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POSITION PAPER ON WATER QUALITY AND CLEANLINESS OF BEACHES



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EXECUTIVE SUMMARY

Malaysia's sandy beaches, some of which are world renowned, are threatened by pollution. Human activities have led to the rise in organic and inorganic waste pollution which have found their way into our coastal waters. Inland and coastal development is to be blamed for the increase in oil and grease contamination as well as high levels of suspended solids in these waters.

The deterioration of our coastal water quality is further compounded by the presence of plastic and styrofoam which form the bulk of the litter indiscriminately thrown into the rivers and sea.

If we fail to take action to improve the quality of our coastal waters, a key ingredient in what makes our beaches beautiful will be lost. And without clean sea water, the experience of one of the greatest pleasures of life – a picnic on the beach – will never be the same. As clean water completes a beach, polluted water destroys it.

We need our beaches. Some of our best hotels are sited on Malaysia's best beaches. Beaches are thus important to our tourism industry and contribute to the income we gain from tourism dollars. Eighteen million tourists visited Malaysia in 2006 and spent an estimated RM36 billion.

The Institution of Engineers, Malaysia (IEM) is concerned with the pollution affecting Malaysian beach waters. Cognizant of the link between coastal development and water pollution, there is an urgent need for better management of the development in the coastal zone particularly in the control and prevention of pollution. The IEM calls for specific and coordinated action to address this problem.

RECOMMENDATIONS

- IEM strongly believes in the urgent need for better management of beaches to reduce their degradation due to pollution via stricter legislation and enforcement;
- IEM recommends that the Government establish a Centre of Excellence to further research and development related to the assessment, monitoring and mitigation of coastal pollution whether it be via the current approach and facilities, or the use of new technology and methods for treating organic and inorganic waste;
- IEM recommends that each state embarks on an "Adopt a Beach" programme;
- IEM recommends that the Government construct more centralised sewage treatment plants in coastal areas and, in view of their potentially major positive impact on beach water quality, consider such projects worthy of being funded through Private Finance Initiatives (PFI).

INTRODUCTION

Malaysia is blessed with beautiful stretches of beaches, warm blue seas and amazing coral reefs. However, over the decades, the quality of these natural treasures has been deteriorating. For instance, Port Dickson, Penang Gurney Drive and Teluk Cempedak used to be popular recreation beaches that people enjoyed swimming in.

Now, however, sewage pollution is a concern in these beaches as it potentially increases human health risks in coastal waters. In 2003, the Malaysian Department of Environment (DOE) reported that the coastal waters of Penang recorded the highest percentage exceeding the Interim Marine Water Quality Standards (IMWQS) for *E. coli* contamination (89%) followed by Johor (77%), Selangor (75%), Negeri Sembilan (72%) and Sarawak (71%).¹

The figures above are based on Marine Environmental Quality Parameters whereby *E-coli* are measured in the Most Probable Number per 100 millilitres (MPN/100ml) and percentages indicate the level that have exceeded the standards.

In 2004, two states made the top of the list again. Penang exceeded the IMWQS for *E-coli* by 89% and Selangor by 79%.² The prevalence of *E-coli* in coastal waters could be attributed to untreated or partially treated discharge of wastes.

High levels of *E-coli* is indicative of the presence of pathogens in the water which may pose health hazards such as dysentery, hepatitis and severe skin rash through contaminated seafood or through direct contact, such as swimming. Other serious illnesses can occur if humans consume contaminated shellfish and fish, leading to paralytic shellfish poisoning and fish poisoning respectively.

Apart from *E-coli* (48.2%) and oil and grease (34.7%), total suspended solids (72.1%) have also been named as one of the main contaminants of the coastal waters in all states which exceeded their IMWQS in 2003. Total suspended solids are brought about by coastal development and sediments from upland sources. They turn crystal blue waters murky or muddy.

In 2004, as in previous years, the three main contaminants of coastal waters that exceeded the interim IMWQS in all states were *E-coli* (50.1%), oil and grease (49.1%) and total suspended solids (76.9%).

To add to the deteriorating quality of coastal waters, solid waste such as plastic and styrofoam, and untreated waste water from beach front hotels and restaurants are thrown and discharged into our coastal waters.

If we do not take action to improve the quality of our coastal waters, we will lose the beauty of our beaches. Also to go will be the simple pleasures of life like a refreshing swim in the sea or a leisurely picnic under a shady tree as children build sandcastles by the shore. Malaysia will lose her wonderful underwater ecological treasures unless she follows in the footsteps of countries that have rescued their waterways and beaches from the grip of pollution like London (River Thames) and China (Xiamen) (Refer to appendix).

¹ *Malaysian Environmental Quality Report 2003*

² *Malaysian Environmental Quality Report 2004*

We need our beaches as they support the tourism industry and generate income in the form of tourism dollars. According to the Ministry of Tourism Malaysia, 16 million international tourists visited Malaysia in 2005, yielding over RM32 billion. In 2006, 18 million tourists generated a total revenue of RM36 billion. Clearly, the trend is on the rise for tourism and this year being Visit Malaysia Year 2007, it is projected that 20 million visitors will reach our shores from whom we will earn RM45 billion. This should be motivation enough to protect our beaches and coastal waters for a sustainable tourism industry in Malaysia.



Rubbish strewn in the waters of a beach in Kuantan

TYPES OF POLLUTION

The serious and chronic problems of coastal water pollution that Malaysia currently face stem from

Direct Pollution Sources

- Raw and untreated wastewater is released by hotels and other services (shops) and food businesses (gerai and warung) into drains/channels leading to the sea
- Poorly maintained wastewater or sewage treatment plants in hotels and resorts that lead to leakage of waste/sewage into soil and rivers and ultimately the sea
- Development in beach areas have caused siltation and sedimentation leading to poor visibility of the ocean and murky waters
- Oil spills

- Littering on beaches by the public
- Indirect Pollution Sources: of upstream, inland or distant origins***

- Solid waste, sewage and chemical waste into rivers which flow out to sea
- Kitchen waste or grey wastewater comes from residential and school areas upstream
- Development upstream or inland have caused siltation and suspended solids leading to poor visibility of the ocean and murky waters

REASONS WHY POLLUTION PERSISTS

Lack of Funds

- The current sewage system is inadequate because the cost was underestimated due to unforeseen inheritance by the Concessionaire of large numbers of deficient sewerage systems because of inadequate records of sewerage assets. Therefore, the Concessionaire has been unable to implement new systems and rehabilitate existing facilities. The tariff revenue at existing tariff levels will not support all of the required capital and operating expenditure even if collection rates are improved 80-100%. If tariffs were increased to international benchmark levels (3-7 times of existing tariffs), it still would not be enough to cover the Government's full sewerage development targets and the significant increases in charges are unlikely to be politically acceptable.³
- Funds are also scarce to build new facilities (solid waste) and for maintaining the facilities.

Lack of Manpower

- Inadequate personnel in government agencies have led to challenges in effectively enforcing policies and controlling waste disposal processes.
- The problem is compounded by the lack of legislation for coastal development control which hampers the effectiveness of local authorities in enforcement efforts.
- The lack of personnel/skilled human resources to draw on by appointed Private Concessionaires contributes to disruptions in workflow or services.

Lack of Concern

- Ultimately the apathetic attitude of the public and private sector (hotels/resorts/restaurant & shop operators) greatly contributes to the pollution of beaches.

HOW DO WE SOLVE THE POLLUTION PROBLEM?

Strong action and close collaboration between main stakeholders such as the local governments, various government agencies, local communities, engineers/consultants is indispensable to developing an optimal and sustainable solution to beach pollution.

³ *Price Waterhouse Coopers, October 2000, Study on the Viability of Privatisation of Sewerage Services, Draft Final Report, ES1 – 78.*

Recommendations for solutions

1. Centralized sewage treatment (STP) facility

For new coastal developments, developers of commercial districts, housing schemes and any kind of township must provide a centralised STP system and this must be monitored with stringent enforcement by the National Water Services Commission or Suruhanjaya Perkhidmatan Air Negara (SPAN). For older developments, shops and various warung/gerai and smaller hotels along beaches can pay a small sum to use a centralized sewage treatment plant (STP). Hotels and resorts should also upgrade and maintain sewage treatment facilities that are leaking or in need of repair and upgrading, or face the law and pay a penalty and a Polluters-pay system. For a cluster of houses and warungs, the state authorities can build more package sewage treatment plants.

2. Funding

Private Finance Initiative (PFI): Considering that the government lacks funds, centralised sewage treatment facilities should be considered for PFIs. The Government must do a feasibility study and preliminary design up to budgetary purpose to prevent project proponent of PFI to invest too little in investigation and design, resulting in high cost of projects – consequences of high risk with the minimum investment.

3. A Centre of Excellence

A Centre of Excellence should be set up as a standalone institute in partnership with universities, the Ministry of Natural Resources and Environment, Ministry of Energy, Water and Communication, the Information Ministry, Ministry of Education and in particular, work closely with local authorities and the newly formed National Water Services Commission (SPAN) to source and develop technology for mitigating pollution

The Institute will carry out Research & Development of new technology to upgrade the STP system, as well as provide training for government and industry staff and guidelines that will help industries develop cost effective methods for sewage management.

Aside from that, an environmental education programme for raising public awareness should be another component in the Centre of Excellence.

4. 'Adopt a Beach' state programme

The Department of Drainage and Irrigation is to review the progress of the 'Adopt One River' programme and incorporate 'Adopt One Beach' by each state and ensure both river and beach cleanliness through strict enforcement with the help of state local authorities

under the laws of the Department of Environment and legislation provided for under the Town and Country Planning Act.

The programme can be complemented with public education campaigns for the average consumer. An education campaign for schoolchildren and the public will give them a sense of ownership so they take on the responsibility of caring for the environment. Competitions to rate the cleanest beach or township can be held. Corporations can also be asked to do social work within the community. The concessionaire should practise wider customer outreach, and better provision of information (timely and up-to-date) with the cooperation of local and water authorities.

5. Enforcement

The Department of Environment must beef up staff and with SPAN; regularly carry out strict monitoring to ensure efficient operations and maintenance of the STPs. They must also test for and ensure strict compliance by sewage treatment plants according to the Environmental Quality (Sewage and Industrial Effluent) Regulations 1979 (SIE).

The Department of Environment and the Local Authorities have to be more proactive, fast acting and increase its presence in the field to ensure illegal methods of waste disposal do not happen.

The public too has to be educated to the benefits of a clean environment and play a bigger monitoring role in informing the relevant government agencies to deter pollution. In short, they can be the eyes and ears of the authorities.

6. Legislation

The Department of Drainage and Irrigation needs laws and greater clout to enforce the Manual Saliran Mesra Alam (MASMA) guidelines. Stakeholders especially the government agencies should be more serious about implementing MASMA.

CONCLUSION

Pollution persists due to many factors, chief among which are the lack of funds to build and maintain facilities, lack of manpower to monitor and enforce legislation as well as the apathetic attitude of Malaysians. The government must continue its effort to inculcate public awareness and the sense of responsibility or civic consciousness through the mass media and

via NGO participation while at the same time, enforcement of the existing legislature should be strengthened and reviewed from time to time to suit current evolving conditions.

The Proposed Actions by Stakeholders Matrix in pages 8 & 9 explains the roles that various agencies will play in heading and implementing the action plans. Partnerships and cooperation with all stakeholders especially with the public are very important for the success of this initiative. Our beaches will regain their beauty for our people to enjoy and increase our revenue on tourism.



Algal sludge from restaurants and hotels covering beach water at a beach in Kuantan, Pahang



Would you want to swim in this beach?

PROPOSED ACTIONS BY STAKEHOLDERS

Action	Organisations in charge (bold)
<p><u>Centralised Sewage Treatment Plants</u></p> <ul style="list-style-type: none"> • All new development at beaches must be linked to a centralised Sewage Treatment Plant system. • Hotels and resorts should upgrade existing sewage treatment plants that are leaking or need repair or face the law and pay a penalty and a Polluters-pay system. • For cluster of houses and warungs, more package sewage plants have to be built. • A law to be passed to make it compulsory that all food outlets at the beach area must install fat, oil and grease (FOG) traps to reduce the pollutant discharge. Regular monitoring and maintenance must be made compulsory as the traps are most likely to become clogged /saturated rapidly and would need to be replaced about twice a month. A minimum maintenance cost is to be borne by users in the area 	<p>National Water Services Commission/Suruhanjaya Perkhidmatan Air Negara (SPAN)</p> <p>State Governments/Local Authorities</p>
<p><u>Centre of Excellence</u></p> <ul style="list-style-type: none"> • Set up a Centre of Excellence as a standalone institute in partnership with universities to provide training and to develop Research & Development guidelines that will help industries develop cost effective methods for sewage management and/or improve and update the technology - Upgrade the STP system - Propose feasible pollution control measures - Provide training for government and industry staff and guidelines for industries - Develop Environmental Education programme(s) for raising public awareness 	<p>Ministry of Energy, Water and Communications</p>

Action	Organisations in charge (bold)
<p><u>'Adopt a Beach' state programme</u></p> <ul style="list-style-type: none"> • Address stakeholder and public involvement (public awareness raising and Environment Education: changing attitudes, long term sustainability) • Each state will adopt one beach and ensure its cleanliness through strict enforcement by the relevant government authorities. <ul style="list-style-type: none"> - Rate the Cleanest Beach Contest - Corporate involvement 	<p>State Governments</p>
<p><u>Enforcement</u></p> <ul style="list-style-type: none"> • DOE to beef up staff and with SPAN carry out strict enforcement of environmental regulations for new constructions which should include water quality limits for effluents of at least Standard A as stipulated in the Environmental Quality Act, 1974 i.e., no discharge of untreated wastewater whatsoever, grey and black wastewater included and no burying garbage on beaches • In the case of solid waste namely plastic bags, a “users pay concept” can be applied for those who prefer to use and pay for the use of plastic bags for shopping. 	<p>Department of Environment (DOE)</p> <p>Department of Solid Waste</p>
<p><u>Legislation</u></p> <ul style="list-style-type: none"> • The Department of Drainage and Irrigation and local authorities need laws and greater clout to enforce MASMA and coastal development guidelines 	<ol style="list-style-type: none"> 1. Manual Saliran Mesra Alam (MASMA-DID) 2. DOE – Pollution & Sewage 3. Department of Solid Waste (Jabatan Pengurusan Sisa Pepejal) 4. Local governments – Kitchen Waste
<p><u>Lack of Funding</u></p> <p>Proposal writing and sourcing for funding avenues</p>	<p>Private Finance Initiatives (PFIs), government allocations</p>

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Appendix

Close collaboration between all stakeholders including local communities, government agencies, environmental engineers/consultants and developers is indispensable to ensure an optimal and sustainable solution to river and beach restoration/rehabilitation.

The following are some examples or case studies of success stories in river and beach management.

Examples of Success Stories in Waste Management Strategies

1. River Thames, London

The River Thames is the cleanest river in the world that flows through a major city. This is a major feat considering that fifty years ago the river was so polluted that it was declared biologically dead. From 1830 to 1860 tens of thousands of people died of cholera as a result of the pollution in Thames. Sewage was discharged directly into the Thames. Despite the foul smell, people continued to bathe and drink from the river. A letter from Michael Faraday to *The Times* newspaper, London described the river: “The whole river was an opaque pale brown fluid....surely the riverought not to be allowed to become a fermenting sewer.” A few years later the curtains in the Houses of Parliament had to be soaked in lime to stop the odours from preventing the government from doing its work. In 1878, *Princess Alice*, a pleasure steamship sank in a river collision. Most of the 600 odd passengers did not drown but died because of the pollution in the river.

It was finally decided that treatment plants be built to clean the water from the Thames before it was pumped to homes and to clean dirty water from homes before it went back into the Thames. The people’s health did not only improve, but the Thames water became cleaner. After the earlier treatment plants were destroyed in World War II, new treatment plants were built in the 1950s. In the 1960s new laws were made to stop factories releasing their dirty water into the river. Today more than half of London’s sewage sludge is sold in pellet form as fertilizer for agricultural use. The Environment Agency keeps an eye on levels of pollution. It has eight monitoring stations in the London area to monitor how much oxygen there is in the water. The information is fed to a computer. If the level drops, they send in two boats to pump oxygen into the river where it is needed. This system is world famous and has prevented many fish deaths. However the long term solution is to replace the old Victorian-era sewerage/drainage system with a modern system.

2. Bataan, Philippines

From 1999 to 2002, Bataan Province has seen more than 61,000 coastal households mobilized to conduct regular beach cleanup activities, removing over 360 metric tons of garbage and cleaning up a 120 kilometre long coastline. In addition restoration of mangrove communities has been carried out.

3. Xiamen, China

As part of the Integrated Coastal Management demonstration activities, ecosystem based coastal land and water use zonation scheme has been developed through scientific assessments and stakeholder consultation. Local ordinance to enforcement of the scheme has been adopted and implemented. Through four years of the zoning practices, a study shows the economic cost incurred by the coastal and marine use conflicts have been reduced by 50%. The zoning include a special protection scheme for the Chinese white dolphin (*Sousa chinensis*), an 18 km² marine area as nature reserve for an endangered fish species (lancelets), and a declared nature reserve for an endangered bird species (*Egretta eulophotes*)

4. Bute Island, Scotland

Beachwatch Bute, a charitable company, began operations on 1 April 1998 and was formed to remove pollutants and monitor the condition of the beaches and shorelines of the Isle of Bute. The organisation employs a beach ranger to fulfil this aim and coordinate the efforts of individuals, voluntary organisations and other groups to remove pollutants during beach clean. In a typical year more than 1000 bags of rubbish may be collected. This is almost exclusively water borne plastic pollutants originating from off the island. The positive environmental effects of the project also contribute to the sustainable development of the local economy, by encouraging tourism and leisure. Beachwatch Bute also carries out educational campaigns to improve and sustain the natural environment of Bute. Among other initiatives Beachwatch Bute has carried out are the beach ranger takes their tractor trailer to fairs/gala days and other public events to publicise the project, the project installed litter bins at high profile public events to collect rubbish, the project has collection and marketing points in shops, hotels and at local beauty spots, and the beach ranger has given talks to school children on picking up needles, flares, etc.

LIST OF REFERENCES

1. Malaysian Environmental Quality Report 2003
2. Malaysian Environmental Quality Report 2004
3. Price Waterhouse Coopers, October 2000, *Study on the Viability of Privatisation of Sewerage Services*, Draft Final Report, ES1 – 78.