai Selatan	8
		(3) Kg. Dew, Perak	10
		(4) Kg. Baru Changkat Jong, Teluk Intan, Perak	13
		(5) Sg. Langat	18
		(6) Sg. Sepang	20
		(7) Segamat, Johor	25
		(8) Kota Tinggi, Johor	29
		(9) Sg. Jekateh/Keratong	35
		(10) Tanah Merah, Kelantan	48
Kilang Getah	10	(1) Jalan Kanchut	3
		(2) Kg. Sg. Tok Pawang	4
		(3) Kg. Sg. Jagung, Sg. Layar, Sg. Petani	4
		(4) Kuala Ketil	5
		(5) Tasik Glugor	6
		(6) Kg. Enggor	13
		(7) Sungai Siput (Utara)	13
		(8) Jementah, Segamat	25
		(9) Grisek, Muar	25
		(10) Kluang, Johor	32
Perlombongan dan Kelodakan	6	((1) Balik Pulau	6
		(2) Kg. Enggor, Perak	13
		(3) Sg. Kampar, Perak	13
		(4) Bidor, Perak	13
		(5) Seri Menanti, Johor	29
		(6) Kota Tinggi, Johor	29

Jenis Punca Pencemaran	Jumlah Kawasan Yang Terlibat	Kawasan	Wilayah Kualiti Air
Kawasan Perindustrian	4	(1) Tikam Batu (2) Prai (3) Taşek (4) Pasir Gudang	4 6 13 29
Pembuangan Babi	3	(1) Ladang Juru (2) Kuala Kurau, Perak (3) Sg. Sepang/Bukit Pelandok	6 9 20
Kilang Padi	2	(1) Seberang Pumpong (2) Sg. Bakau, Nibong Tebal	3 7
Kilang Memproses Makanan	2	(1) Petaling Jaya	18
Kilang Sagu	1	(1) Tasik Gelugor	6
Kilang Ubi Kayu	1	(1) Tasik Gelugor	6
Logi Penapis Minyak	1	(1) Port Kelang	18
Kilang Batik	1	(1) Sungai Penchala	18
Lain-lain	6	(1) Kuala Lumpur (2) Kelang (2) (3) Ulu Kelang (2) (4) Petaling Jaya	18 18 18 18

Jadual XIV: Penyiasatan Aduan Suratkhabar

Negeri	Jumlah Aduan	Punca Aduan
Pulau Pinang	3	(1) Kumbahan (2) Kilang Sagu (3) Kilang Menenun
Kedah	2	(1) Kilang Padi (2) Kilang Kimia
Perak	2	(1) Pembuangan Pepejal (2) Lombong Timah
Johor	2	(1) Effluen Industri (2) Kilang Kayu
Pahang	2	(1) Kilang Kelapa Sawit (2) Kilang Kelapa Sawit
Selangor dan Wilayah Persekutuan	1	(1) Kumbahan
Negeri Sembilan	1	(1) Kilang Getah
Terengganu	1	(1) Kilang Kelapa Sawit
JUMLAH	14	

TABLE XV: Complaints Received According to the Nature of Pollutants in 1980

Types of Complaints	Total	%
Particulates	92	26.5
Smoke/Fumes	53	15.0
Noise	92	26.5
Gas	5	1.5
Odour	58	17.0
Others	47	13.5
Total	347	100.0

TABLE XVI: Complaints Received According To Types of Industries in 1980

Types of Sources	Total	%
Wood based industries	48	18.0
Rubber Factories	16	6.0
Metallurgical Works	14	5.0
Chemical Industries	7	2.5
Feedmill and Fishmeal Factories	5	2.0
Rice mills	17	6.5
Concrete and Cement Works	1	0.5
Quarries	8	3.0
Engineering Workshops	7	2.5
Others	146	54.0
Total	269	100.0

TABLE XVII: Summary Description. Environmental Impact Assessment Procedure

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

2. PRELIMINARY ASSESSMENT

Objectives: For selected projects:—

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

Description:

- Standard guidelines issued by the Review Panel.
- Is initiated at an early stage of project planning.
- Resources required are a small proportion of those committed to the prefeasibility study.
- Some form of public participation is required.
- Environmental data collection may be necessary.
- A report is required.

3. DETAILED ASSESSMENT

Objectives: For projects with potentially significant residual environment impact.

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

Description:

- Standard guidelines and specific terms of reference for each project are issued.
-
- Continues through the course of the detailed study of the project.
- Resources required are a small proportion of those committed to the feasibility study.
- Some form of public participation may be required.
- The assessment method is selected according to the nature of the project.
- Environmental data collection is required.
- A report is required.

4. REVIEW

Objectives: For projects subjected to Detailed Assessment

- To critically review the Detailed Assessment report.
- To evaluate development and environmental costs and benefits in the final project plan.

- To formulate supported recommendations to the project approving authority on the implementation of the project.

Description:

- The review is conducted by an independent Review Panel appointed by and responsible directly to the Minister responsible for the environment.
- Comment is invited from concerned environment-related agencies and from the public.
- Recommendations are forwarded to the approving authority except when the project initiator elects to revise or abandon his project.
- A maximum period of two months is allowed for review.

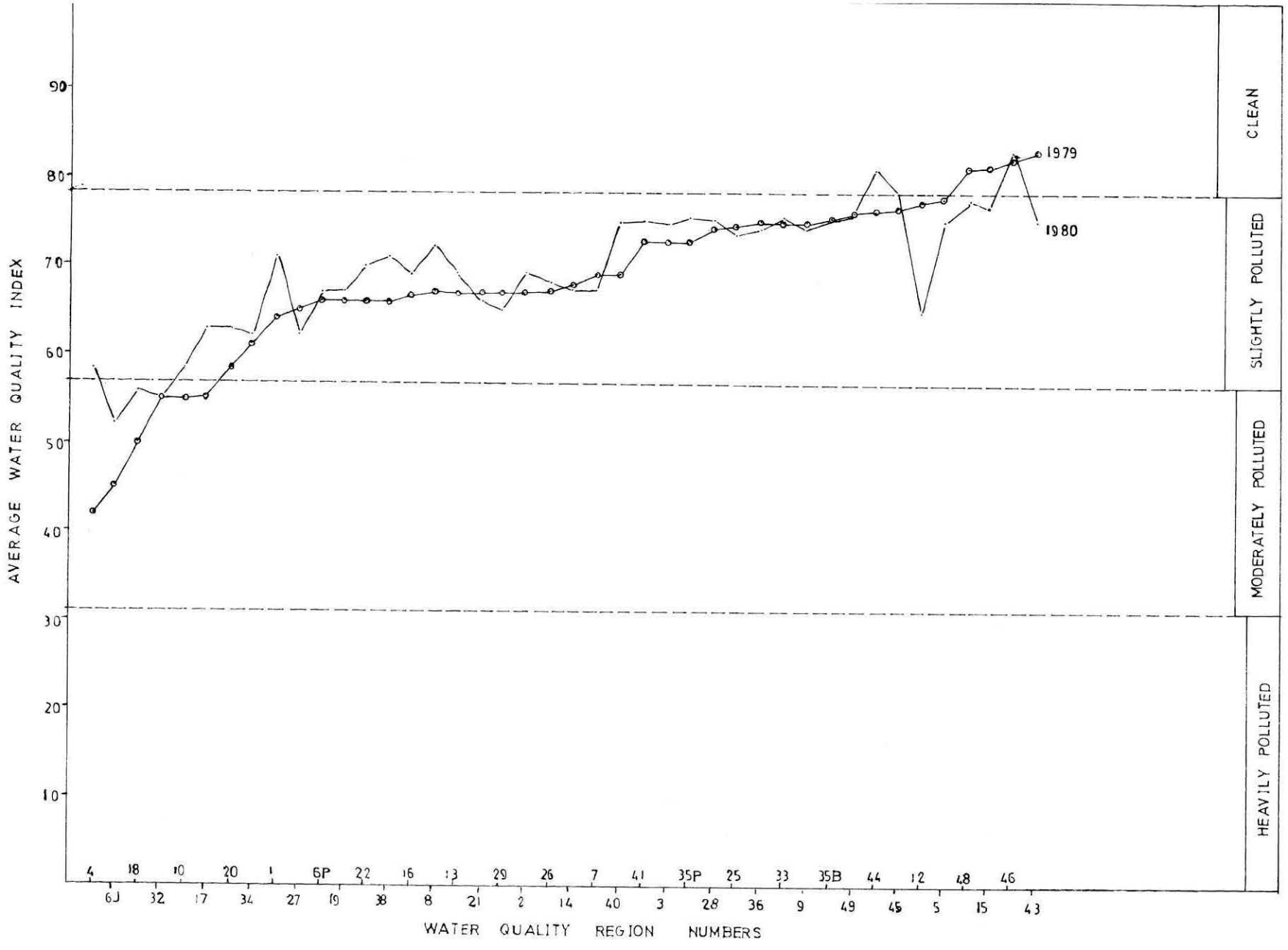
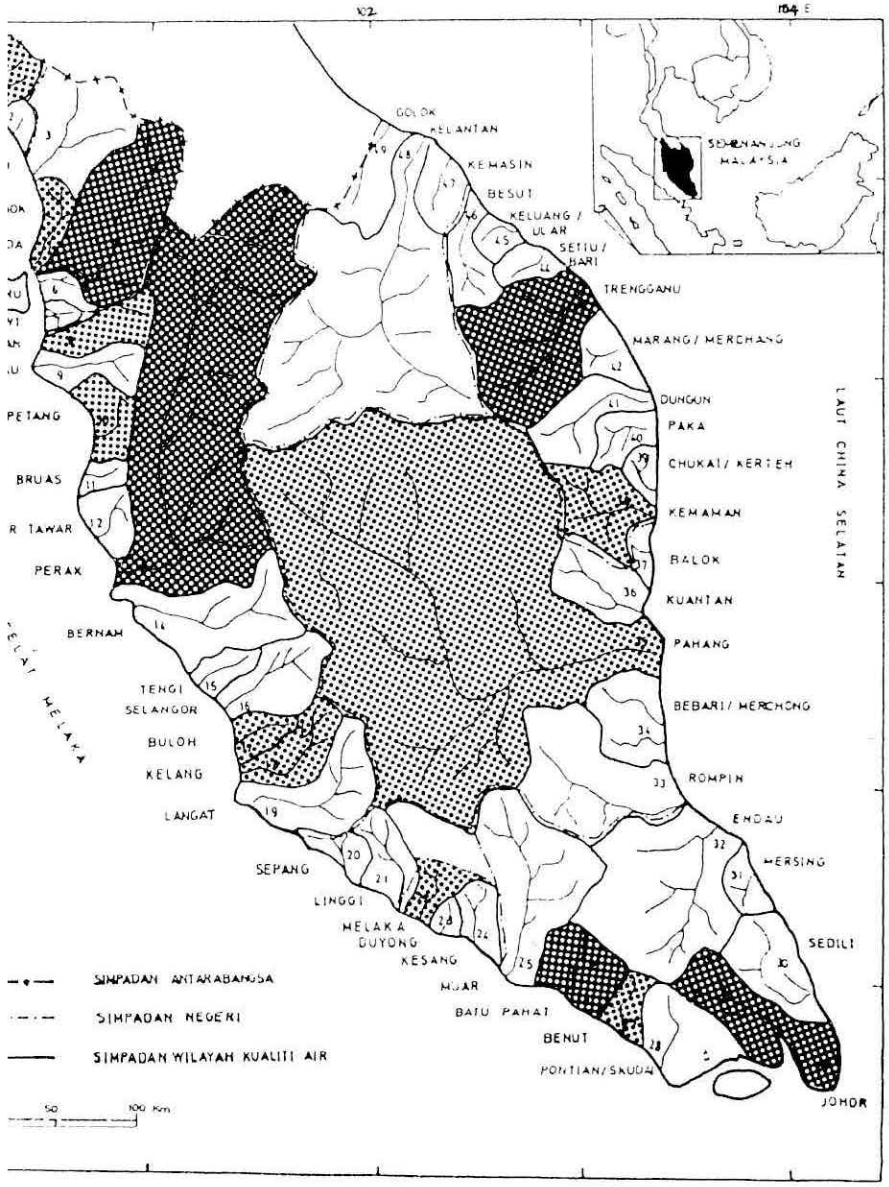


FIGURE 1: AVERAGE WATER QUALITY INDEX OF RIVER BASINS IN PENINSULAR MALAYSIA



2 : RIVER BASIN CATEGORIZATION, 1979 - 1980

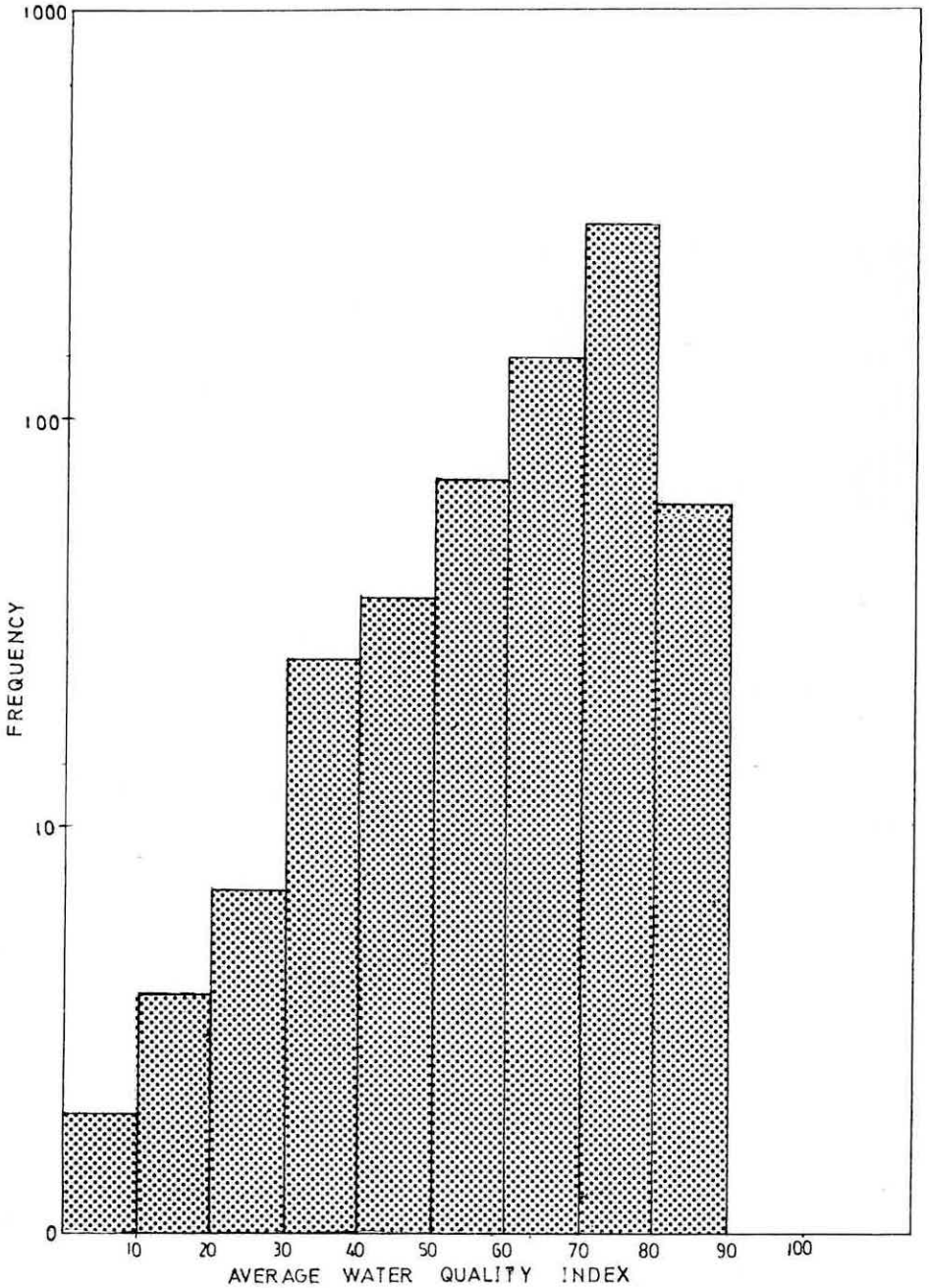


FIGURE 3: FREQUENCY DISTRIBUTION OF AVERAGE WATER QUALITY INDEX (STATION, 1979 - 1980)

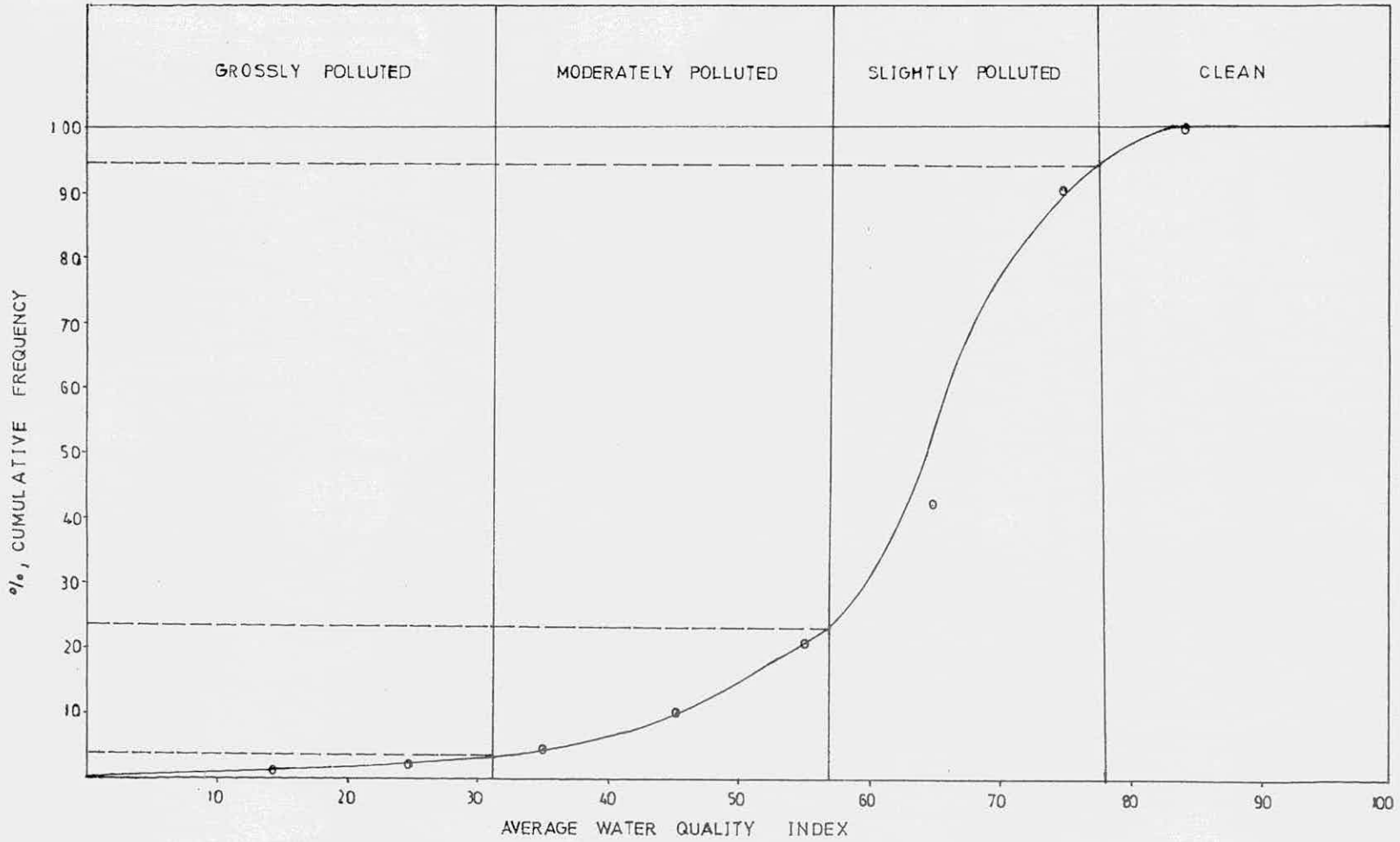


FIGURE 4 : CUMULATIVE FREQUENCY DISTRIBUTION CURVE OF AVERAGE WQI OF STATIONS, DATA 1979 - 1980

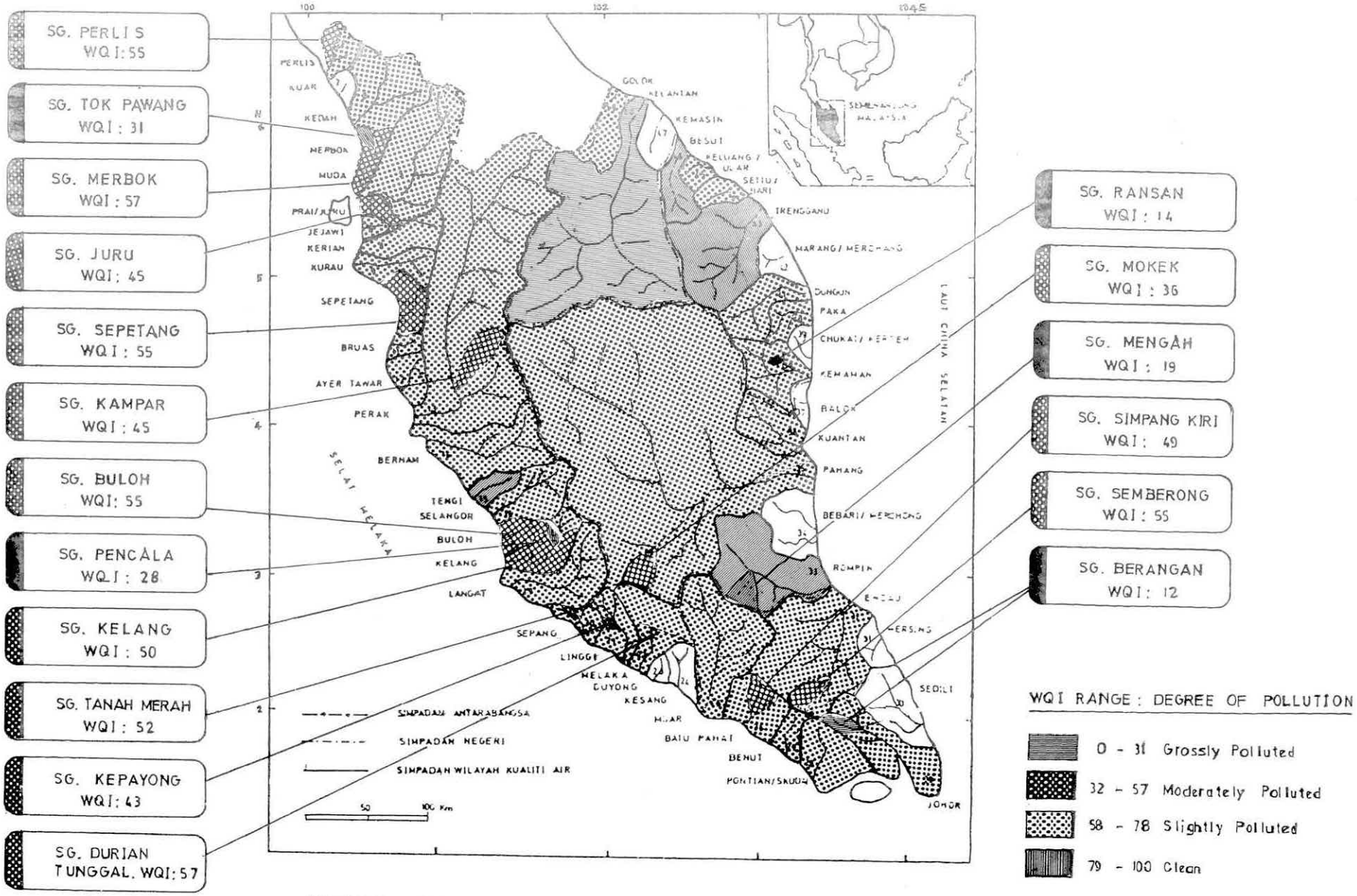


FIGURE 5 : AVERAGE WATER QUALITY INDEX DISTRIBUTION MAP, 1979

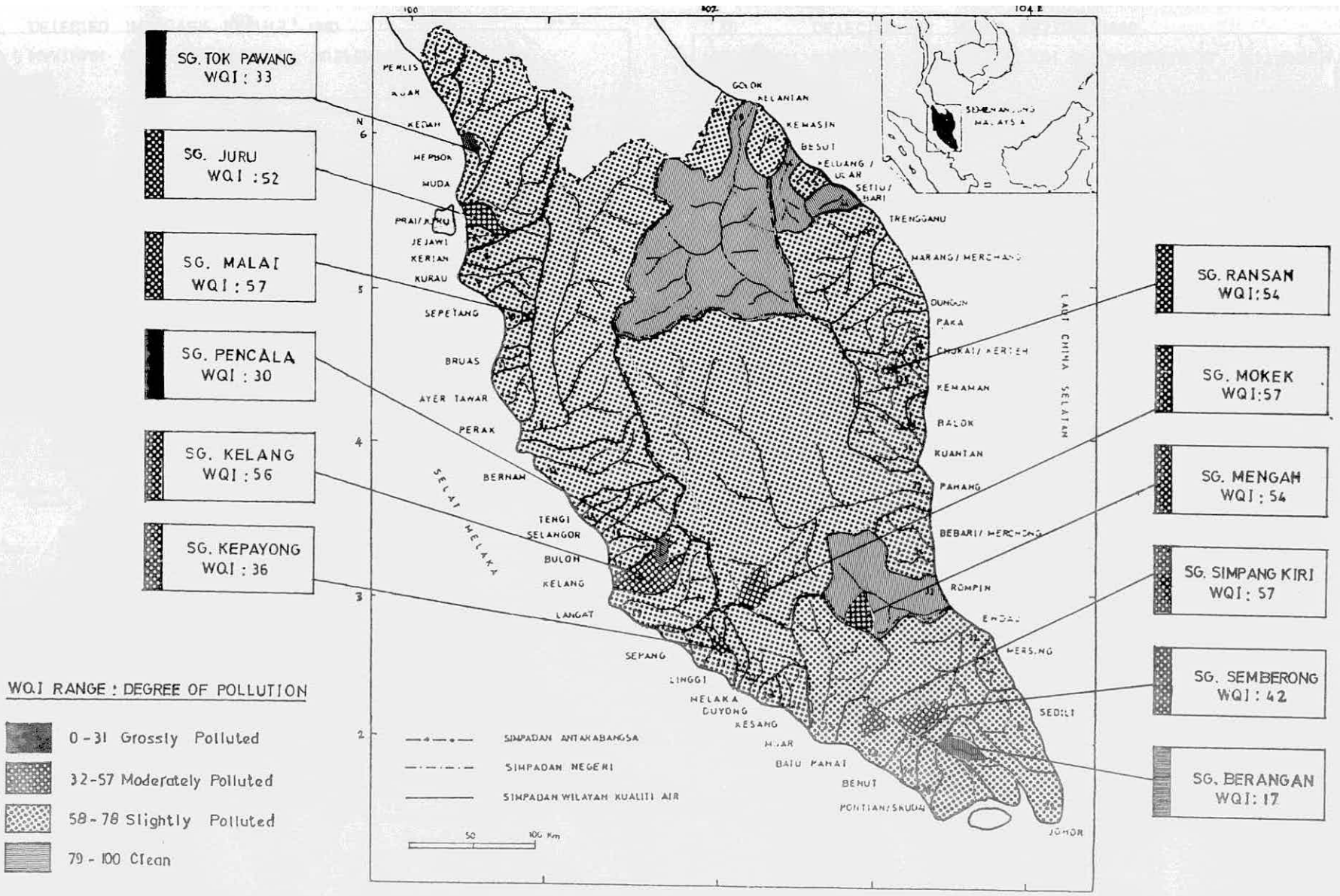


FIGURE 6 : AVERAGE WATER QUALITY INDEX DISTRIBUTION MAP , 1980

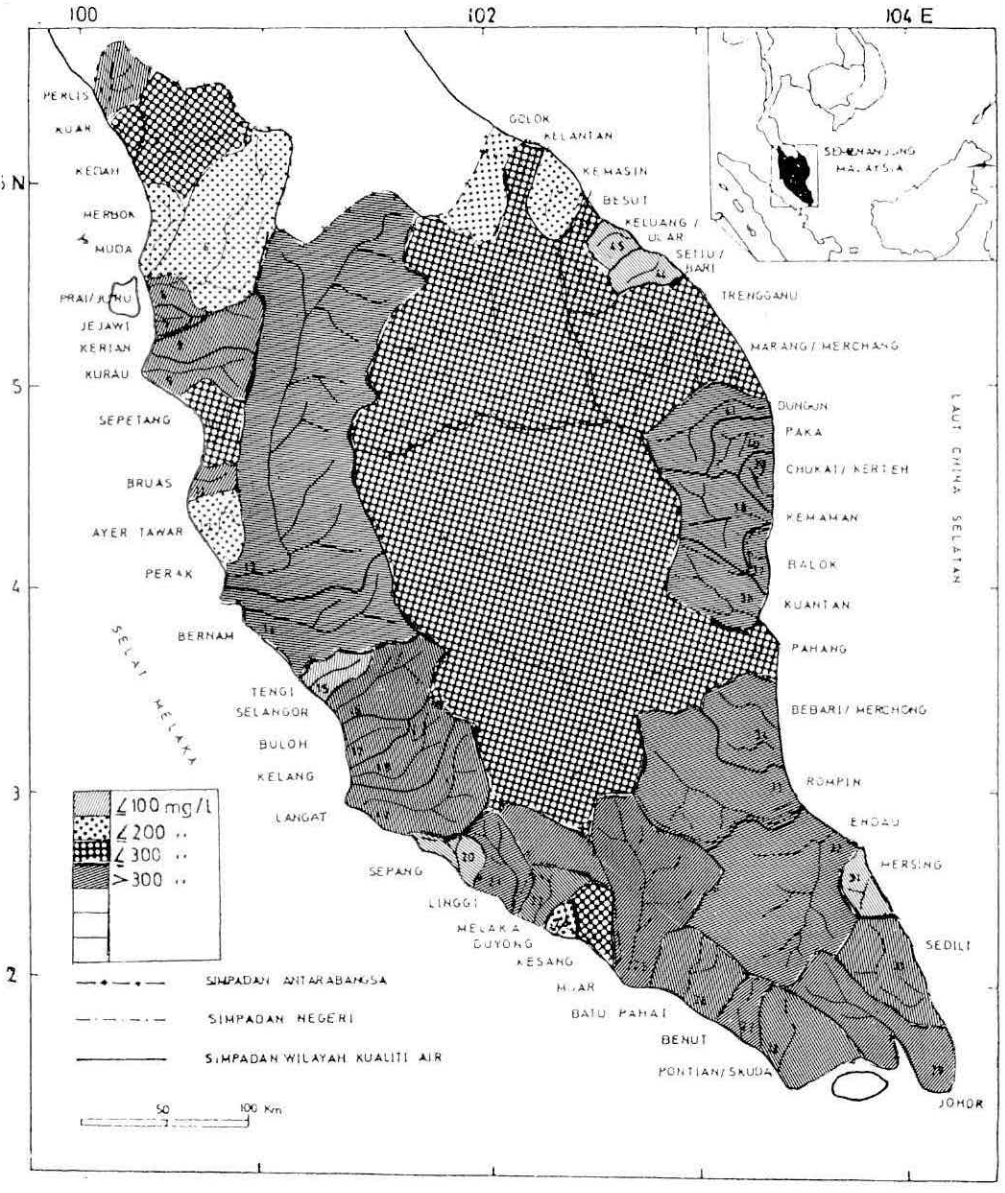


FIGURE 7 : MAXIMUM CONCENTRATION OF SUSPENDED SOLIDS (mg/l) DETECTED IN RIVER BASINS, 1980

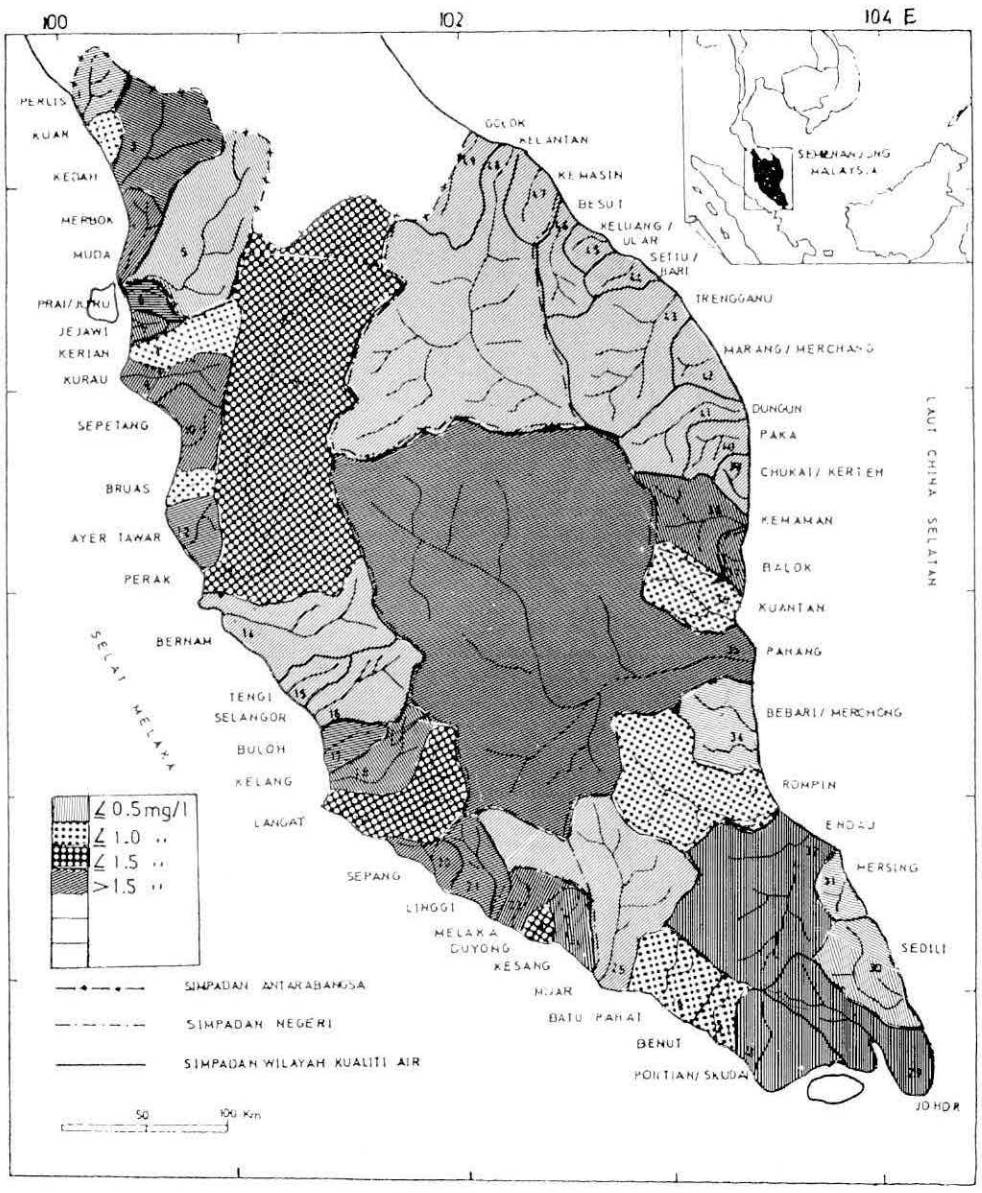


FIGURE 8 : MAXIMUM CONCENTRATION OF AMMONIACAL NITROGEN (mg/l) DETECTED IN RIVER BASINS, 1980

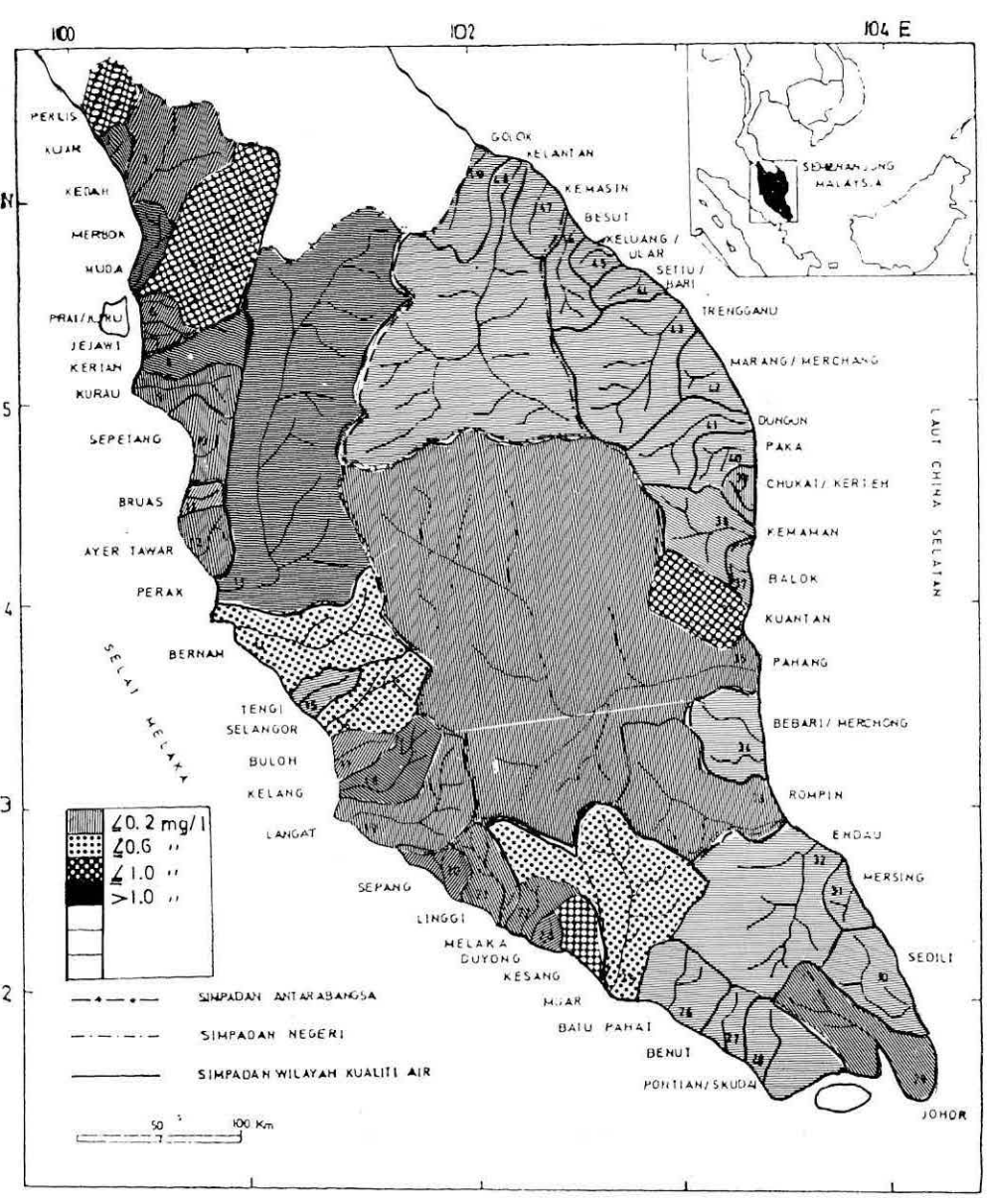


FIGURE 10 : MAXIMUM CONCETRATION OF PHOSPHATE (mg/l) DETECTED IN RIVER BASINS , 1980

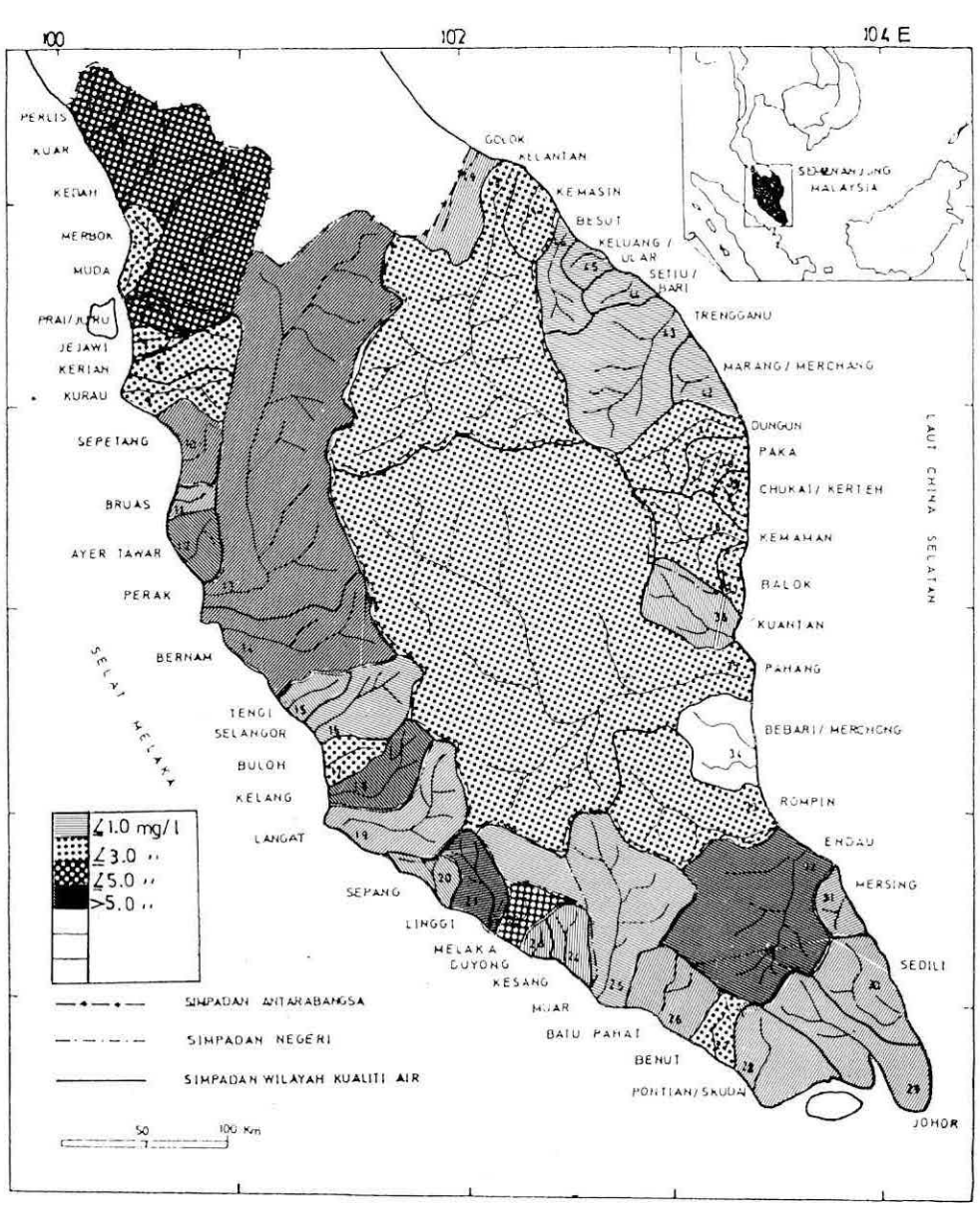


FIGURE 9 : MAXIMUM CONCENTRATION OF NITRATE NITROGEN(mg/l) DETECTED IN RIVER BASINS , 1980

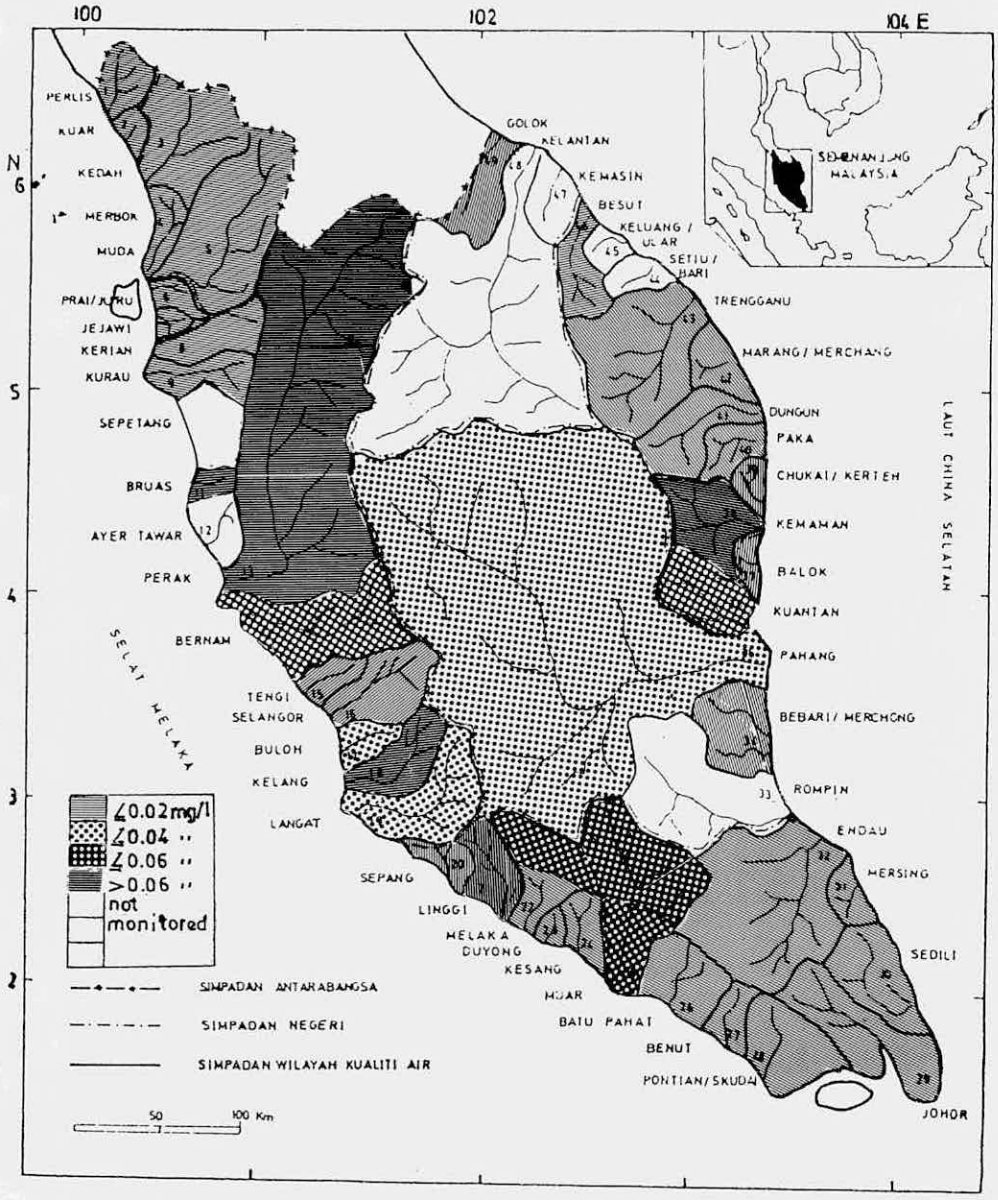
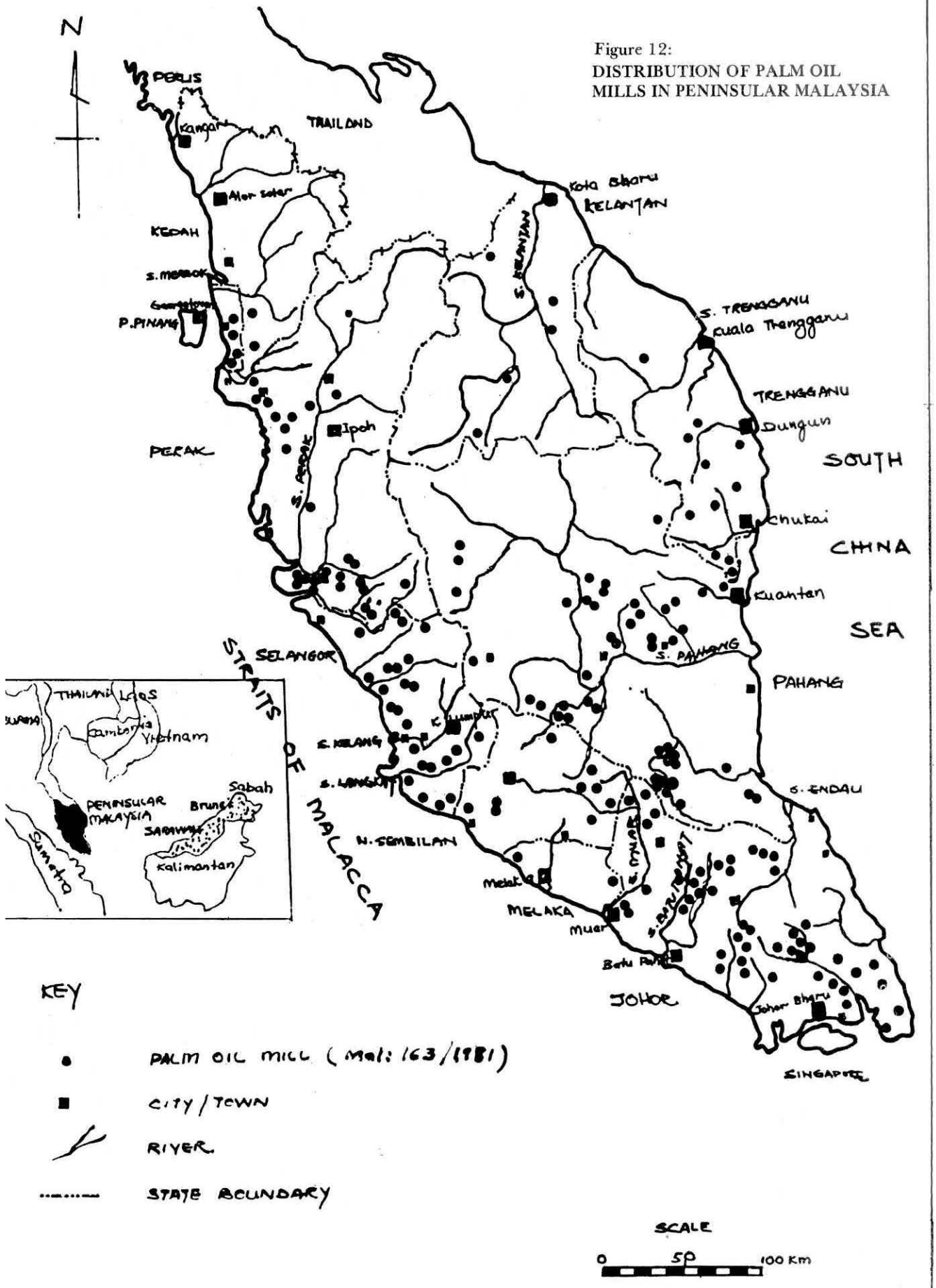


Figure 11:
MAXIMUM CONCENTRATION OF ARSENIC (MG/I) DETECTED IN RIVER BASINS, 1980.

Figure 12:
DISTRIBUTION OF PALM OIL MILLS IN PENINSULAR MALAYSIA



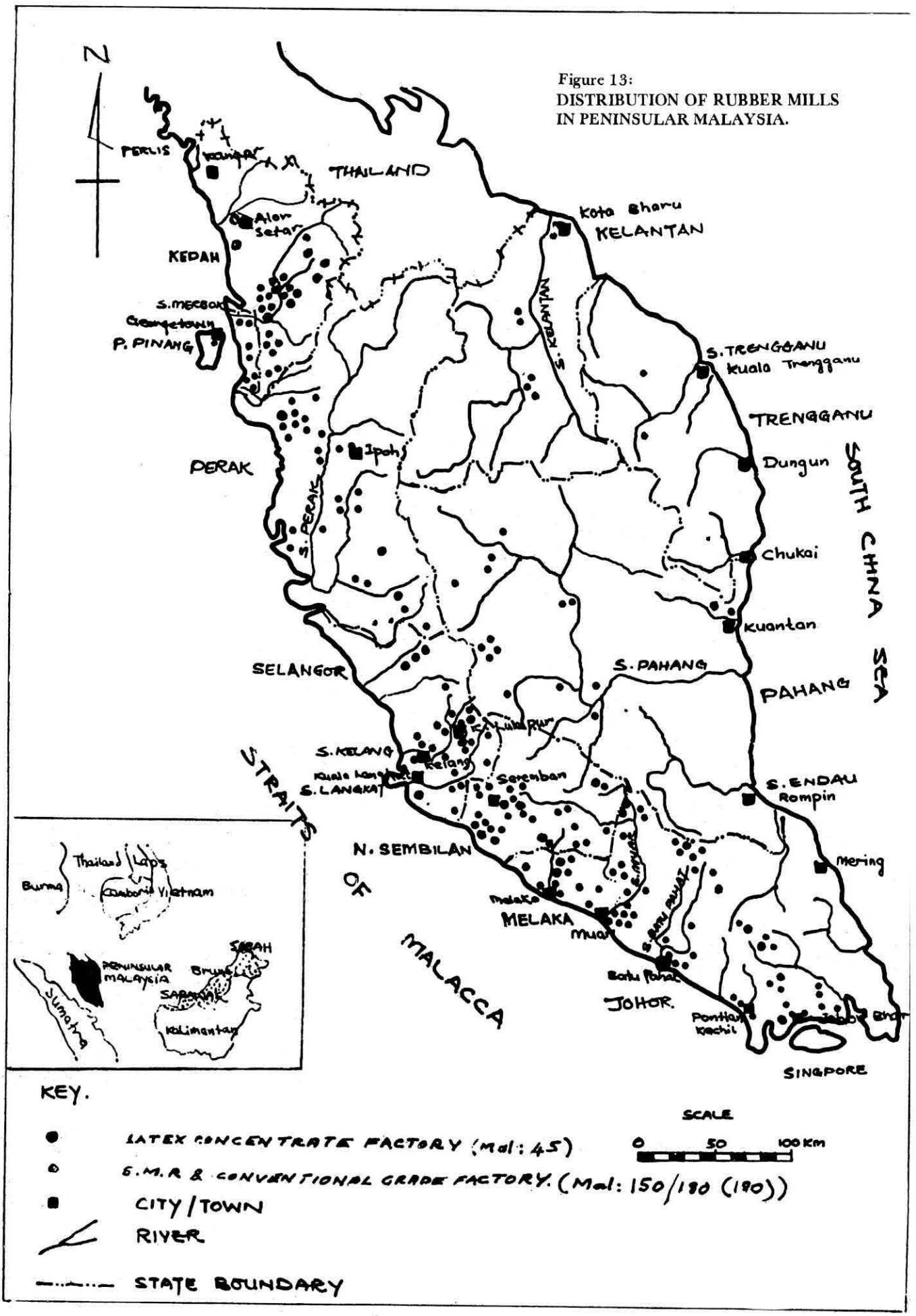


Figure 13:
DISTRIBUTION OF RUBBER MILLS
IN PENINSULAR MALAYSIA.

Figure 14:
DISTRIBUTION OF INDUSTRIAL
ESTATES IN PENINSULAR MALAYSIA

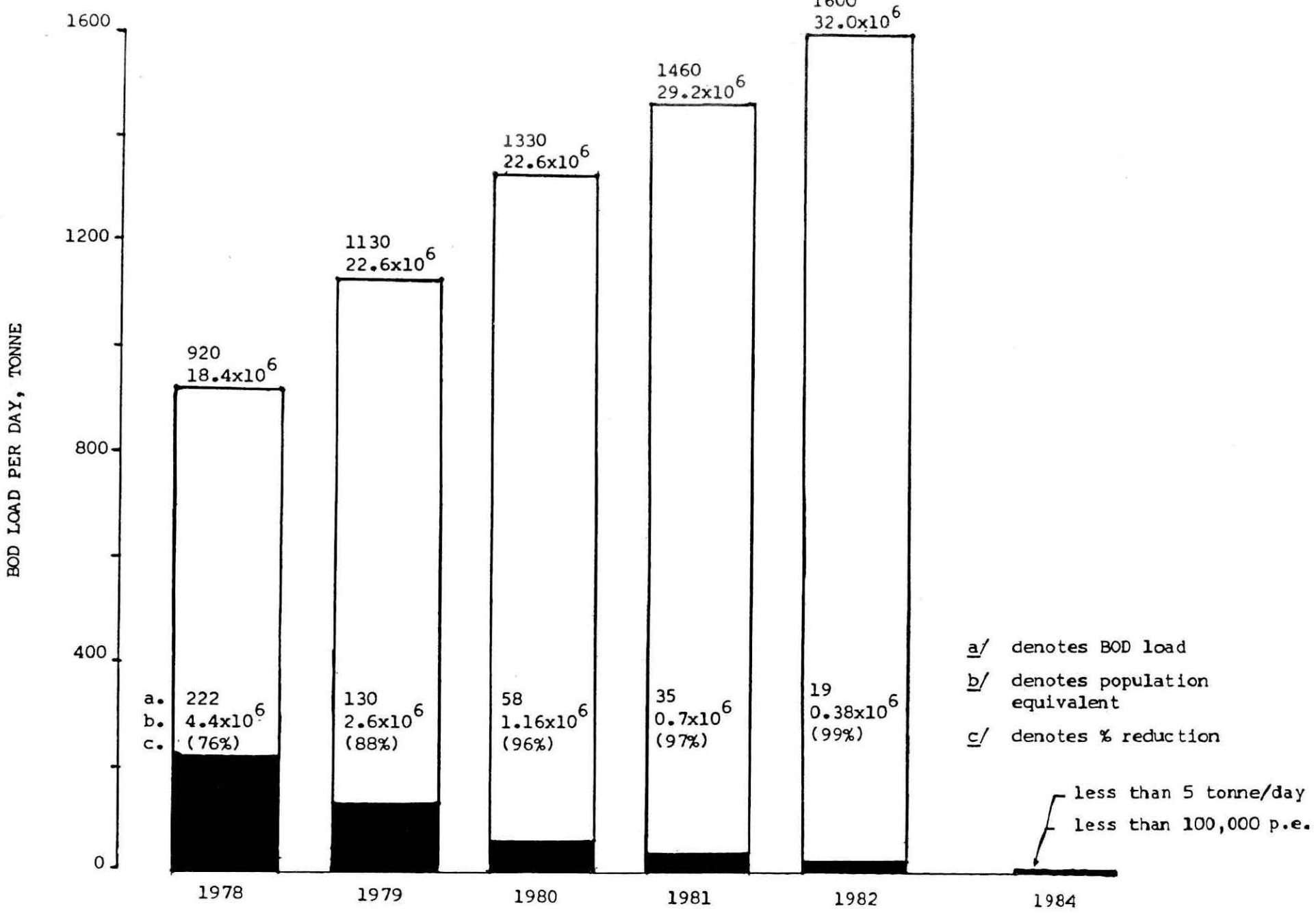
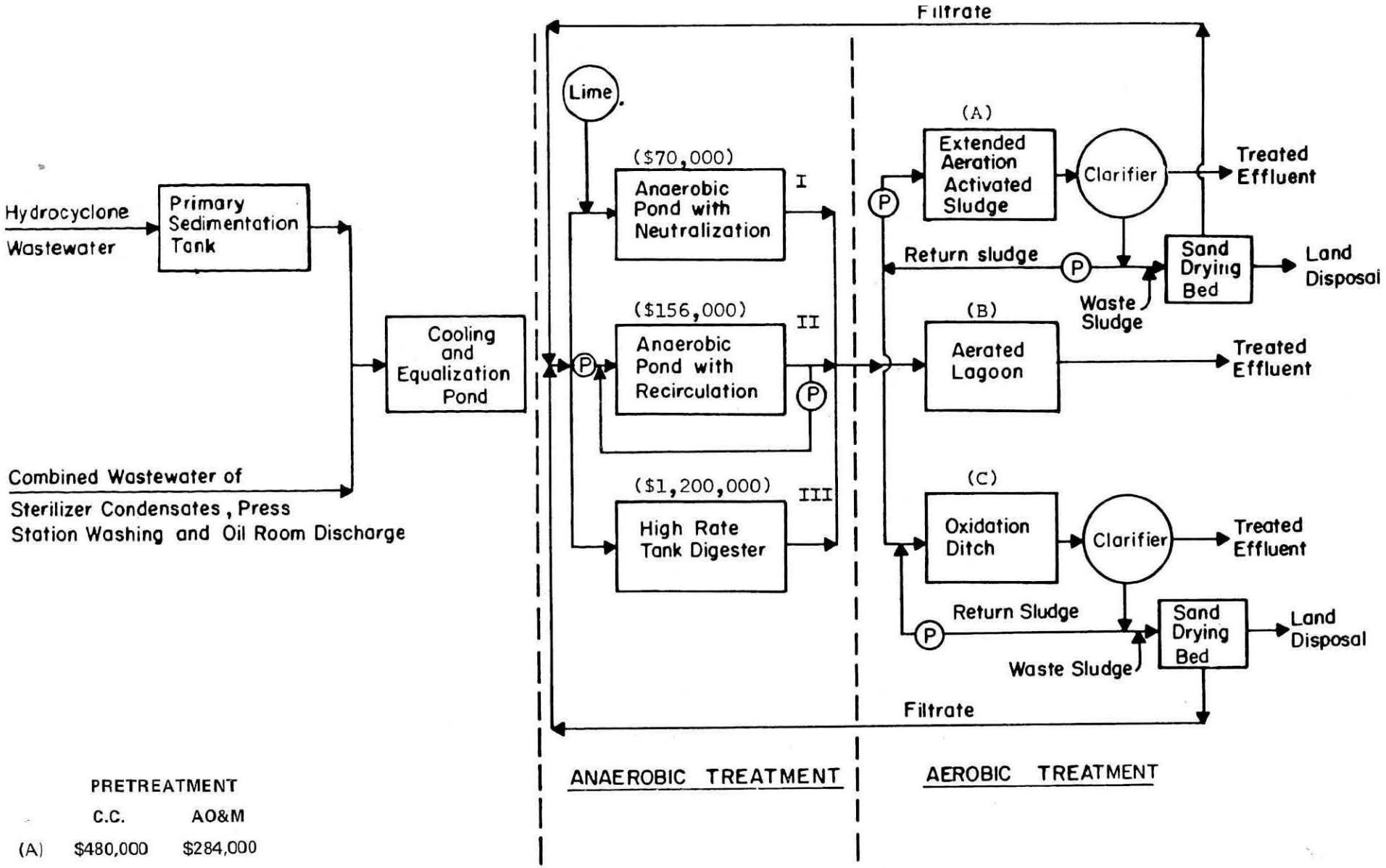


Figure 15: B.O.D. LOAD REDUCTION IN THE CRUDE PALM OIL INDUSTRY



PRETREATMENT	C.C.	AO&M
(A)	$480,000	$284,000
(B)	$594,000	$ 83,000
(C)	$1,812,000	$ 92,600

Figure 16:
FLOW DIAGRAM OF PALM OIL WASTE TREATMENT ALTERNATIVES FOR COST ANALYSIS
Basis: 20 TONNE/HOUR (FFB); 20 HOUR/DAY; 1000 CU. M/D FLOW.

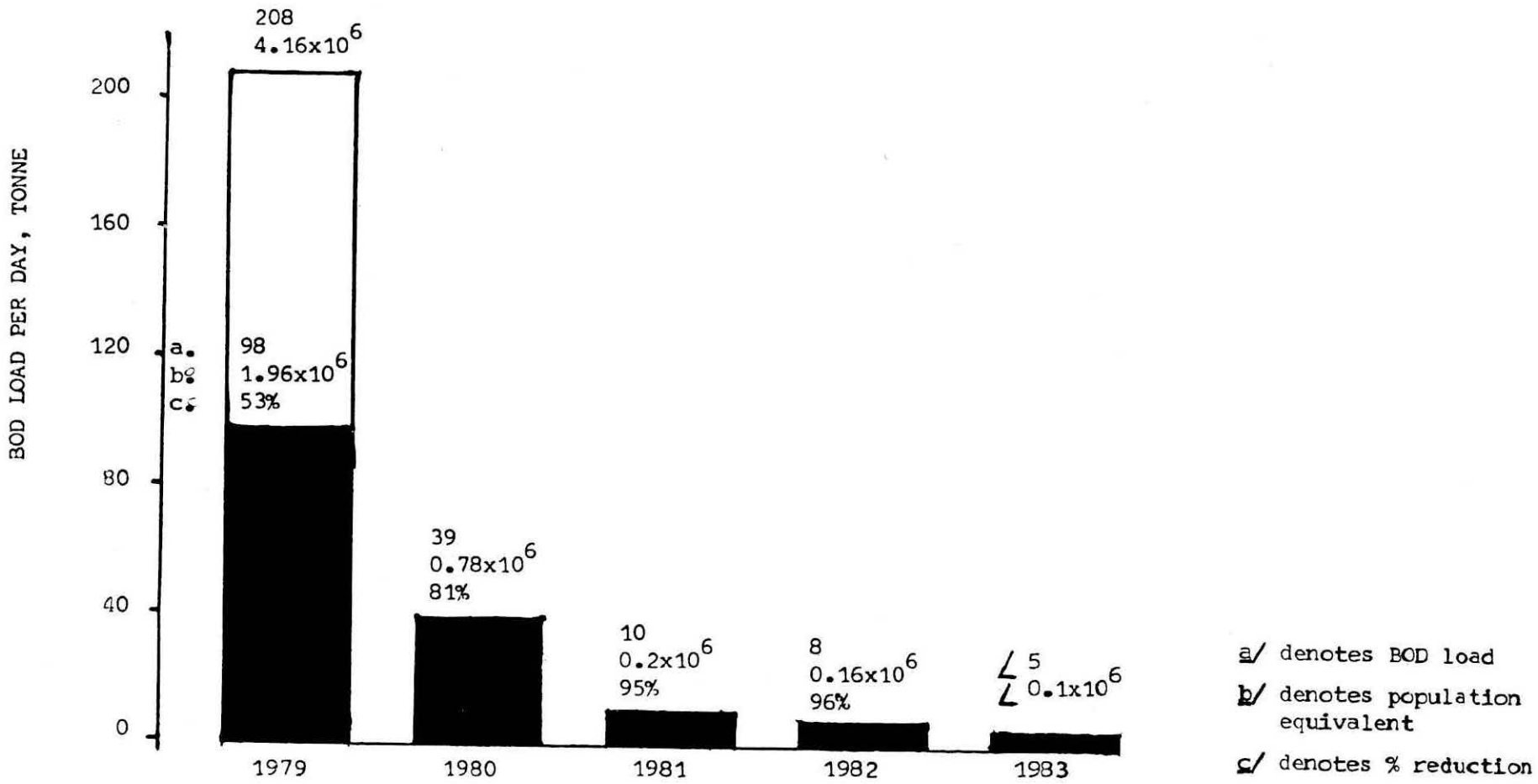
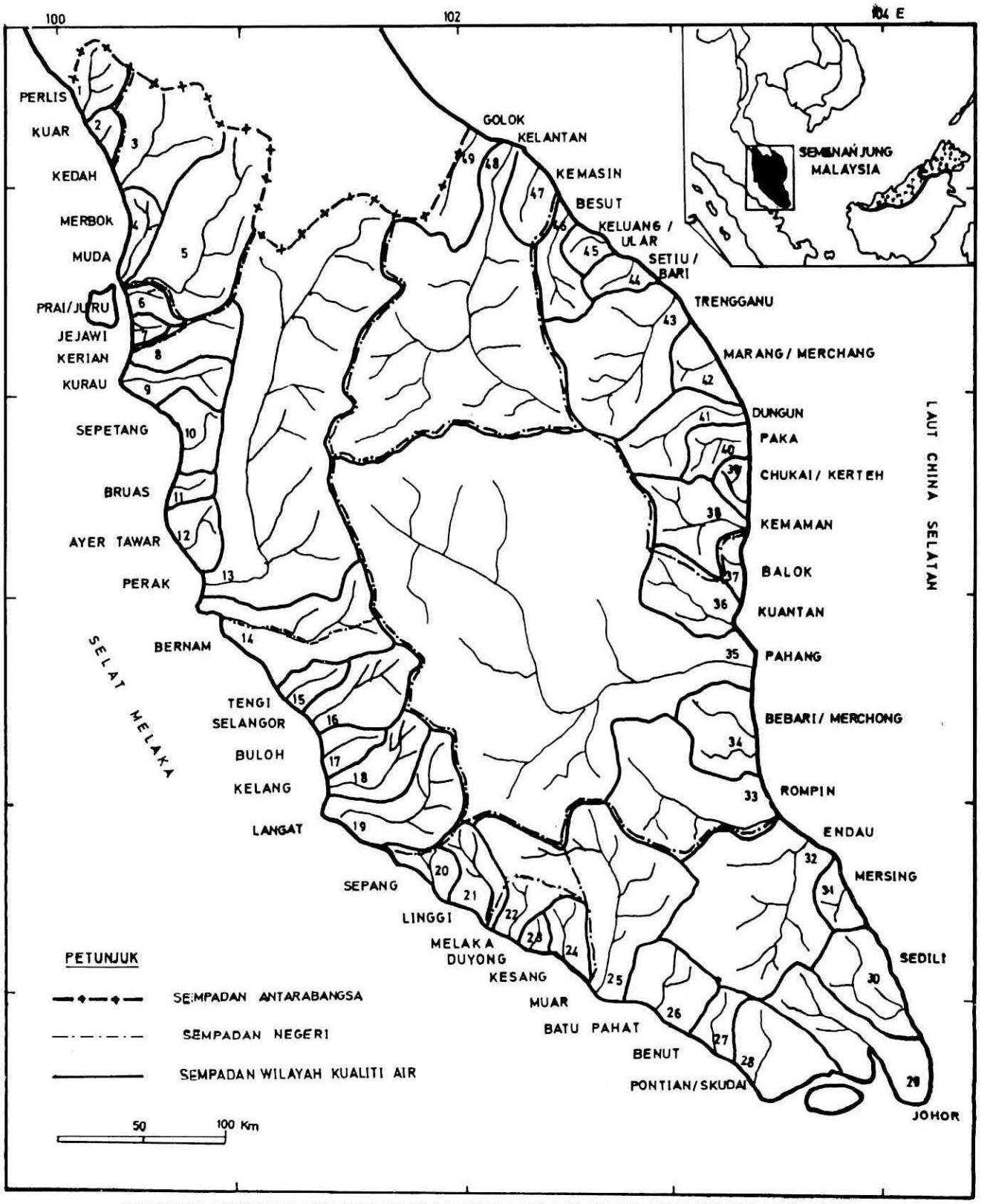


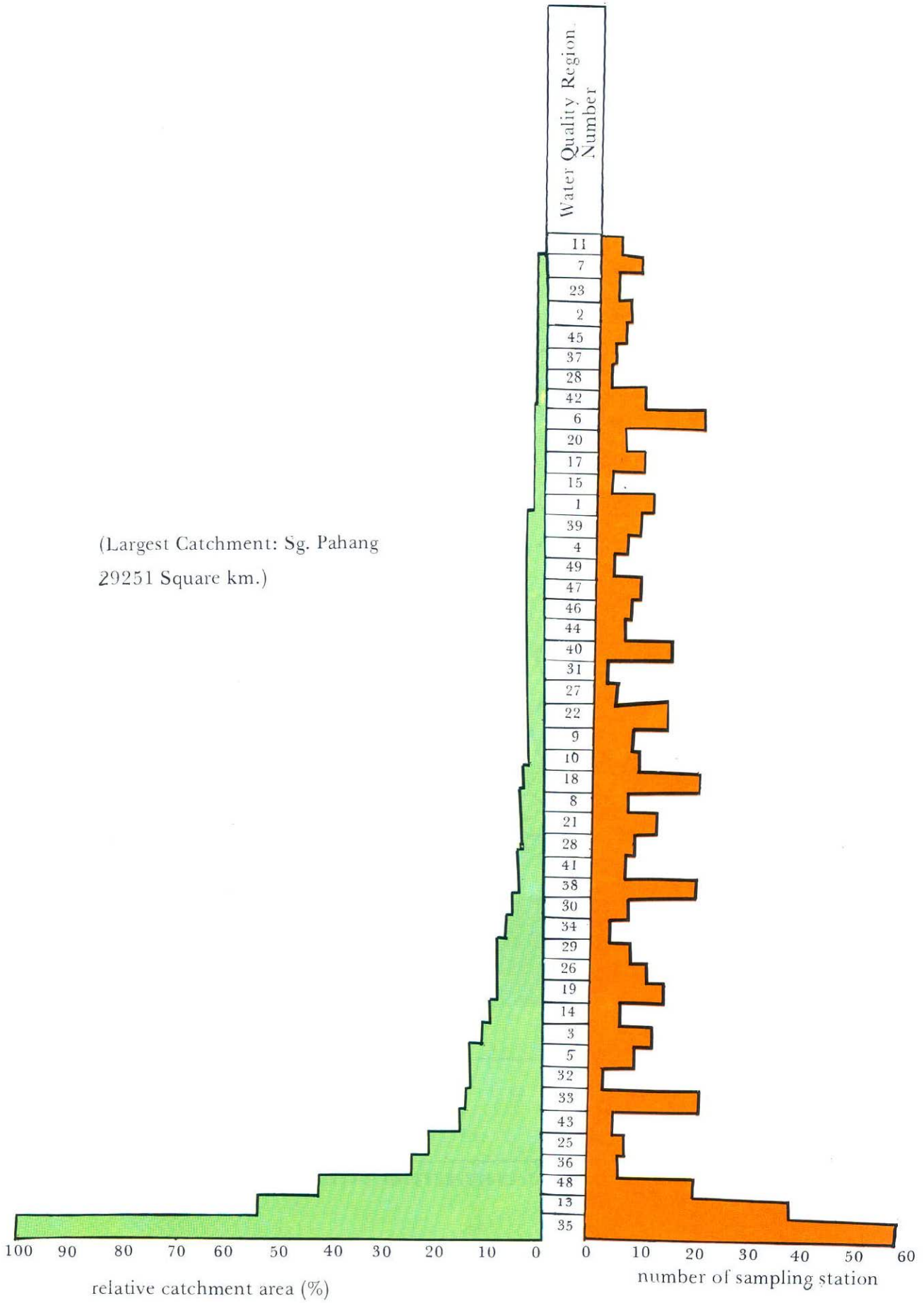
Figure 17:
B.O.D. LOAD REDUCTION IN THE RAW NATURAL RUBBER INDUSTRY

FIGURE 18



PENGKELASAN WILAYAH KAWALAN KUALITI AIR DI SEMENANJUNG MALAYSIA

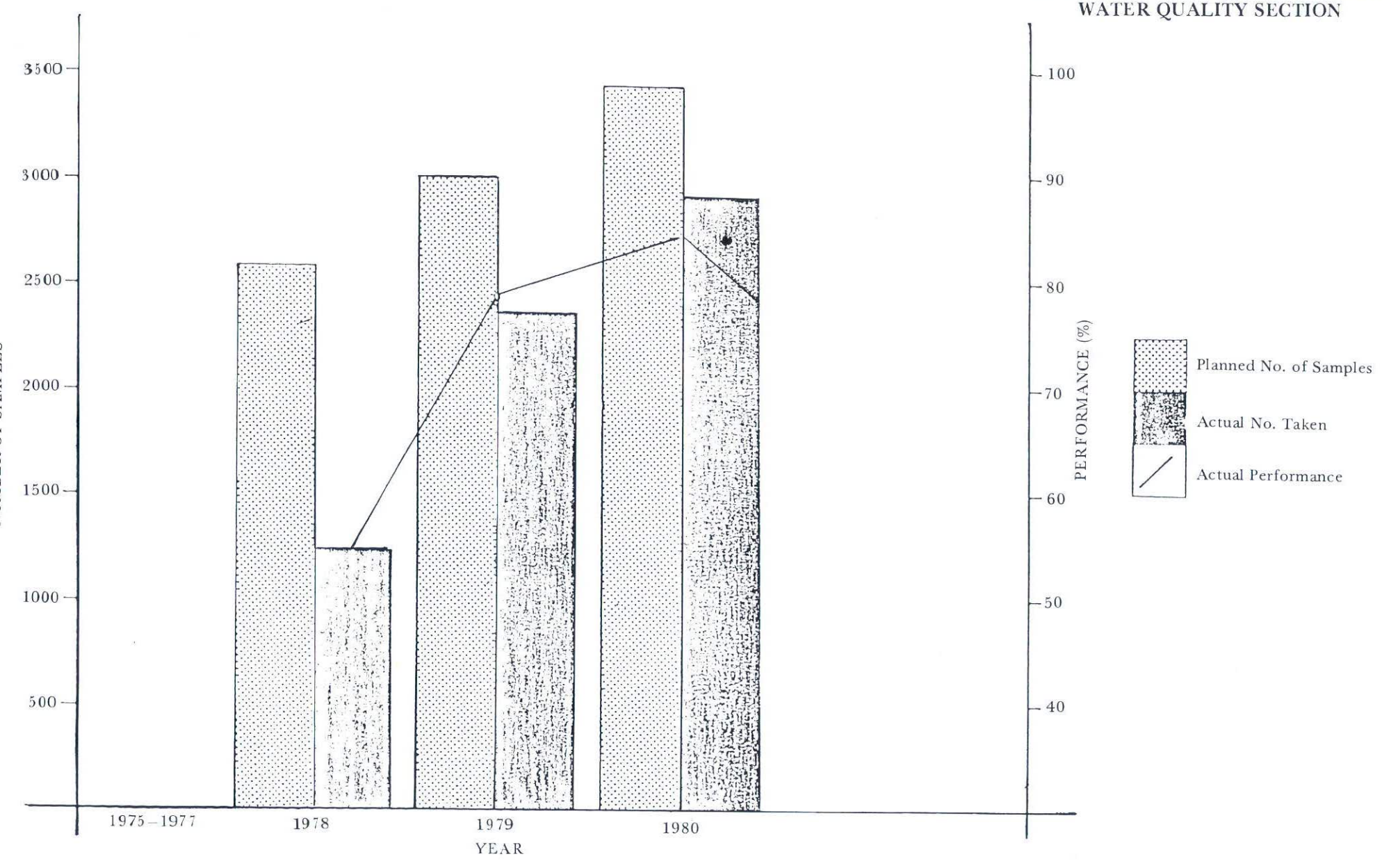
FIGURE 19



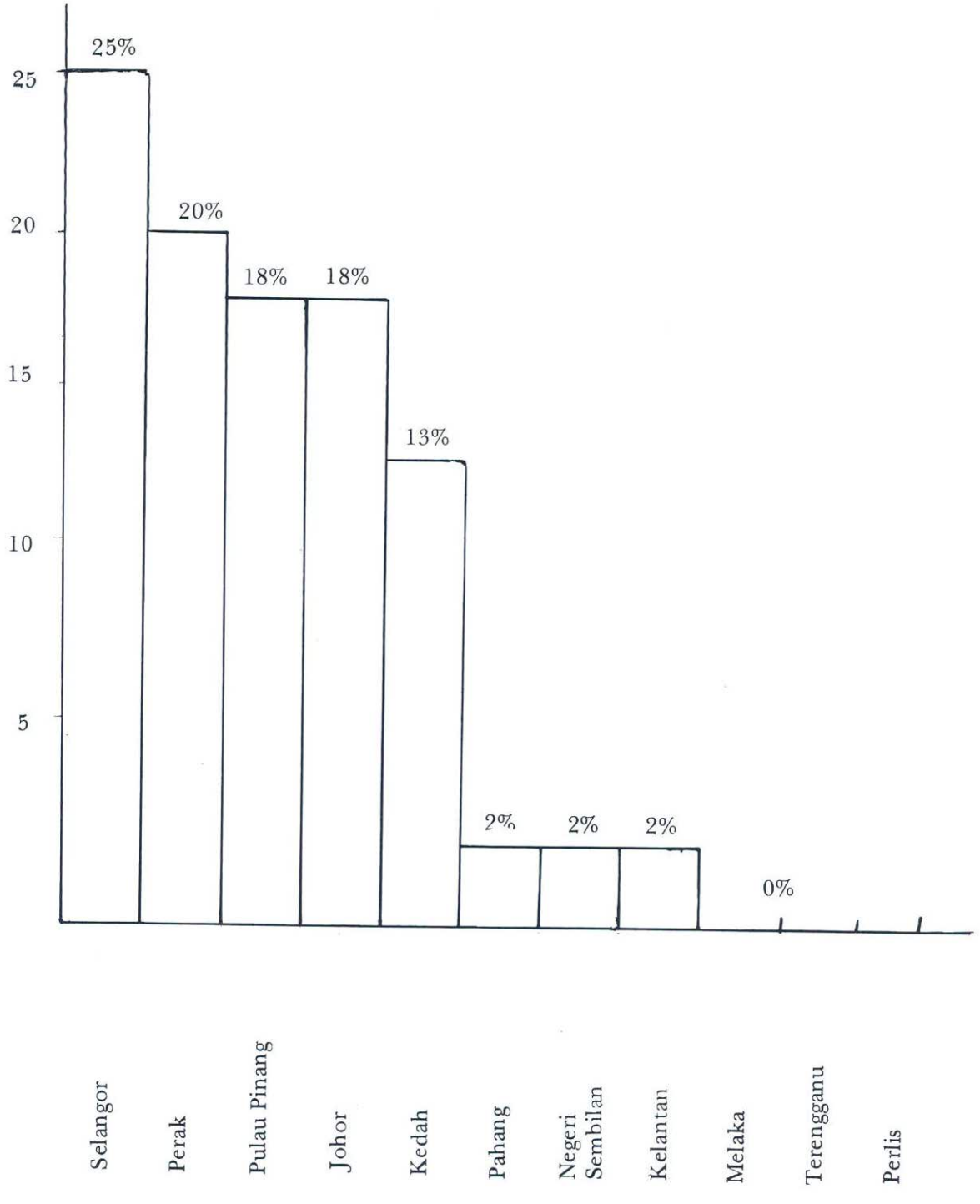
(Largest Catchment: Sg. Pahang
29251 Square km.)

FIGURE 20

PERFORMANCE OF WATER QUALITY MONITORING
WATER QUALITY SECTION



Rajah 21: Aduan Pencemaran Air 1980:
Taburan Mengikut Negeri
(Mengikut Jumlah Aduan)



Rajah 22: Sebab-sebab Aduan Pencemaran Air, 1980

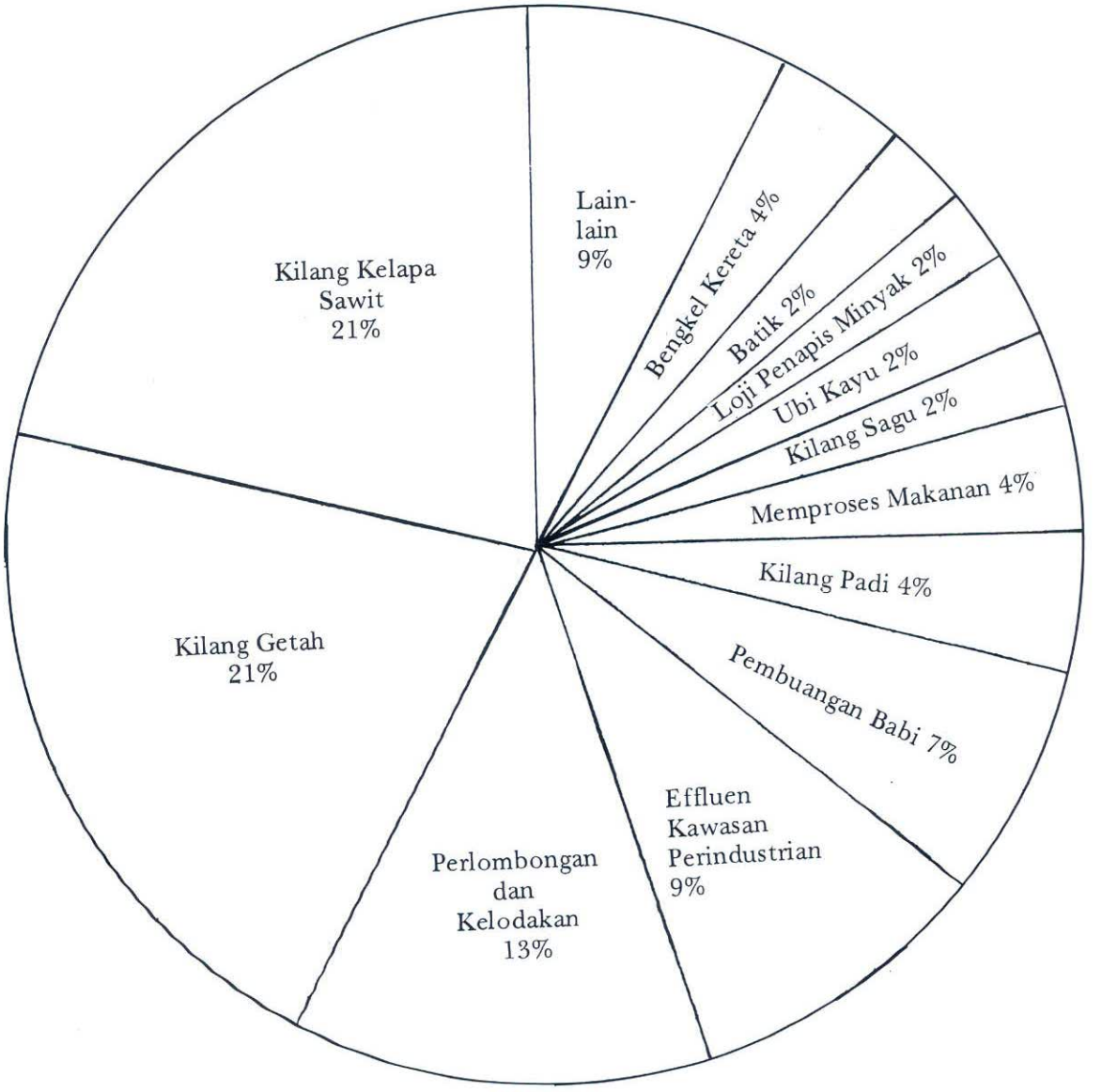


FIGURE 23 THE ENVIRONMENT IMPACT ASSESSMENT PROCEDURE

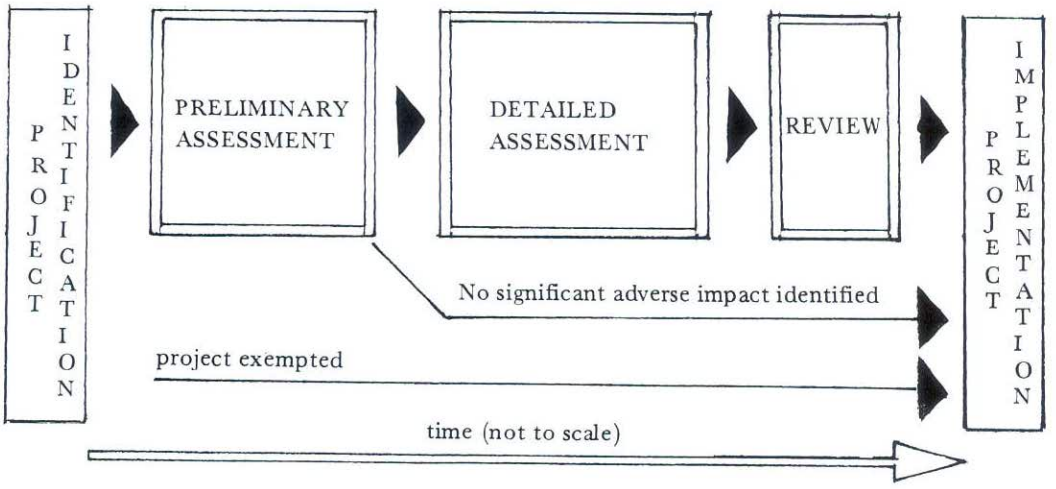
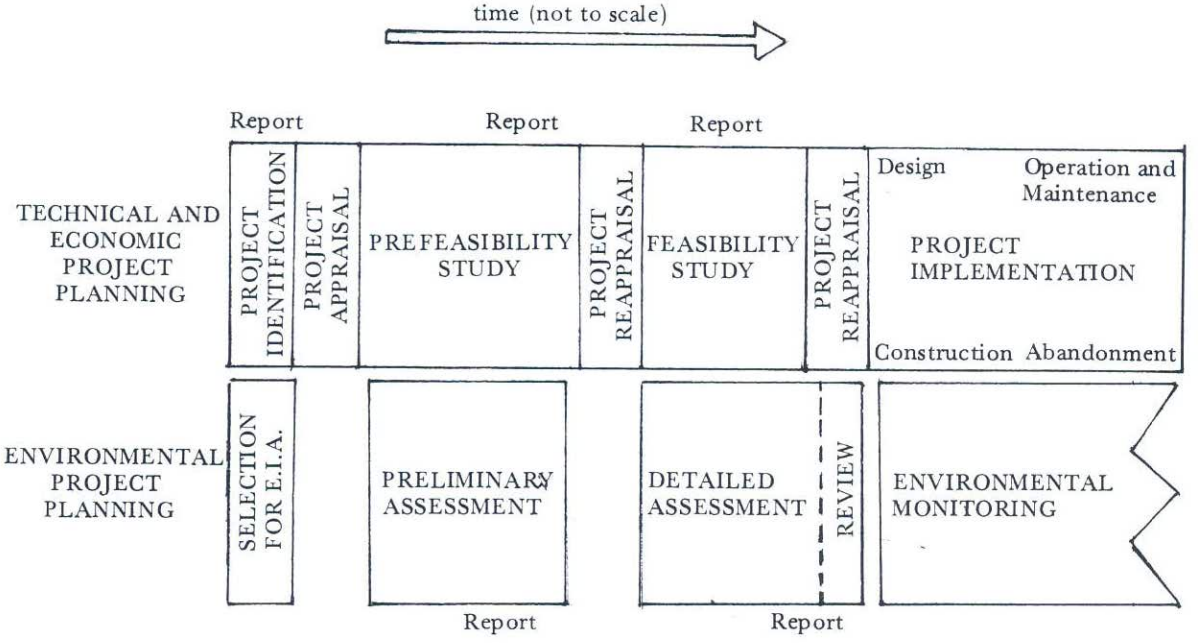


FIGURE 24 THE INTERGRATED PROJECT PLANNING CONCEPT



MATRIX

Key: (Instructions on reverse side)

- 0 — Potentially significant adverse environmental impact for which a design solution has been identified.
- ? — Adverse environmental impact that is potentially significant but about which insufficient information has been obtained to make a reliable prediction.
- • — Residual and significant adverse environmental impact
- + — Significant environmental enhancement.

PROJECT ACTIVITIES

ENVIRONMENTAL COMPONENTS			
			Identification of Activities
PHYSICO-CHEMICAL	LAND		Land
			Soil Profiles
			Soil Composition
			Slope Stability
			Subsidence and Compaction
			Seismicity
			Flood Plains/Swamps
			Land Use
			Engineering and Mineral Resources
			Buffer Zones
	SURFACE WATER		Shoreline
			Biotope Interface
			Flow Variation
			Water Quality
			Drainage Pattern
			Water Balance
			Flooding
			Existing Use
	GROUNDWATER		Water Table
			Flow Regime
			Water Quality
			Recharge
			Aquifer Characteristics
			Existing Use
	ATMOSPHERE		Air Quality
			Air Flow
			Climatic Changes
			Visibility
	NOISE		Intensity
			Duration
			Frequency
BIOLOGICAL	SPECIES AND POPULATIONS		Terrestrial Vegetation
			Terrestrial Wildlife
			Other Terrestrial Fauna
			Aquatic/Marine Flora
			Fish
			Other Aquatic/Marine Fauna
	HABITATS AND COMMUNITIES		Terrestrial Habitats
			Terrestrial Communities
			Aquatic Habitats
			Aquatic Communities
			Estuarine Habitats
			Estuarine Communities
			Marine Habitats
			Marine Communities
HUMAN	HEALTH AND SAFETY		Physical Safety
			Psychological Well-Being
			Parasitic Disease
			Communicable Disease
			Physiological Disease
	SOCIAL AND ECONOMIC		Employment
			Housing
			Education
			Utilities
			Amenities
	AESTHETIC AND CULTURAL		Landforms
			Biota
			Wilderness
			Water Quality
			Atmospheric Quality
			Climate
			Tranquillity
			Sense of Community
			Community Structures
			Man-Made Objects
			Historic Places or Structures
			Religious Places or Structures
			Landscape
			Composition

MATRIX

Instructions

1. The purpose of the Matrix is to help the project planner to:

   (a) Identify specific sources of potential environmental impact,

   (b) Provide a means of comparing the predicted environmental impacts of the various project options available,

   (c) Communicate in graphic form,

   (i) Potentially significant adverse environmental impact for which a design solution has been identified,

   (ii) Adverse environmental impact that is potentially significant but about which insufficient information has been obtained to make a reliable prediction.

   (iii) Residual and significant adverse environmental impact.

   (iv) Significant environmental enhancement.

2. In the first line identify with a check (√) in the appropriate box each relevant project activity for the proposed project. Each type of development project has its own set of project activities. Background information on the project activities is given in Appendix 2.4.

3. Consider in turn each relevant project activity and each broad environmental characteristic eg. land, atmosphere, health and safety for possible areas of environmental impact. Using the Key on the front of the matrix identify the potential significant environmental impacts against each specific environmental component. Background information on environmental characteristics and components is given in Appendix 2.5.

Note:
Preliminary Assessment matrices alone are not an environmental impact assessment. However, the matrices used in Preliminary Assessment are a graphic summary of the environmental concerns arising from the project and should be included in the Preliminary Assessment report.

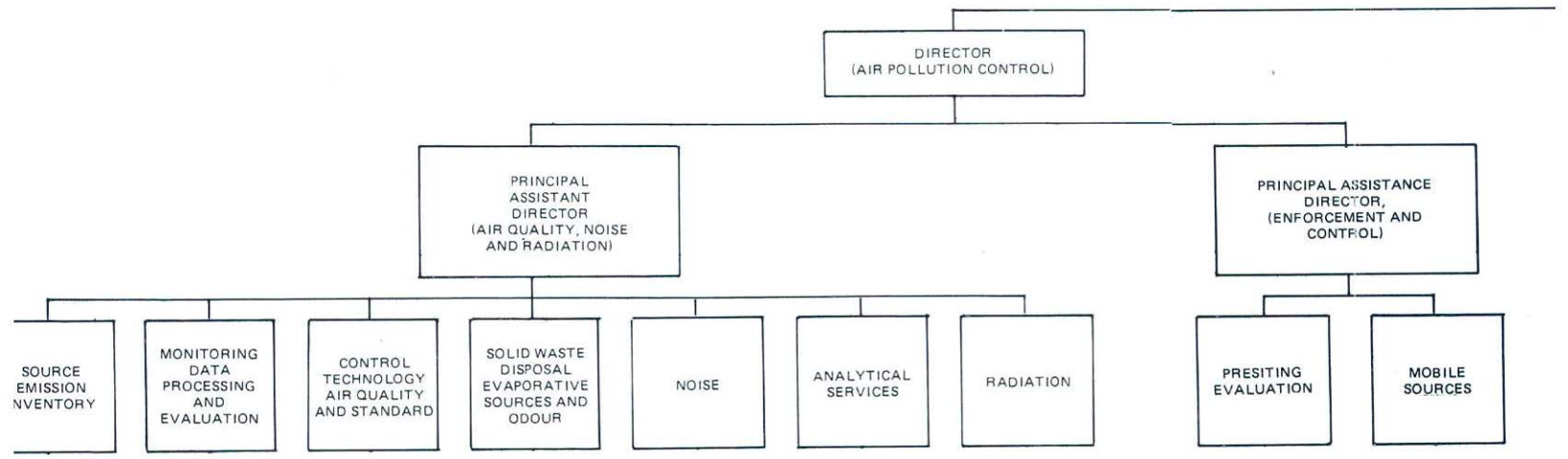
APPENDIX B

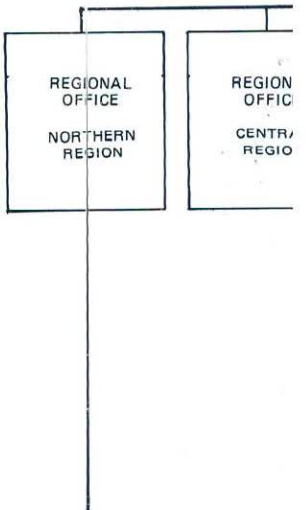
NAME AND POST	COURSE/SEMINAR/VISIT	PLACE	DATE
1. Mr. S.T. Sundram, J.S.M. Director-General	i. Intersessional Informal Consultation With Governing Council Members, UNEP.	Nairobi	Jan. 1980.
	ii. 3rd ASEAN Experts Meeting on the Issue of Environment.	Manila, Philippines	19th – 23rd May 1980.
	iii. ASEAN/UNEP Workshop on Environmental Impact Assessment for Decision Makers.	Baguio City, Philippines	23rd – 26th Jun 1980.
	iv. Technical Symposium and Study Tour on Marine Pollution.	China	17th – 28th Sept. 1980.
	v. 2nd Specialists Meeting on the Review of Draft Action Plan for East Asian Seas.	Bangkok	8th – 12th Dec. 1980.
2. Mr. A. Maheswaran, K.M.N. Director (Water).	i. 3rd International Congress on Industrial Wastewater and Wastes.	Stockholm	6th – 8th Feb. 1980.
	ii. 8th Session of the UNEP Governing Council.	Nairobi	16th – 29th April 1980.
	iii. 3rd ASEAN Specialists Meeting on the Issue of Environment.	Manila	19th – 23rd May 1980.
	iv. Interdependence of Economic Development and Environmental Quality in South East Asia: Malaysia as a case Study.	Ohio	4th – 10th Aug. 1980.
	v. 4th Session of the ASEAN Committee of Science and Technology.	Singapore	23rd–27th Jun, 1980.
	vi. 2nd Specialist Meeting on the Review of Draft Action Plan for East Asian Seas.		
3. Mr. Goh Kiam Seng, K.M.N. Director (Air).	i. ASEAN/UNEP Environmental Impact Assessment Workshop.	Baguio City.	23rd – 26th Jun. 1980.
	ii. WHO Fellowship for Director Air Pollution Control.		

NAME AND POST	COURSE/SEMINAR/VISIT	PLACE	DATE
4. En. Abu Bakar bin Jaafar Principal Assistant Director (Water).	i. 3rd United Nation Conference on the Law of the Sea.	New York.	23rd Mac – 4th Apr. 1980.
	ii. UNEP: Regional Seas Programme.	Baguio City.	17th – 21st Jun. 1980.
	iii. Workshop on the Preparation of Operational Plan: Action Plan for East Asian Waters – UNEP Regional Seas Programme.	Bangkok.	28th – 30th Jul. 1980.
5. Mr. Godwin Singam, Principal Assistant Director (Water).	i. River Input of Contaminants into the Sea	Jakarta	June 1980.
	ii. First Meeting of ASEAN Ministers of Science and Technology.	Pattaya	Oct. 1980.
6. Mr. Tan Meng Leng, Principal Assistant Director (Air).	i. Conference on the Environmental Standard and Energy Policies.	Hawaii	9th – 21st Mar. 1980.
	ii. UNEP Environmental Consultative Meeting on Motor Vehicle and its uses.	Paris	16th – 19th Sept. 1980.
7. Mr. Ho Yueh Chuen, Environmental Control Officer.	i. 10th Biennial Conference of the International Association on Water Pollution Research.	Canada	23rd – 27th Jun, 1980.
8. Mr. Patrick Tan Hock Chuan, Environmental Control Officer.	i. WESTPAC Workshop on Coastal Transport of Pollutants.	Tokyo	27th – 31st Mar 1980.
	ii. Short-term Consultant East Asian Seas Programme.	Geneva	13th – 19th Oct. 1980
	iii. IMCO/UNEP International Workshop on the Prevention, Abatement and Combating of Pollution from ships in East Asian Waters.	Manila	3rd – 8th Nov. 1980.
	iv. Senior Officers Meeting on the Safety of Navigation in the Straits of Malacca and Singapore.	Singapore	12th Nov. 1980.
9. Mr. Soo Ah Kan, Environmental Control Officer.	i. M. Sc. in Environmental Technology and Management.	Bangkok	Sept. 1979 – Sept. 1981.

NAME AND POST	COURSE/SEMINAR/VISIT	PLACE	DATE
10. Cik Norhayati Mustapha, Environmental Control Officer.	i. Course on Water and Wastewater Engineering.	Bangkok	Sept. 1979 – Sept. 1981.
11. Cik Hasmah Harun, Environmental Control Officer.	i. 2nd UNEP/INFOTERRA Workshop on Model Focal Point.	India	14th – 23rd July, 1980.
	ii. UNEP/INFOTERRA Meeting for Asian and Pacific Region.	China	13th – 15th Aug. 1980.
12. Puan Rosnani Ibrahim, Environmental Control Officer.	i 17th Technical Officers Meeting on Clean Air and Programme with State Pollution Control Commission, New Australia.	Perth	13th Sept – 3rd Oct. 1980.
13. Mr. Wong Foon Meng, Environmental Control Officer.	i. Courses on Prosecution and Court Procedure.	Kuala Lumpur	14th – 25th April, 1980.
14. Mr. Lee Heng Keng, Environmental Control Officer.	i. Training Course in handling 'Sonic Boom Monitoring System' equipment.	Denmark	3rd – 9th Feb. 1980.
	ii. Environmental Control and the Malaysian Iron and Steel Industry.	Kuala Lumpur	17th July, 1980.
	iii. WHO/UNEP Workshop on Planning for Control of Emission from Motor Vehicles.	PEPAS/ K. Lumpur	10th – 14th Nov. 1980;
15. En. Hashim Daud, Environmental Control Officer.	i. Fellowship Post-Graduate Course in Environmental Control and Technology..	Holland	24th Oct. 1979 to 8th Sept. 1980.
	ii. International Course in Environmental Science and Technology, IHE.	Delft the Netherland	16th Oct. 1979 to 16th Sept. 1980.
	iii. WHO/UNEP Biregional Workshop on Planning for Control of Emission for Motor Vehicle.	UPM, Serdang.	12th Nov. 1980.
16. En. Shamsuddin Hj. Abdul Latif, Environmental Control Officer.	i. Training Seminar on Environmental Management.	Indonesia.	[illegible]pt. 1980.
17. En. Mohamad Ishak Thani, Environmental Control Officer.	i. Application of System Analysis Techniques to Environmental Problems.	Bangkok.	25th – 29th Nov. 1980.

NAME AND POST	COURSE/SEMINAR/VISIT	PLACE	DATE
18. Miss Choong Mei Chun, Environmental Control Officer.	i. Wastewater Control Technology. ii. Advances in Palm Oil Effluent Control Technology.	UPM, Serdang. K. Lumpur	Aug. 1980. Nov. 1980.
19. En. Mohd. Shariff Mustapha, Asst. Environmental Control Officer.	i. Courses on Law and Court Procedure.	K. Kubu Bahru.	11th – 23rd Feb. 1980.
20. En. Radzuan @ Mohd. Radzuan Yusof, Asst. Environmental Control Officer.	i. Symposium on Industrial Wastewater Control.	UPM, Serdang.	7th – 11th July 1980.
	ii. Regional Meeting and Study Tour on Protection of Marine Environment and Related Ecosystems in Asia and Pacific.	Bangkok/ Sweden.	4th – 23rd Aug. 1980.
	iii. Demonstration of Oil Pollution Control Equipment.	Singapore	Oct. 1980.
	iv. Oil Spill Control Seminar.	Singapore	Dec. 1980.
21. En. Yaacob bin Kader Mydin, Asst. Environmental Control Officer.	i. Symposium on Industrial Wastewater Control.	UPM, Serdang.	7th – 11th July 1980.
22. En. Mohd. Yusof Mei, Asst. Environmental Control Officer.	i. Demonstration of Oil Pollution Control Equipment.	Singapore	Oct. 1980.
23. En. Jimat Bolhassan, Asst. Environmental Control Officer.	i. Symposium on Industrial Wastewater Control.	UPM, Serdang.	7th – 11th July 1980.
24. Mr. Kwong Chong Leong, Asst. Environmental Control Officer.	i. Sewage Works Engineering for Water Pollution.	Japan	4th Sept. – 11th Dec. 1980.


DIRECTOR
(AIR POLLUTION CONTROL)
PRINCIPAL ASSISTANT DIRECTOR (AIR QUALITY, NOISE AND RADIATION)
PRINCIPAL ASSISTANCE DIRECTOR, (ENFORCEMENT AND CONTROL)
SOURCE EMISSION NVENTORY
MONITORING DATA PROCESSING AND EVALUATION
CONTROL TECHNOLOGY AIR QUALITY AND STANDARD
SOLID WASTE DISPOSAL EVAPORATIVE SOURCES AND ODOUR
NOISE
ANALYTICAL SERVICES
RADIATION
PRESITING EVALUATION
MOBILE SOURCES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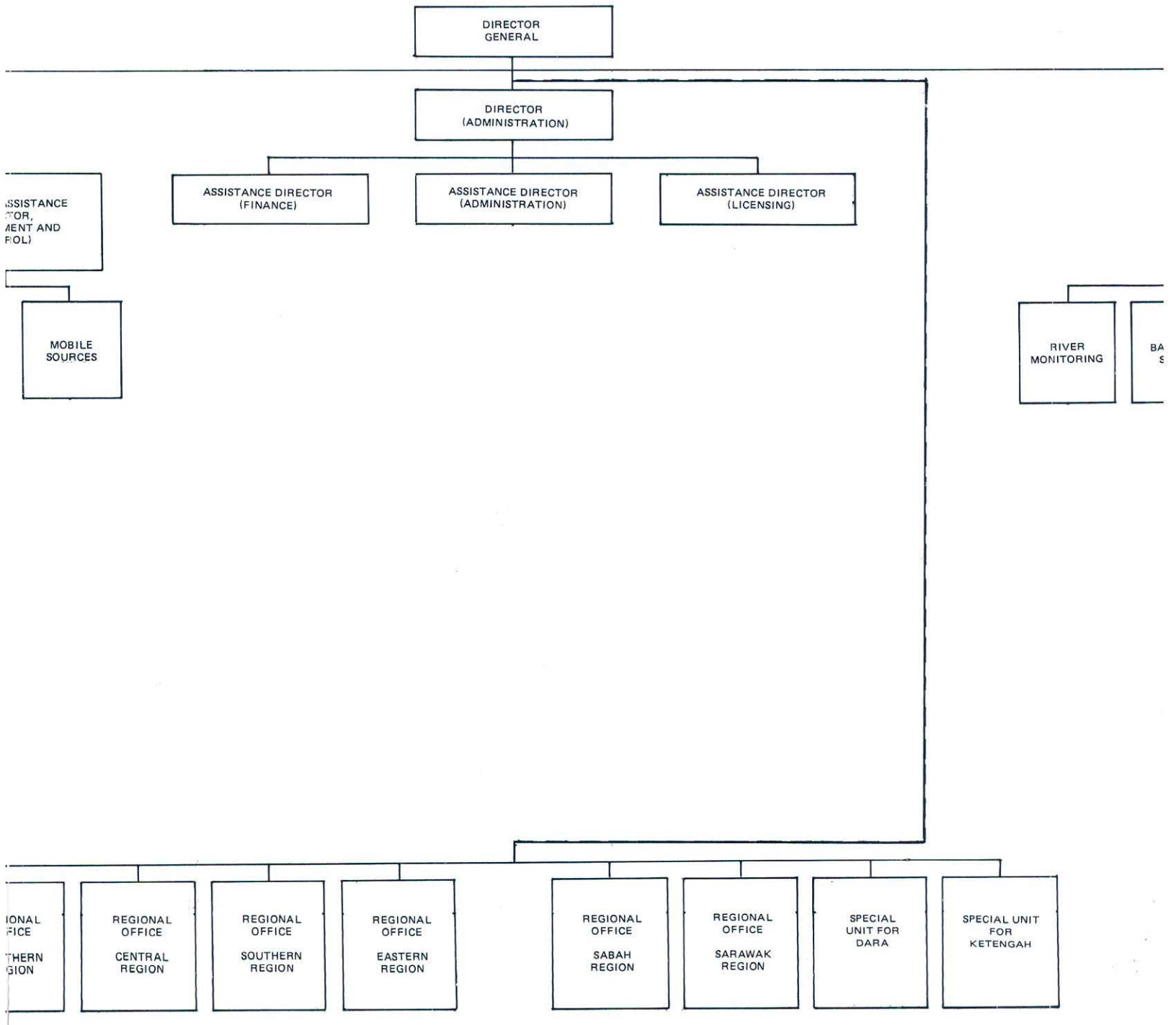

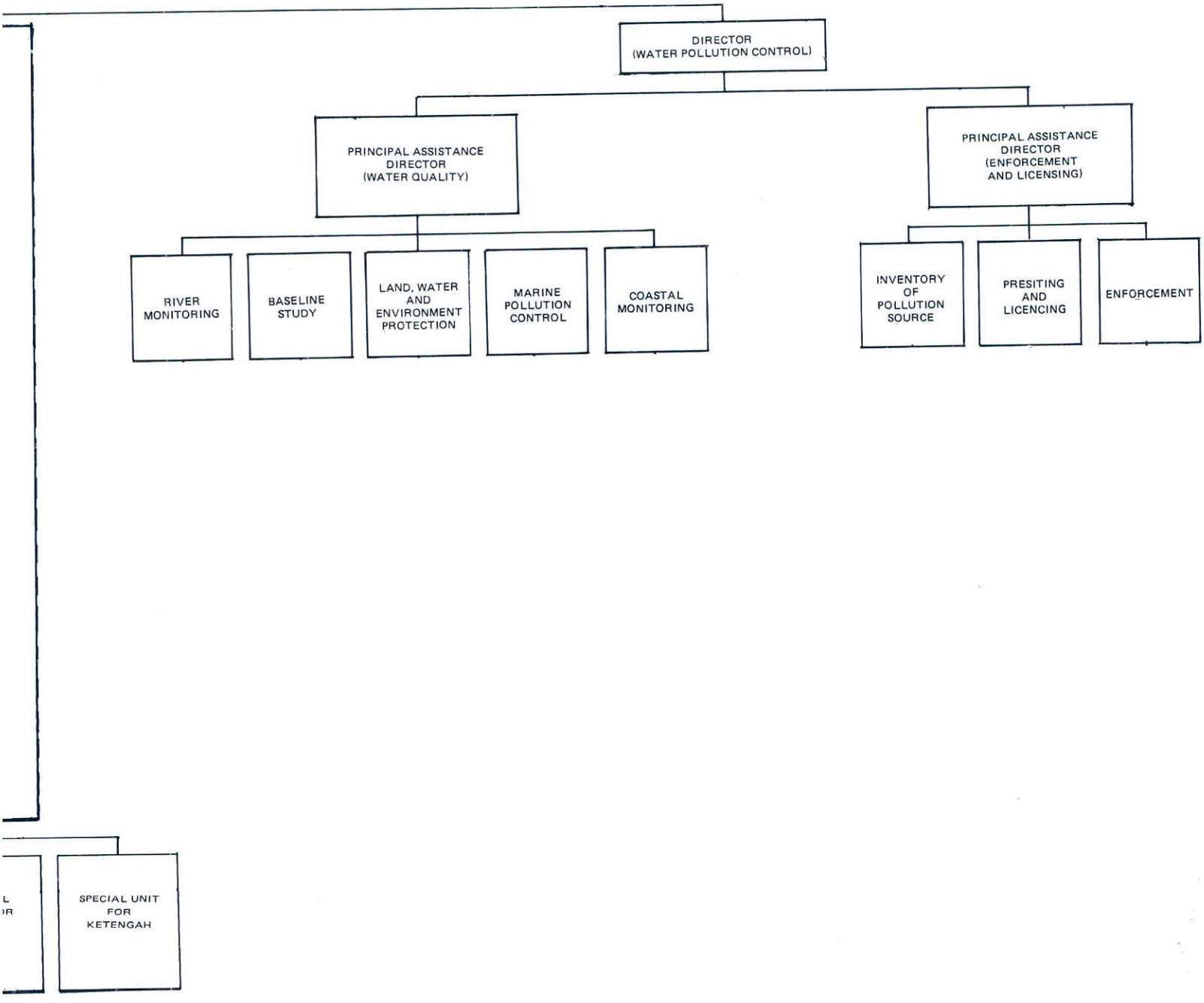
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