

MALAYSIA



The Management of Environmental Risk Factors which Impact on Human Health

Part 2

A National Strategic Plan for Environmental Health for MALAYSIA

Ministry of Health
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Ministers Office

Statement from minister launching and implementing the National Strategic Plan for Environmental Health

Malaysia

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Environmental health areas of concern – Current situation, issues and challenges

Preface

While promoting people's health is becoming the core of environmental issues and sustainable development, more attention is needed to reduce or eliminate those environmental factors that pose a risk to human health all over the world. The aim of implementing the "National Environmental Health Strategic Plan for Malaysia" (NEHSP) is to focus attention on the relationship between environmental risk factors and health impacts in order to recognize, evaluate, and manage the various environmental risk factors related to human health, and to actively promote people's health.

In recent years, WHO in the Western Pacific Region has encouraged all member states to develop strategies and plans for a national approach to improving collaboration in the development of environmental health in the region. This should establish long-term institutional cooperative mechanisms between the ministries responsible for health and ministries responsible for the environment and other relevant ministries and sectors of government.

The strategic plan in this document is in support of the National Environmental Health Framework (Policy) and provides strategies for the development of environmental health in Malaysia.

The essential functions of environmental health are:

- The identification of hazards to health.
- The monitoring and evaluation of environmental hazards and the determination of the risks to health.
- The determination, implementation and evaluation of management strategies to manage the environmental risks to health.

This strategic plan has been designed to be the guiding document for the implementation of the National Environmental Health Framework (Policy) of the Malaysian Government. This plan provides the outcome objectives and the strategies to achieve the objectives. The actions needed to implement the strategies, the lead agencies of government and supporting agencies for each action and a suggested time frame for implementation are in Part 3 of this sequence of documents.

The document sets out a set of broad based objectives and strategies in chapter 2 and these represent a set of objectives for the long term. A set of Environmental Health Areas of Concern is set out in Part 3 of the three parts of the overall NEHAP. This gives more specific focus for lead sectors of government together with support agencies to act on in the shorter term to improve the environment for human health

The sequence of documents is as follows:

Part 1: National Framework (Policy) on Environmental Health for Malaysia

Part 2: National Strategic Plan for Environmental Health for Malaysia

Part 3: National Action Plan for Environmental Health for Malaysia. This Part 3 provides a list of actions, lead agencies and a time frame for action on the environmental health areas of concern which were identified by participants at the National Consultative workshop on Environmental Health held in September 2009. This list is under continual revision by the sectors involved. The Appendix to this document provides an indication as to the areas of concern, the current situation and the issues and challenges for each area.

Chapter 1: Introduction

1.1 Introduction

Good health is something which everyone wants, for themselves, their children and for the wider economic and social benefits it brings to society. It plays a major role in long-term economic growth and sustainable development. Malaysian society has become increasingly urbanized and more complex. In supporting contemporary lifestyles, there has been increased air, water and soil contamination; persistent chemical pollutants have become gradually widespread; and global climate change presents new environmental health hazards. These factors are contributing to communicable diseases, non-communicable diseases, physiological and neurological disorders. Environmental health is highly inter-sectoral, embracing a broad range of subject areas and involving a wide variety of stakeholders. In addition to improving well-being of Malaysians, the purpose of this National Environmental Health Strategic Plan (NEHSP) is to maximize the potential economic and social benefits and reduce the adverse health impacts of environmental risk factors and to bring these stakeholders together across the range of issues which encompasses environmental health. This NEHSP has been developed in close coordination and cooperation of various sectors. Its preparation has involved a consultation process conducted at the National level. The success of the implementation of this strategic plan will be achieved if there is participation and support from all stakeholders, including international organizations, and most importantly, the active contribution of all Malaysians.

The term **environmental health**, as defined by WHO, addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviors. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behavior not related to environment, as well as behavior related to the social and cultural environment, and genetics. As such, it is the cornerstone of public health and provides much of the basis for modern society.

Many environment and health related problems have been solved, but much remains to be done, in particular with respect to the health implications of chronic exposures. The interaction between environment and health is far more intimate and complex than is commonly understood. In particular, little attention has been paid to the interaction of different pollutants in the human body as well as in the environment.

Global changes have begun to affect human health simultaneously and often interactively. These changes involve some global issues such as climate change and stratospheric ozone depletion, and issues of natural resource degradation such as land degradation and desertification.

1.2 Environmental Health Areas of Concern

The environmental health areas of concerned are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. For other areas of concern the relevant Ministries/Departments/Agencies are welcomed to forward their proposals and suggestions.

The following have been identified to be important environmental health issues in Malaysia with the relevant ministries/departments/agencies in brackets:

- (1) Hazardous waste management (DOE, MOH, NRE, DOSH);
- (2) Rural water supply and sanitation (MOH, MEGTW, DOE, NRE, DID, FDPM, MRRD);
- (3) Recreational water (MOH, DOE, MHLG);
- (4) Safe drinking water (MOH, MEGTW, SPAN, DOE, MHLG, DID, FDPM, MAABI);
- (5) Air pollution – outdoor and indoor (DOE, DOSH, MOH, MHLG);
- (6) Sewerage and urban sanitation (MEGTW, SPAN, DSS, DOE, MHLG, DID);
- (7) Solid waste management (NSWMD, MHLG, DOE);
- (8) Food safety (MOH, MAABI, MHLG).
- (9) Soil contamination (DOE, MOH)
- (10) Occupational health and safety (DOSH, MOH)

The additional area of climate change was identified as a very important emerging issue (All sectors)

DID	:	Department of Irrigation and Drainage
DOE	:	Department of Environment
DOSH	:	Department of Occupational Safety and Health
DSS	:	Department of Sewerage Services
FDPM	:	Forestry Department of Peninsular Malaysia
MAABI	:	Ministry of Agriculture and Agro-Based Industry
MEGTW	:	Ministry of Energy, Green Technology and Water
MHLG	:	Ministry of Housing and Local Government
MOH	:	Ministry of Health
MRRD	:	Ministry of Rural and Regional Development
NRE	:	Ministry of Natural Resources and Environment

NSWMD : National Solid Waste Management Department
SPAN : National Water Service Commission

1.3 General Issues Requiring Improvement

- Specific policies and legislation for environmental health: develop specific policies, strategies, legislation and long term plan for environmental health.
- Institutional development and inter-sectoral collaboration.
- Human resources development.
- Monitoring and surveillance.
- Integration of health and environment in international/regional agreements.

Chapter 2: Environmental Health Objectives and Strategies

2.1 Millennium Development Goals (MDG) and Environmental Health Components

Reducing the disease burden of environmental risk factors will contribute significantly to the Millennium Development Goals. Reducing environmental risks to health also contributes to poverty reduction, while supporting other MDG goals such as access to education and gender equality.

Many Millennium Development Goals (MDGs) have an environmental health component. Key elements are highlighted below:

- Goal 1: Eradicate extreme poverty and hunger
- Goal 2: Achieve Universal Primary Education
- Goal 3: Promote Gender equality and Empower Women
- Goal 4: Reduce Child Mortality
- Goal 5: Improve Maternal Health
- Goal 6: Combat HIV/AIDS, Malaria and other diseases
- Goal 7: Ensure Environmental Sustainability
- Goal 8: Develop a Global Partnership for Development

2.2 Government policy

The Strategic Plan for Health provides a summary of the Country Health Plan, which was developed for the Ninth Malaysia Plan. This plan proposed that efforts would be undertaken to consolidate health care services, enhance human resource development and optimize resource utilization.

2.3 Environmental health objectives and strategies

In developing the National Environmental Health Strategic Plan there are a number of broad areas which can be used to focus attention on strategies to identify, monitor, evaluate, manage and control the impact of environmental factors on health on a long term basis. The objectives for this are set out in the sections below.

These areas are as follows:

- Institutional components and government structure - policies, procedures, economic factors and legal framework.
- Essential functions of environmental health:
 - Environmental health information systems with links to environmental and health information systems;

- Identification, monitoring and evaluation of health hazards (e.g. physical, chemical, biological and psychosocial in air, water, food, waste disposal, climate change and human ecology);
- Oversight and implementation of risk management measures.
- Essential support functions for environmental health
 - Environmental health services
 - Professional training and education, public information and education
 - Research and technological development
 - International collaboration

There are a number of stakeholders that need to participate in the improvement of the identification, monitoring, evaluation and management of environmental determinants of health.

These are:

- Competent authorities at all levels (national, regional and provincial). In addition to approving and assessing agencies, other agencies in the public and private sectors need to participate.
- NGOs including trade associations, professional and technical bodies, advocacy groups, the public, consultants.
- Public and private sector businesses (large, medium and small), which have the potential to be involved in operations that may affect the environment or health.
- The media, public relations and information services.
- Universities, research centers, scientific associations and international organizations.

For each of the aspects covered by the plan there is some background information with specific reference to the country giving the basis for action, the objectives and outcome actions. Key Target Areas are identified in Chapter 4.

Broad strategic areas for the implementation of the Policy are given below. A set of more specific shorter term objectives (Key Target Areas) is provided in Part 3 (National Environmental Health Action Plan) which details specific actions for each of the key target areas.

2.3.1 Institutional components and government structures – policies, procedures, economic factors and legislative requirements

Strategies

- Establish, at the national level, an appropriate mechanism for regular consultation and information exchange on planning and decision-making which have the potential to affect health. This should involve representatives of all relevant government departments and

other agencies to work cooperatively in hazard identification, monitoring, evaluation and management of risks to human health and the environment.

- Develop and review continually national environmental and health policies in cooperation with all other sectors, as appropriate, so as to reach decisions in the best interests of the human health, the environment and the economic well-being of the country.
- Establish similar mechanisms at the State and Local Government levels with the capacity to identify and assess local issues and develop solutions taking full advantage of public participation.
- Develop effective delegation of responsibilities from Federal to State and Local Government levels while maintaining a consistent approach.

2.3.2 Environmental health management – Key Functions

2.3.2.1 Environmental health information systems

Strategies

- Develop capacities at appropriate levels to monitor environmental exposures and the collection, analysis and interpretation of data. Emphasis needs to be placed on the relevance and quality of the data using recognized quality control procedures. Data and information available from other sources must be used to avoid duplication.
- Develop, at the national level, a network of health statistical databases to link data to information at the local level on exposures, exposure pathways, and the disease and injury burden attributable to environmental factors so that adverse impacts of environmental factors on health can be identified.
- Improve the access to current databases and information systems through the internet.
- Improve and expand library resource material on environmental health.

2.3.2.2 Identification, monitoring and evaluation of environmental risks to health

Strategies

- Provide comprehensive checklists and audit procedures which can be used nationally for identification, monitoring and evaluation of environmental factors that could have adverse effects on human health.
- Risk assessments should be carried out on current specific sites which are considered a priority for potential adverse effects on human health or the environment.
- Develop and synchronize procedures to improve and harmonize the environmental and health risk assessment process for government, industry and other relevant agencies taking into account, when possible, multi-factorial and cumulative impacts.

- Programs should focus on qualitative and quantitative risk assessment procedures which allow for the assessment of the potential impact in terms of the risks to human health.
- Environmental and health risk assessments (qualitative or preferably quantitative) should be carried out on all new policies, programs and projects.

2.3.2.3 Implementation and oversight of risk management measures

Strategies

- Enhance an operational plan to ensure that risk management measures set out in the Key Target Areas are carried out and that a broad range of additional measures are identified to meet national, state and local requirements.
- Regularly monitor and review the implementation of the risks management measures with emphasis on optimizing the cost, efficiency and effectiveness of the risk management measures.
- Review the effectiveness and sustainability of risk management measures used in other countries as a benchmark..
- Introduce new risk assessment and management measures using qualitative and quantitative techniques giving consideration to cumulative risk management methods.

2.3.3 Essential Support Functions for Environmental Health

2.3.3.1 Environmental health services

Strategies

- Establish appropriate human resource capacity to provide up-to-date support to proper management of environmental health support services.
- Establish appropriate mechanisms to enable staff to effectively implement appropriate techniques, methods and procedures, and to be able to effectively communicate the results and interpretations to the various stakeholders.
- Develop appropriate career structures and performance appraisal procedures for personnel to encourage them to invest the considerable amount of time and effort in the development of the skills needed for them to carry out their responsibilities.
- Develop mechanisms and procedures to monitor the performance of support services for environmental health in meeting current and future needs.
- Formulate and implement a plan for the development of infrastructure (equipment, hardware and software, physical facilities, laboratories, etc.) over the short, medium and long term.

2.3.3.2 Professional training and education

Strategies

- Introduce courses in environment and health (e.g. as part of undergraduate programs in engineering, law, medicine, economics, architecture, town planning, occupational health or public health or as part of post-graduate programs in public health, business or engineering) at various levels in colleges, universities and other

institutions to increase the understanding of environmental health in the next generation of professionals.

- Prepare an inventory and review the current availability of formal course of relevance to environmental health.
- Develop and implement a continuing professional education program for people from stakeholder groups who need to be made aware of the principles and application of environmental health.
- Develop and implement programs designed to provide in-service training for people with specialist knowledge of HIA or in specialized aspects of HIA. Post-graduate courses, in-service short courses and fellowship programs could be considered.
- Conduct seminars and workshops on a regular basis for stakeholder groups such as consultants, scientists and other groups with special interest in health and environment linkages.
- Design and conduct a program to develop the knowledge and skills of staff in research methods, particularly those in health and health science research.

2.3.3.3 Public information and education

Strategies

- To review public information strategies used in a range of other countries to determine which processes may be appropriate for Malaysia.
- Develop programs to increase the quality and quantity of information available to all stakeholders.
- Develop mechanisms to ensure that public participation is included, at an early stage, in the HIA process. Right to know, transparency of interests and equity need to be included.
- Develop programs for media personnel in environment and health issues so that they may be better able to reflect informed opinion.

2.3.3.4 Research and technological development

Strategies

- Encourage research in areas such as:
 - The assessment of environmental parameters and health status indicators at the local level.
 - The evaluation of promising international experiences for use in Malaysia.
 - The identification of vulnerable groups.
 - The development and evaluation of checklists and audits of environmental hazards and health status for use in the Malaysia.
 - The attributable fraction of specific disease burdens to specific environmental health risks.
- Carefully evaluate control methods which have the promise of being successful in Malaysia.

- Collate all relevant environmental and health status data and examine methods to further develop this database.
- Determine the effectiveness of rapid assessment methodologies for predicting environmental contamination and health risk.
- Conduct a study to evaluate the usefulness of rapid assessment techniques for the assessment of environmental contamination.
- Establish and conduct programs to improve the research and development effort.

2.3.3.5 International collaboration

Strategies

- Establish collaborative networks in key area in environmental health through regional networks such as the Thematic Working Groups established in the Region.
- Contribute to international meetings and other forums to promote environmental health in the region.
- Collaborate with international agencies to raise the standards of environmental health for all countries in the region.
- Participate in international programs to establish international standards for environmental parameters affecting human health including issues such as climate change.
- Encourage international agencies to support the processes to be used for the implementation plan.
- Establish collaborative networks in sharing knowledge and skill in environmental health through seminars, international meetings, exchange programs, etc.

Chapter 3 Implementation

3.1 Environmental health areas of concern

In support of this policy an Environmental Health Action Plan has been prepared. This plan gives details of specific objectives for environmental health for Malaysia. It sets out strategies to achieve the objectives and specific actions and assigns responsibilities to agencies of government and a notional time frame.

3.2 Performance indicators

The following provides indicators to be used to assess the progress towards the implementation on the Policy and Plan

- The legal environment for environmental health will have been revised and the system of identification, evaluation and control, will be improved;
- The sources and reasons for the environmental risk factors will be identified, and the assessment of the relationships between environment contamination and health will be determined;
- Intervention methods to reduce adverse impacts and enhance positive health impacts will have been developed, implemented and evaluated;
- The human capacity building of the environmental health sector, and laboratory capacity will be improved;
- Databases and information on risk factors related to health will be widely available through the internet;
- The level of education of the population on environmental health will be increased; community participation in the promotional activities and programs on environmental health will be increased;
- The basic indicators of health and environmental risk factors will have been improved;
- The morbidity and mortality directly caused by environmental contamination shall be decreased (See target below).

Selected indicators of health status from the Ministry of Health are given below.

Indicators	2000	2005	2007 ^p
Life expectancy at birth (years)			
Males	70.0	71.4	71.7
Females	75.1	76.2	76.46
Crude birth rate (per 1,000 population)	24.5	18.5	17.5
Crude death rate (per 1,000 population)	4.4	4.5	4.5
Infant mortality (1,000 live births)	6.6	6.6	6.3
Toddler (1 – 4 years of age) mortality rate (per 1,000 live births)	0.6	0.5	0.4
Maternal mortality rate (per 1,000 live births)	0.3	0.3	0.3

Perinatal mortality rate (per 1,000 total births)	7.5	7.2	7.3
Neonatal mortality rate (per 1,000 live births)	3.8	3.9	3.9

^p : Provisional data

Source: Department of Statistics, Malaysia

3.3 The Implementation Process

- 3.1. Ministry of Health will be responsible for strengthening its collaboration with related agencies to promulgate this National Environmental Health Strategic Plan to ensure that the overall country has the same understanding. This also includes the development of the national action plan which will provide the details for each of the Environmental Health Areas of Concern and detailed action for each sector.
- 3.2. All ministries and sectors of government and other stakeholders should take a carefully considered approach to implement these strategies for effective and realizable results.

The Minister of Health

Appendix I

For each of the environmental health areas listed the following gives the current situation and some of the issues and challenges. This list was developed during the National Consultative Workshop on Environmental Health held in September 2009. It is not an exhaustive list but provides an indication as to the areas of concern which form the basis of the action plan in line with the National Framework (Policy) on Environmental Health Part 1 and the Strategic Plan presented in this document.

Environmental health areas of concern

1. Hazardous waste management (DOE, MOH, NRE, DOSH);
2. Rural water supply and sanitation (MOH, MEGTW, DOE, NRE, DID, FDPM, MRRD);
3. Recreational water (MOH, DOE, MHLG);
4. Safe drinking water (MOH, MEGTW, SPAN, DOE, MHLG, DID, FDPM, MAABI);
5. Air pollution – outdoor and indoor (DOE, DOSH, MOH, MHLG);
6. Sewerage and urban sanitation (MEGTW, SPAN, DSS, DOE, MHLG, DID);
7. Solid waste management (NSWMD, MHLG, DOE);
8. Food safety (MOH, MOA, MHLG).
9. Occupational health and safety (DOSH, MOH)
10. Soil contamination

The emerging area of concern raised was Climate Change and this was expected to involve all sectors. This topic will be considered during the next development stages

1. Hazardous Waste Management – Current Situation, Issues and Challenges

The current situations, and issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) Mandatory that all hazardous waste listed under the First Schedule of the Environmental Quality (Scheduled Waste) Regulation 1989, Environmental Quality Act 1974, is disposed at Kualiti Alam Sdn. Bhd.
- ii) Enforcement to curb illegal dumping or disposal of hazardous waste is carried out by the Department of Environment under the Environmental Quality Act 1974.
- iii) Risk elimination or minimization to workers' safety and health with regards to the use of any hazardous substances in any working premises is legislated under

the Occupational Safety and Health Act 1994 by the Department of Occupational Safety and Health.

Issues & challenges:

- i) Indiscriminate dumping of toxic wastes resulted in negative impacts on environment and health.
- ii) Lack of public awareness and education on hazardous waste.
- iii) Effectiveness of enforcement on legislative requirements.
- iv) Provision of services for on-site treatment and disposal of hazardous waste involved high costs due to stringent transportation and treatment requirements.
- v) Limited access to information hindered planning initiatives and financial projection requirements.
- vi) Point sources of pollution of hazardous waste can be easily regulated and monitored but requires commitment from various authorized stakeholders as well as concerted multi-sector efforts.
- vii) Pollution from non-point sources at present is difficult to control as it may be contributed by individuals, chemical used in plantations, daily cleaning activities using hazardous chemicals, and other environmental factors such as rain, geological features and temperature.
- viii) Lacking in comprehensive registries for chemicals and pharmaceutical products, which hindered the traceability of chemicals and products from sources of supply or importation to final disposal.
- ix) Lacking in the field of research and development which is important for gathering basic information that can be used for estimating the amount of hazardous waste generated in Malaysia and identifying the various forms of toxic waste (by its physical and chemical characteristics) that existed in the Malaysian environment .
- x) Correlation between diseases and various hazardous wastes based on local conditions are scarce and need to be strengthened.
- xi) Cleaner technology has been promoted for the past 15 years but is not effectively practiced by industries due to its higher cost. Cheaper technological solutions and more options need to be developed to assist the industries.

- xii) Integrated efforts from various relevant agencies in the management of hazardous waste have not achieved its desired capacity as every agency has their own prioritized targets and interest to meet.

2. Rural Water Supply and Sanitation – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

By the end of 2008, 71.99% of the rural households which is equivalent to 1,264,364 households have public water supply while 23.29% (408,801 households) use other sources such as gravity-feed system, sanitary wells with house connection, rainwater collection system and private water supply. 4.74% (83,225 households) still do not have clean water supply. As at December 2008, the coverage for the four main rural sanitation activities under the Rural Water Supply and Environmental Sanitation program are as follows:

- i) Clean water supply : 95.26% (1,673,165 households)
- ii) Sanitary latrines : 97.93% (1,756,390 households)
- iii) Sullage disposal : 62.21% (1,092,604 households)
- iv) Solid waste disposal : 69.84% (1,226,744 households)

Issues & challenges:

- i) To achieve 100% coverage for rural clean water supply by the end of the 9th Malaysia Plan (2006 – 2010).
- ii) A majority of the low cost technology water supply systems provided by MOH do not have treatment at all. Simple and effective treatment systems need to be considered to ensure that the water supplied is safe.
- iii) To achieve 100% coverage for sanitary latrines by the end of the 9th Malaysia Plan (2006 – 2010).
- iv) Cost effective and innovative technologies need to be considered for very remote areas, coastal and riverine settlements.

- v) To achieve 80% coverage for sullage disposal and solid waste disposal by the end of the 9th Malaysia Plan (2006 – 2010). Poor sullage disposal and solid waste management can give rise to vector borne diseases.
- vi) Communal systems need to be considered for sullage and solid waste disposal.

3. Recreational Water – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) No systematic monitoring program on recreational water, such as swimming pools, coastal and fresh water.
- ii) Total coliform, E.coli, Enterococci, and Clostridium perfringens were constantly detected in sea water and storm water drain samples at levels above the acceptable value. This is an indication of fecal pollution that would have adverse health effects on recreational users.

Issues & challenges:

- i) Cases of infectious diseases has been detected in recreational water.
- ii) All waterways have values and uses. These values/uses have criteria necessary to enable the use to occur or the value to be preserved. Generally, these values/uses fall into categories associated with supplies for potable, industry and agricultural use, recreation, commercial fisheries and conservation. The value areas included the community health, ecological health, economic inclusion and personal health.
- iii) Reports published by various government and non-government agencies have indicated a trend of deteriorating water quality and water amenity.
- iv) Lack of information necessary for managing waterways on a continuous basis.
- v) A consensus should be reached to incorporate simple techniques for monitoring waterway health, as an indicator for more detailed analysis. What is essentially required is to detail a low resource and continuing information base, necessary for day to day management for the recreational use of the different types of waterways.

4. Safe Drinking Water – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) The provisions in the Federal Constitution had been amended in 2005 to empower the Federal Government to legislate water services industry in Peninsular Malaysia and Federal Territory (Kuala Lumpur, Labuan and Putrajaya). Following the amendment the National Water Service Commission (SPAN) Act and the Water Service Industry Act (WSIA) were established. The provisions in the WSIA are focused on service requirements and compliance while the policy for environmental and health regulation will continue to be driven by relevant federal agencies.
- ii) Sources of raw water are mainly from surface water while ground water makes up the smaller share.
- iii) Rapid economic growth has exerted severe constraint on present water utility infrastructures, especially in states with high economic growth. Vision 2020 which stresses on industrialization has increased the demand for water supply, thereby exhausting traditional water resources and calling for inter-State raw water transfer.
- iv) Present water supply infrastructures could not keep up with the pace of economic development due to the Government's limited financial resources. Privatization was viewed as the panacea to address these constraints.

Issues & challenges:

The management of safe drinking water is a national priority. This issue has constantly been discussed locally and internationally through the World Water Forum and the United Nations Development Program's Millennium Development Goal. The most common issues and challenges experienced by Malaysia are as follows:

- i) Surface water pollution from point sources such as industrial effluents, leachate from unsanitary landfills and sub-standard sewerage effluents and from non-point sources such as pesticide and herbicide from agriculture activities.

- ii) The number or size of natural water catchments are on the decline due to deforestation for development and agricultural activities, and encroachment by human activities.
- iii) Lack of public awareness on the importance of protecting water sources.
- iv) Ineffective enforcement and weak legislative requirements for catchments and water run-off.

5. Air Pollution (Outdoor and Indoor) – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

Outdoor Air

- i) The country's ambient air quality is monitored by the Department of Environment (DOE) through a network of 51 air monitoring stations throughout the country. Five parameters are measured, namely PM10, sulfur dioxide, nitrogen dioxide, carbon monoxide, and carbon dioxide. The air quality obtained from each station is used to determine the Air Pollutant Index (API) for the particular areas.
- ii) DOE enforces the Environmental Quality Act (EQA) 1974 to prevent, abate and control pollution, and to enhance the quality of environment through enforcement visits, inspection, aerial and ground surveillance on pollution sources.
- iii) DOE also participated in international negotiations on relevant environmental issues, such as the yearly trans-boundary haze pollution arising from land and forest fires.

Indoor Air

- i) A code of practice for indoor air quality in workplaces had been established by the Department of Occupational Safety and Health (DOSH). Standards were established for five parameters of indoor air pollutants, namely carbon dioxide, carbon monoxide, formaldehyde, respirable particles, and total volatile organic compounds. These standards were designed for 8-hour exposures of healthy adults.

- ii) Prohibition of cigarette smoking in public areas and workplaces was enforced by the Ministry of Health to discourage smoking and to control indoor air pollution by environmental tobacco smoke.
- iii) The Uniform Building By-law under the purview of the Ministry of Housing and Local Government specifies requirements for ventilation in buildings.

Issues & challenges:

Outdoor Air

- i) A Clean Air Action Plan is currently being developed by DOE to improve the ambient air quality. The plan outlines the strategies and plan of action in a holistic and inter-sectorial manner and its strategies are focused on the following areas:
 - a) Reduction of air pollution from motor vehicles.
 - b) Reduction of air pollution from industrial activities.
 - c) Haze caused by land clearing and forest fires, and open burning activities.
 - d) Human resources development and capacity building.
 - e) Strengthening education program and awareness to the public and to encourage public participation in sustainable air quality management.

Indoor Air

- i) Establishment of emission limits or standards to protect public health from indoor air pollutant sources that pose excessive risks, such as furniture, building materials, combustion appliances, air cleaners, etc.
- ii) Requirement for manufacturers to submit building materials, furnishings, combustion appliances, consumer products, and other significant sources for emission testing by independent laboratories before being marketed or used.
- iii) Indoor air pollution should also be given emphasis in schools, homes, and childcare premise because infants, children, senior citizens and those who are immuno-compromised are highly susceptible to such pollution.
- iv) Development of indoor air quality guidelines for schools, hospitals and healthcare facilities.

- v) Promotion of education and outreach program for school teachers, health professionals, and other agencies with the aim that they will be able to identify and remedy indoor air quality problems.
- vi) Promote more research works on the health impacts of specific indoor air pollutants.

6. Sewerage and Urban Sanitation – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) IWK together with Sewerage Services Department (JPP) has inculcated an organized and integrated approach towards the management of sewerage services within the Local Authorities that they have jurisdiction on. However, lack of finance and funding has curtailed its ability to perform on a more effective manner.
- ii) Centralized sewerage services within Peninsular Malaysia has been, and continuous to be driven mainly by the private sector in the form of housing developers. This has been the case since the Government made it mandatory for housing developments with 30 or more dwelling units to incorporate communal or centralized sewerage systems complete with suitable treatment plant into their scheme and at the own cost of the developer.
- iii) The more efficient and economic sewerage schemes, incorporating sewage treatment on a regional scale, have not materialized on a progressive level across the Peninsular due to lack of funding, unavailability of suitable sites to accommodate the regional STPs, insufficient revenue generation and poor collection of service charges.
- iv) The Government has relied on international agencies to fund required sewerage schemes. But such funding has been sporadic and intermittent. Furthermore, sewage sludge disposals have been posing significant technical problems and adverse financial impacts.
- v) Due to the shortcomings faced IWK, sewage continues to pollute the environment. The impact of untreated sewage on the environment has been highlighted in many forums, but unfortunately less emphasis was being given to

its impact on human health and quality of life which is of ultimate concern to communities and nation at large.

Issues & challenges:

i) National Sewerage Policies and Planning

Since the federalization and privatization of sewerage services in 1996, the national sewerage sector was not seen to have undergone any major revision on its strategic planning and policy direction. Most of the previous policies and method of implementation are still in place without much expansion to what was intended when it was conceptualized.

ii) Coherent relationship with water management

Although the responsibility for sewerage and water management had been placed in one ministry, i.e. the Ministry of Energy, Water and Telecommunication and recently changed to Ministry of Energy, Green Technology and Water, their integration was seen to be weak and as such, the economical and environmental benefit from the integration did not provide the expected yield.

iii) Slow progress of planned regional sewerage scheme

Although more than twelve major towns in Peninsular Malaysia had managed to formulate their respective Sewerage Master Plans in the 1980's, their implementation costs were usually high and beyond the financial and technical capabilities of most local authorities. And this had become a burden to the Ministry of Energy, Green Technology and Water.

iv) Funding

It is observed that relatively low funding was allocated for building regional sewerage systems as compared to funds for other sectors, such as water supply and electricity. Lack of fund has hampered development of this sector in general.

v) Public Contribution

The privatization program had failed to make major changes due to its unviable cash flow. While to a certain extent the program has provided good technical solutions to the appalling condition of the sector before it was privatized, the public is not coming forward sufficiently in paying the tariff imposed.

vi) Small and old facilities that are sources of pollution

Although the number of houses connected to communal and centralized treatment system had increased, there are still nearly 20% of old houses and

small housing schemes that are being served by septic tanks. Adverse environmental impact associated with the use of septic tanks and similar systems are expected as some of the designs are not known and their treatment efficiency had deteriorated due to lack of maintenance.

vi) Sludge disposal

Desludging of septic tanks was not enforced on a regular basis. As a result solids gradually build-up overtime and overflowed into receiving water courses. Residual sludge generated by mechanized biological treatment plants as by-products was not adequately managed in most STPs.

vii) Operation and Maintenance

Preventive maintenance programs were not carried out on a regular and concerted basis. As a result sewers were known to convey a relatively high percentage of infiltrated water, thereby reducing their capacity to transport sewage flow as originally designed. Lax maintenance and operational efforts occasionally resulted in overflows of raw sewage to the environment.

viii) Health implications

Health implications due to poor sewerage systems were not given much emphasis in present sewerage development programs. The agency concerned is more worried about the lack of infrastructure and fund to improve the sewerage system in the country, while pollutants from sewage continued to endanger the environment and public health. Environmental health elements could be considered as an indicator for the success or failure of the sector itself.

7. Solid Waste Management – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) The ever-expanding population and high rates of economic development in Malaysia have resulted in the generation of vast amount of waste. About 17,000 tons of waste is generated per day in Peninsular Malaysia. The average per capita generation of waste is 0.80 kg/cap/day, with about 1.5 kg/cap/day in Kuala Lumpur itself. About 76% of waste generated is collected while 1 – 2% is recycled and the remainder is taken to disposal sites. About 5% of waste collected in KL is

reused and recycled. Landfill is the main disposal practice. The statistics for disposal sites in Malaysia are as follows:

- a) Total number of disposal sites : 289
 - b) Total number of operational disposal sites : 176
 - c) Total number of enclosed disposal sites : 113
 - d) Total number of sanitary disposal sites : 10
- ii) The government has approved the National Solid Waste Management Policy that outlines five objectives:-
- a) Solid Waste Management that is integrated and cost-effective to cover the scope of collection and transportation, intermediate treatment and disposal.
 - b) Reduction of domestic, commercial, industrial, institutional, community and construction solid waste through 3R (Reduce, Reuse, Recycling).
 - c) Efficient and cost-effective service through privatization, efficient monitoring and consistent standards.
 - d) Selection of proven and feasible technology, affordable in terms of CAPEX and OPEX and environmentally friendly.
 - e) Ensure environmental sustainability and public health protection.
 - f) Establishment of legislation and institution for Solid Waste Management.
- iii) In order for the policy to materialize, a National Strategic Plan (NSP) that outlines the following principles has been developed:-
- a) Direct participation of Federal Government

The Government of Malaysia has agreed to take over the entire responsibility of managing the Solid Waste Management program based on the fact that Local Government/Authorities do not have financial and technical capacities to carry out the program.
 - b) Legislation

For the purpose of legislation, a new law, i.e. the Solid Waste and Public Cleaning Act, 2007, was introduced, granting full authority to the Federal Government.

c) Institutional development

Two new agencies have been set-up, i.e. the Department of Solid Waste Management, and the Solid Waste Management and Public Cleaning Cooperation to administer and implement the new act.

d) Development of technical and managerial capabilities

Various guidelines and scopes have been outlined for the development of technical and managerial capabilities.

e) Inter-agency cooperation amongst stakeholders

In order for best management practice of this new policy, inter-agency cooperation amongst stakeholders such as the Department of Environment and Ministry of Health would be able to help in the implementation and enforcement of the Solid Waste Management program.

f) Privatization of Solid Waste Management services

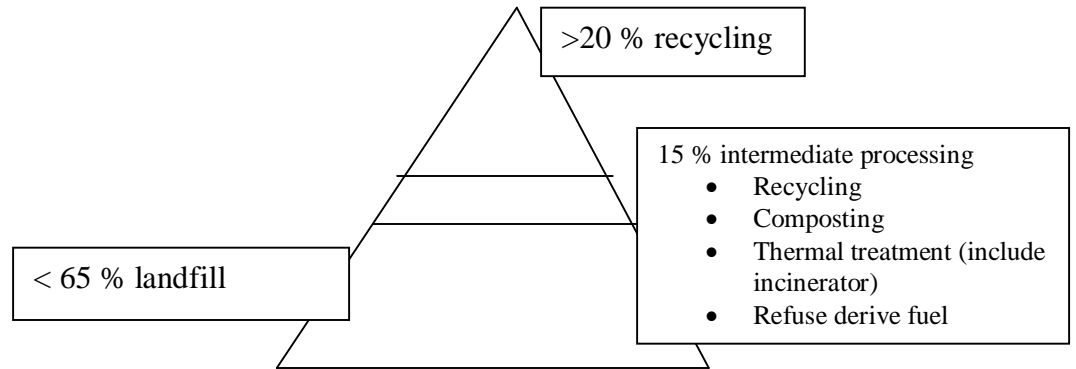
The privatization of solid waste management had taken place in 1997 to enhance resource management; uniformity and standardization; economy; focus monitoring; and to reduce the Government's burden.

g) Sustainable waste management

Sustainable Solid Waste Management is crucial to reduce environmental impact; energy consumption; pollution of land, air and water; loss of amenity; and create a balance between cost and environmental impact.

h) Integrated Solid Waste Management

The target of the National Strategic Plan (NSP) is to introduce scientific and engineering approaches/technologies to waste management, with a well-designed hierarchy of waste management. The Waste Management Hierarchy, targeted by 2020, is to (1) reduce, (2) reuse, (3) recycle, (4) intermediate processing, and (5) disposal; such as in the diagram below.



- i) Public awareness programs such as cleanliness program, recycling program and ad hoc awareness campaign

The National Recycling Program was developed with long term objective to inculcate the habit of recycling among the population, reduce operation cost of solid waste management, minimize the volume of waste disposed by landfill, reduce utilization of raw materials, to improve awareness and cooperation among stakeholders.

Issues & challenges:

- i) The challenges faced by the Solid Waste Management program are towards the derivation and implementation of a sustainable and integrated solid waste management plan that ensures the quality of public health.

Environmental and public health issues need to be addressed at every stage of waste management as shown below:

- a) Generation of waste
 - b) Storage
 - c) Collection
 - d) Transportation
 - e) Intermediate treatment
 - f) Disposal
- ii) Environmental health hazards that may arise from poor solid waste management are as follows:
 - Air pollution

Open burning causes air pollution, e.g. the emission of carbon dioxide and methane, which are known as green house gases, will cause global warming. Such gases also cause odor problem.

- Water pollution

Leachate from landfill contains hazardous chemicals (heavy metals, pesticide/biocides residues), biological organisms and micro-organisms (amoeba, parasites, viruses, bacteria, etc) and other public health hazards that can lead to poisoning, birth defects and congenital deformities, cancer, and neurobehavioral effects. Uncollected solid waste also causes clogging of drainage systems, thus causing flash floods.

- Land/soil pollution

Indiscriminate and illegal dumping and unsystematic disposal may cause land pollution and render the land unsuitable for agriculture or other development activities. Solid waste that contains toxic or clinical waste, if not separated may produce radon or radionucleides.

- Other public health hazards include the infestation of disease-causing vectors such as flies, cockroaches, rats and other rodents, and mosquitoes that may cause diseases such as malaria and dengue, worm infestation from water helminthes, etc.

iii) Land constraints and lacking in people friendly solid waste management systems, resource recovery, energy recovery and pollution control devices. The introduction of newer technologies may create issues of safety, environmental friendliness, people friendliness, evaluation and decision-making in terms of feasibility, practicality and risk versus benefit considerations under Malaysian circumstances/scenario. The introduction of unconventional technologies such as modern thermal treatment plant was not well conceived by the people and instead received a lot of opposition. Health hazards to the surrounding community from air, water and land/soil pollution were the main concerns.

iv) Lacking in knowledge, skill and experience had hampered the appropriate and proper evaluation, assessment and decision-making of every methodology and target set for every stage in the hierarchy of waste management. Nevertheless, in order to address these challenges, proven technologies, comprehensive training programs, overseeing by local experts/consultants, design guarantee, spare parts guarantee, meeting international and local emission requirements need to be incorporated and continuously strengthened.

8. Food Safety – Current Situation, Issues and Challenges

The current situations, issues and challenges are identified by the Engineering Services Division, Ministry of Health for guiding purposes only and are in no way exhaustive. Further elaboration or expansion by relevant Ministries/Departments/Agencies is welcomed.

Current situations:

- i) Data indicates that food borne diseases reported were mainly cholera, typhoid, hepatitis A, dysentery and food poisoning. Most common pathogens isolated were *Salmonella* 57%, *E.coli* 14%, *Shigella* 11%, *Campylobacter* 5% and *Aeromonas* 4%.
- ii) Food is a feast of chemicals, most of them being integral components of the food, important for nutrition and health. Examples are proteins, carbohydrates, fats, vitamins, trace elements, fibre, and antioxidants. However, some chemicals naturally present in certain foods, such as cyanogenic glycosides in cassava or solanine in potatoes, have toxic properties.
- iii) Certain food processing techniques, including cooking, can produce toxic by-products, such as polycyclic aromatic hydrocarbons or acrylamide.
- iv) Environmental pollutants such as lead and chlorinated compounds, toxic elements such as cadmium from the earth's crust, and natural mould and algal toxins such as aflatoxins and shellfish poisons can be present at varying levels in the food supply.
- v) Procedures must be in place to estimate the health risk of all the chemical additives and compounds in food, taking into account all other sources of exposure. However there are not much data available on the effect of physical, chemical and biological contaminants, additives and natural constituents of food.

Issues & challenges:

- i) Chemical contaminants from the environment can threaten the safety of food through air, water, and land pollution. These chemical contaminants are absorbed by the raw materials such as fruits, vegetables, grains, and spices or condiments used in food preparation. Microbiological contamination may also be derived from the contaminated soil and crops, but the bulk of it came from human environment through food handlers and contaminated water.

- ii) Water safety

Water is one of the important elements in food productions where it constitutes about 70 – 90% of most food products. Water relates to microbiological and

chemical safety in food. The availability, purity, and safety of water are always taken for granted in food establishments. Water quality is normally controlled by complying with local and state regulations for public drinking water systems and plumbing codes. However, hazards as a result of repairs works, water supply interruptions, and alterations to the water delivery system and distribution system within the establishment may still occur. Therefore, there is need to give special attention to water supply system in food establishments by providing appropriate monitoring mechanisms to prevent contamination of food.

iii) Soil pollution

Natural sources of land pollution includes heavy metals in some parts of the country such as land rich in mineral deposits or previously mined areas in East and West Malaysia. Lead, arsenic, antimony, bismuth, nickel or cadmium and other heavy metals from the soil is taken up by agriculture crops may contaminate our food supply. Soil contamination also occurred due to unscrupulous chemical dumping by factories or from factory effluents that directly contaminated food crops in the surrounding areas or in agriculture land further away through the water table or rivers.

The use of agrochemicals such as pesticides, fungicides, herbicides, and others in agriculture activities directly contaminated food crops. Their residues are washed down onto the soil and reabsorbed into the plant. Many such chemicals are non-biodegradable or have very low level of biodegradability and they tend to accumulate in the soil and crops.

iv) Air pollution

Lead, carbon monoxide, oxides of nitrogen, oxides of sulfur from vehicle and factory emissions may contaminate agriculture products in farms close to the city or to the industrial areas. Another burning issue normally raised is dioxin released from incinerators.

v) Noise pollution

The effect of noise pollution usually occurs in terms of occupational health in food factories such as canning and bottling factories where the level of noise is higher than 80 decibels. It can result in irreversible deafness for workers who are constantly exposed to it over long periods. Appropriate preventive and protection measures are important to safeguard the health of the workers.

vi) Other materials

Food may come into contact with materials and surfaces from the farm, as well as during preparation from the utensils, equipment, and packaging materials and

this will result in contamination to raw food produced or to the finished products.

vii) Temperature

Environmental factor during storage of food and raw materials can affect the safety and quality of food products. Direct heat from the sun may be beneficial in drying fruits, vegetables or dried fish as a processing mechanism, but in general storing of foods under hot condition such as under the sun or near heat from boilers or machinery may accelerate the denaturizing of food making it unsuitable for consumption. Canned, bottled, or packaged foods or low perishable foods may be safely stored at room temperature for months or years. More perishable foods may need to be stored under chilled conditions such as in the refrigerator or kept frozen. The effect of temperature on the various types of perishable, semi perishable or low perishable foods including the effect of temperature on the nutritional status of such foods should be studied. This is important in order to prevent the denaturizing of food and the resultant economic waste if the food is no longer suitable for consumption.

Environmental humidity level also affects the quality of food that is stored since excess humidity may result in damage to the food and excessively low humidity may dry up or shrink or wrinkle the food due to loss of turgidity and make the food inedible.

viii) Sanitation

Dirty environment promotes pests and rodents breeding. Rodents and cockroaches that chew through packaging will contaminate food while flies will breed on moist uncovered food and introduce pathogenic organisms onto the food. Birds, cats, and dogs can also intrude and contaminate food that is not well protected. The use of chemical pest control substances in food premises is another major factor of food contamination.

ix) Health hazards due to environmental factors need to be minimized and the surroundings of food premises need to be given adequate attention. Proper sanitary controls for water supply and sewage disposal are necessary in food establishments to prevent public health hazards. A clean and sanitary food establishment is a prerequisite to an effective food-safety program. Therefore, a routine cleaning program must be established and monitored.