

Legislative Approach to Water Quality Management in Malaysia – Success and Challenges

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Introduction

Water resources in Malaysia come in the forms of rivers, lakes and groundwater. As long as we can remember, rivers have served as the sole source of water supply for our consumption in almost all parts of the country. Since achieving independence, the country has developed itself in leaps and bound from an agriculture-based society to an urbanised and industrialised nation. Both this shift and a rapidly growing population have threatened rivers as a vital source of water supply. In addition, the river water quality has deteriorated making its availability for consumption much more difficult than in the past. The continual pollution of rivers will deplete this water resource even further and will have serious repercussions on the national agenda to become a fully developed nation by the year 2020 if essential steps are not taken to improve our river water quality. This paper describes the legislative approach to water quality management in the country, and its success and challenges.

National Policy

The National Policy on Environment states that the nation shall implement environmentally sound and sustainable development for the continuous economic, social and cultural progress and enhancement of the quality of life of Malaysians. It is based on eight inter-related and mutually supporting principles and where water is concerned will include the sustainable use of water resources, conservation of a river's vitality and diversity, and the continuous improvement of its water quality. The policy outlines the strategies and measures to be taken towards an effective management of water resources, pollution control and prevention of environmental degradation. A holistic approach is required to manage our river water quality.

Water quality management

Legislation

Laws are used as a form of management response to environmental problems in Malaysia. Amongst the laws relevant to water quality management include the 1929 Mining Enactment, the 1930 Waters Enactment, the 1954 Drainage Works Ordinance and the 1974 Street, Drainage and Building Act. These laws are largely sectoral in character and focused on specific areas of activity. The increasingly complex environmental problems faced by Malaysia required a comprehensive piece of legislation which came in the form of the 1974 Environmental Quality Act. The Act came into force on 1 April 1974 for the abatement and control of pollution and enhancement of the environment. Three pieces of subsidiary legislation were formed as an initial legislative approach to water quality management. These were:

- (i). Environmental Quality (Prescribed Premises)
(Crude Palm Oil) Regulations 1977;

- (ii). Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978; and
- (iii). Environmental Quality (Sewage and Industrial Effluents) Regulations 1979.

Sources of pollution that threatened our water environment have been subjected to these regulations since the 1970s. It is essentially a command and control approach utilising effluent discharge standards. For pollution sources upstream of public water supply intakes, the effluent discharge standard was made much stricter than those downstream of such intakes.

In addition to making use of these laws to control pollution, additional legislation is also in place to effect prevention of pollution into a river or water body. A third mechanism involves a continuous assessment or monitoring of all the rivers in the country to ascertain the improvement or otherwise of our river water quality.

Prevention

The legislative approach in water quality management effected by the 1974 Environmental Quality Act makes use of Section 34A where a report on impact on the environment resulting from prescribed activities (EIA requirement) is mandatory. Among the prescribed activities or projects that can cause water pollution include airport, housing, industry, mining, petroleum, power generation, resort and recreational development, and waste treatment and disposal facilities.

For non-prescribed activities, site suitability evaluation would also be carried out so as to assess the capacity of the area to receive additional pollution load and the requirement for waste disposal.

The Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 also require that written permission be obtained before the construction of any building or carrying out any work that may result in a new source of effluent or discharge.

Water Pollution Sources and Control

Malaysian rivers are degraded by both point and non-point sources of pollution. The major point sources of pollution are sewage treatment plants, agro-based industries, manufacturing industries, sullage or grey-water from commercial and residential premises, and pig farms. Non-point source (or diffuse) pollution is largely due to storm runoff after a downpour. Earthworks and land clearance activities contribute to siltation of rivers and can be both point and non-point sources of pollution.

Agro-based industries

The earlier post-independence years saw a proliferation of agro-based industries such as raw natural rubber factories and palm oil mills which polluted our rivers. The control of pollution from these sources involved a combination of both economic and command-control instruments which has proven to be very successful. These industries did not only invest in pollution control research and development but also made great efforts to comply as rapidly as possible with the stipulated effluent-discharge or land-disposal standards. They were induced to install effective wastewater treatment systems instead of paying the prohibitive

effluent-related or pollution fees imposed under the licensing requirements that came into force since 1977. The organic pollutant load dumped into rivers has been greatly reduced by more than 90 percent of the total load generated.

Manufacturing industries

A new set of environmental problems emerged as the nation progressed in its industrial development. In addition to organic pollutants, manufacturing industries generate inorganic pollutants, toxic wastes and persistent organic pollutants. All manufacturing industries are required to install wastewater treatment systems to arrest their water pollutants before being dumped into rivers. The achievement in controlling effluent discharges from these manufacturing industries varies from industry to industry. The small and medium scale industries have difficulties in complying with discharge standards. Constraints cited include financial problems and lack of space for the construction of wastewater treatment facilities.

The manufacturing industries are encouraged to implement alternative options such as cleaner production, waste minimisation and waste re-utilisation in order to reduce water pollution further. Such options could also enhance production efficiency, reduce waste generation and thereby its final disposal cost. They are also encouraged to adopt the approach of self-regulation and strive for ISO 14001 Certification not only to ensure compliance with discharge standards but also to attain competitiveness in the global arena.

Efforts are also being stepped up to eliminate indiscriminate disposal of toxic wastes and uncontrolled release of persistent organic pollutants. The management of toxic wastes is based on the cradle-to-grave concept. There are laws in place to control their generation, storage, transportation, treatment and disposal. An integrated state-of-the-art treatment and disposal facility has been set up and is in full operation since August 1998 to assist the manufacturing industries in the proper management of their toxic wastes.

Sewage Disposal and Sewerage Works

Sewage is a major polluter of our rivers. This is a problem of the past centuries that continues to plague the nation as it enters the 21st century. Initial efforts to control sewage are very much focused on protecting public health but there is now a gradual shift to protect water resources and the natural environment. A private company has been tasked to manage sewerage works and sewage disposal in the country since 1994 but currently it is only responsible for 86 out of 144 local authority areas. The management of sewerage in these 86 areas is far from holistic since there are sources that do not come under the private company such as private sewage treatment plants, individual septic tanks, sewage from primitive systems and discharges of raw sewage from squatters. There are still a lot of efforts required and measures needed to reduce the sewage pollutant loads so that river water quality can be improved.

Sullage (Grey-Water)

An important source of point pollution is sullage or grey-water which originates from residential and commercial premises but is often overlooked. The wastewaters can come from places such as kitchen sinks, bathrooms, washing machines, restaurants, wet markets and car washing centres. As rivers pass through urban areas and populated places the sullage will become a major contributor of water pollution. Usually a stream in an urban area does not have enough assimilative capacity to absorb pollutant loads and will contribute organic pollutants, ammoniacal nitrogen and nutrients to a river nearby. At present, sullage is not

treated and poses a problem to improving river water quality.

Pig Farming

Pig farming cannot continue to be a backyard industry if it is to flourish in the country. This industry has a high demand for water and discharges large quantities of wastewater into rivers with a high organic content. Designated pig farming areas are required not only to ensure a proper control of its wastewater discharges but also for disease control.

Non-Point Pollution and its Control

Non-point pollution is pollution that comes from many diffuse sources and is associated with rainfall moving over and through the ground. As it moves, the runoff picks up and carries away natural and man-made pollutants, and deposits them into lakes, rivers and even ground water. This runoff pollution can come from many different land uses over large areas and is far more difficult to control than pollution from point sources. One of the best ways to control this pollution is to implement best management practices.

There are at least three types of runoff pollution in the country. Firstly, agricultural runoff that carries pollutants that originate from activities such as pesticide spraying, fertilizing, planting, harvesting, feedlots, cropland, grazing, plowing and irrigation. The runoff will deposit manure, fertilisers, ammonia, pesticides, livestock waste, oil, toxins, soil and sediment. Good agricultural practices are required to manage these activities so that runoff pollutants are minimized.

Secondly, forestry runoff associated with activities such as timber harvesting, removal of streamside vegetation, road construction and use in forested areas, and mechanical preparation for tree planting. Good forestry practices are required to minimize soil erosion and siltation, destabilisation of stream banks and disruption of river habitats.

Thirdly, urban runoff that will deposit many and high amount of pollutants into rivers and other water bodies. Some of the measures that can be implemented include installing storm water filter to treat drainage and runoff, construction of gross pollutant traps at appropriate places, maintaining vegetation as filters along contours, and constructing wetlands wherever feasible as a good revegetation practice to improve river water quality.

The control of non-point pollution is far from satisfactory but the problem is not unique to this country. Its control is also a major challenge in other parts of the world including the US and countries in Europe.

Erosion and Siltation Control

In the pursuit of national development, the country has embarked on rigorous land clearance activities and many earthworks for constructions purposes. These have resulted in soil erosion and the dumping of sediments into rivers. Significant negative impacts on the rivers are occurring not only in the form of siltation but also losses of river habitats. Control measures are necessary to be imposed on developers to comply with the “Erosion of Soil and Control Plan” made by the Drainage and Irrigation Department and also the “Guidelines for Prevention and Control of Soil Erosion and Siltation” issued by the Department of Environment (DOE).

River quality monitoring

The DOE has established a river monitoring network since 1978 to establish the status of river

water quality, to detect changes in the water quality and wherever possible to identify pollution sources of rivers. It also serves to support environmental management and planning in the country. There are 1085 water quality monitoring stations sited within 140 river basins throughout the nation. The monitoring programme includes both the *in-situ* measurements and laboratory analyses of as many as 30 physico-chemical and biological parameters. In addition, 15 automatic water quality monitoring stations are installed to detect changes in river water quality on a continuous basis at strategic locations on major rivers basins. Water quality levels for specific parameters can be transmitted real-time to the DOE.

Between the years 1998 to 2005, the numbers of clean rivers have risen from 33 to 80 while polluted rivers remained between 9 and 15 (see Figure 1). Over the same period the number of polluted rivers, as measured in terms of biochemical oxygen demand (BOD), ranged between 14 and 31 rivers (see Figure 2). This organic pollutant originated from agro-based industries, manufacturing industries, sullage, pig farms and sewage. The estimated BOD loads from agro-based industries, manufacturing industries and pig farms were dwarfed by the BOD loads from sewage (see Figure 3). This suggests that while industries and pig farms are major polluters nevertheless sewage remains as a significant major polluter whose loading need to be reduced drastically.

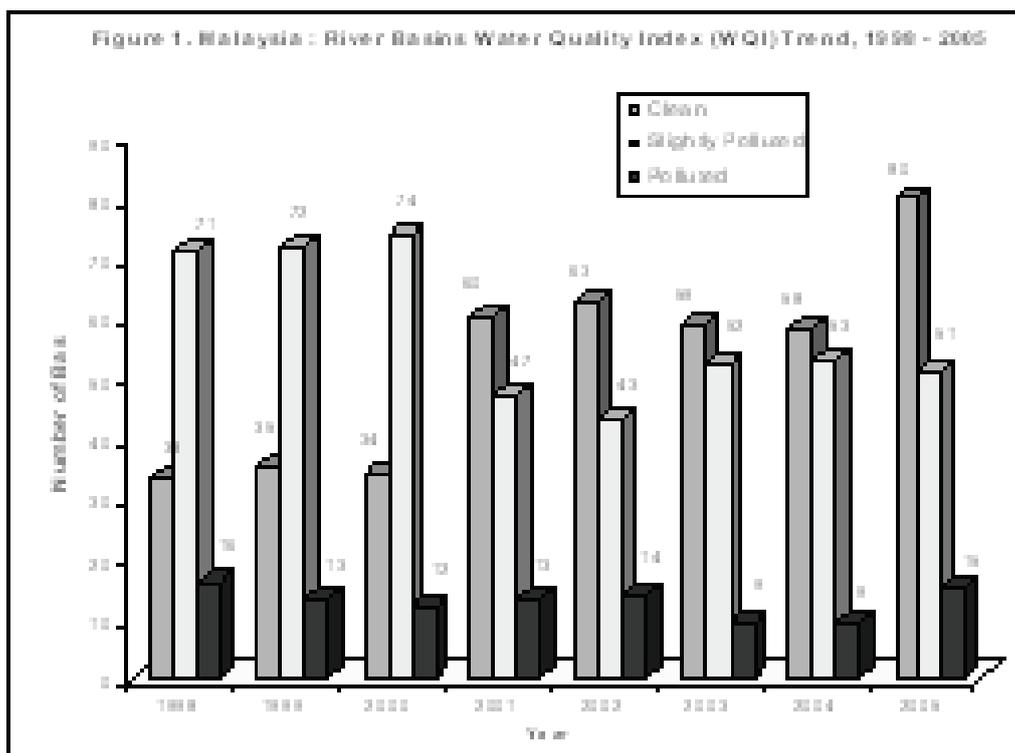


Figure 2. Malaysia: River Basins Water Quality Trend (Based on BOD (Biochemical Oxygen Demand) Sub Index, 1998 - 2005)

Source of Pollution (Activity): - 2: Mining, Agriculture and Manufacturing Industries

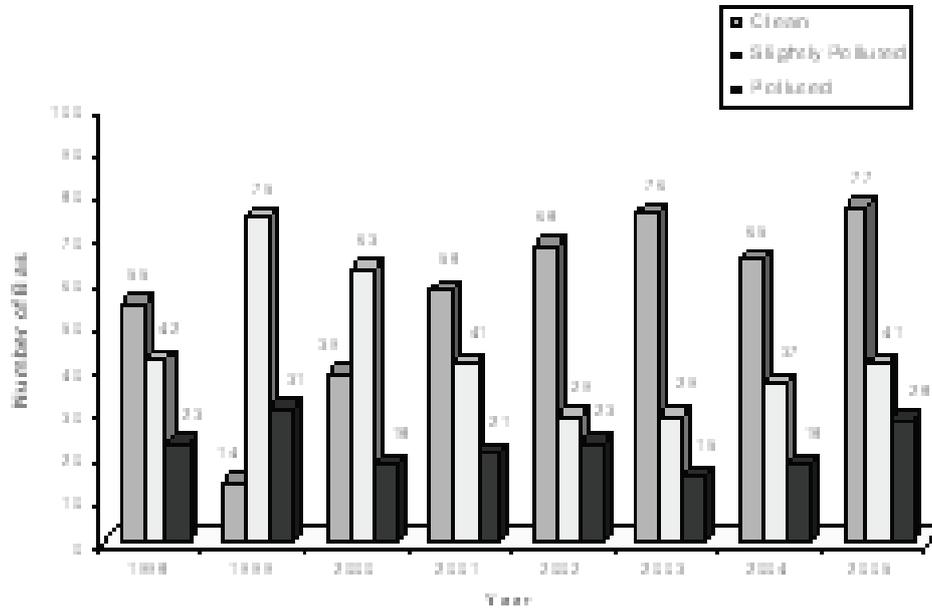
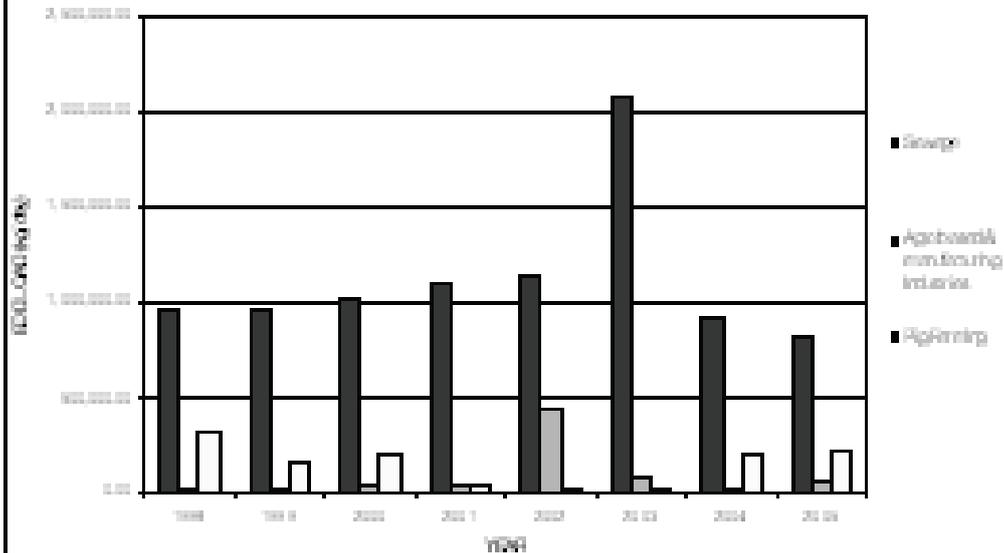


Figure 3. ESTIMATED BOD LOAD FROM MAJOR SOURCES, 1998-2005



Challenges

In addition to challenges outlined earlier there are a number of other challenges that need to be given consideration. The uniform discharge standard is applicable throughout the country and does not take into account the assimilative capacity of a river or water body. For better protection, there is a need to develop river or stream standards and for effluent discharge standards to be set accordingly in order to comply with these river or stream standards.

A number of sources are not able to comply with existing discharge standards and there is a necessity to review these standards to be in line with current acceptable international standards and availability of treatment technology.

Some State governments are requiring palm oil mills to comply with much stricter discharge standards than those imposed by the Federal Government.

Conclusions

The legislative approach in water quality management using the 1974 Environmental Quality Act has been successful in reducing pollution to a certain extent. It has involved pollution control, prevention of pollution and continuous assessment (monitoring) of the river environment. There are still many challenges that need to be addressed to achieve a holistic water quality management. Much of the past and present efforts are very much directed against controlling pollution from point sources while non-point pollution probably continued unabated. The necessary technical, institutional and legal arrangements are also necessary to treat sullage (grey-water) adequately before it is discharged into rivers. The nation will continue to use the water from its rivers for many years to come and it is imperative for the authorities to reduce pollutant loads and improve river water quality on a sustainable basis

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