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Go Green for Sustainability

Livestock Agriculture:
Harmonising Profit with Environment

Livestock agriculture evolved out of the needs of man to ensure a sustained food source from the environment. Increasing population pressure constantly demands higher food production from finite resources on earth.

Since the dawn of civilisation, livestock agriculture has been intertwined with the continuity of culture and community beliefs. The first successful domestication of livestock occurred more than 10,000 years ago, marking the transition from a hunter-gatherer society to a more sustainable and vibrant agricultural society. Agriculture enabled stratification and differentiation of roles in society, and subsequently precipitated the development of a complex culture, knowledge advancement, and continuous evolution of societies to the sophistication of today. From the evolutionary view point, scientists have often attributed the rise of the human species on earth to increased animal fat and protein intake, which in turn facilitated the rapid development of brain and intelligence. This opinion remains a well-researched hypothesis and it underscores the importance of animal agriculture in civilisation.

Evolution of Livestock Agriculture

Generally, the development of livestock agriculture can be roughly divided into three ages: pre-industrial age, the industrial age and the post-industrial age. In the pre-industrial age, primitive farming practices were sufficient when population pressure and size were generally low. In the forest fallow system, one-two years of cultivation alternated with up to 25 years of secondary forest regeneration, with few inputs used during the cropping phase. Increasing population pressure led to shorter fallow periods, more permanent cultivation, and complex animal-crop integration or intercropping systems. Irrigation and integration of livestock in farmlands was also practised in a few areas. Emergence of pastoralism and dedicated pastures enabled societies to sustain larger numbers of livestock. Thus, closer integration of livestock farming and crop agriculture became possible in an increasingly sophisticated but sedentary agricultural society.

The continuous demand for animal products such as food (meats, milk and eggs), clothing (leather, fleece and fur) and industrial materials (grease and oils from animal fats) from livestock became more evident with the arrival of the industrial age. During the industrial age, farms were viewed as factories and inputs such as labour, water, crop

Continued on page 3

Contents

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From the desk of the Director General

Go Green for Sustainability

Sustainability rests on the principle that the needs of the present generation should be met without compromising the ability of future generations to meet their own needs. Hence, the various industries in our country, may it be agriculture, tourism, manufacturing, mining, resources management or forestry, must ensure the three goals of sustainability are met. They are environmental health, socio-economic profitability and social or economic equity. This requires managers and Chief Executive Officers of companies in these industries accept the challenges of going 'green' in a sustainable way.

The challenges of managing sustainability are immense. Managers must therefore be persons of outstanding ability. Merely 'managing' in the old style is inadequate and insufficient. The 'green' manager must be a creative visionary, fully in grasp of the environmental issues facing the world, with a moral character that is infused with values that are humanistic, noble and benign towards nature. When it comes to matters concerning the environment, he cannot plead that he is a greenhorn. He must have, or acquire, the competency to manage both for today and tomorrow as Mother Earth's survival to a great extent depends on the extent of 'greenness' of his policies and procedures. This issue of IMPAK highlights the need for environmentally sound practices in a cross-section of our industries.

Take for example modern livestock farming which has emerged as an 'environmental problem' in our country. Ultimately modern livestock farming requires the active participation of all stakeholders which includes everybody within the livestock production chain – farmers, processors, retailers, regulators, consumers and the concerned public. The panoply of issues involved in operating a livestock farm within the vicinity of residential areas is mind boggling. It would be a health hazard to the immediate community should there be a disease outbreak on the farm. Livestock producers should also manage the farm land and water resources prudently with environmental concerns foremost on their minds. On the consumer and regulatory front, these livestock producers should adhere to their larger social and moral responsibilities to society and the environment.

Taking another example, as a responsible 'green' manager, do you have an e-waste policy for your company? As the world of technology keeps changing and developing, more e-wastes are being generated from electrical and electronic appliances. Business entities should make it their responsibility to ensure the e-wastes of these appliances are disposed off in an environmentally correct way. Meanwhile, the public can also be wise consumers by purchasing products with the least toxic constituents or use recycled, energy efficient, 'minimalist' packaged products designed for easy upgrading and dis-assembly.

Another industry requiring the services and inputs of the dedicated 'green' manager is forestry and its down-stream industries. Sustainable Forest Management (SFM) is under close scrutiny by all stakeholders in its product chain. High rates of global forest ecosystem degradation has had a high impact on issues related to biodiversity, rural livelihood and climate change. Forest managers must improve their forest practices and implement new SFM strategies. As SFM is generally believed to be closely related to biodiversity and climate change, global policies now provide a definition of SFM that is all pervasive – profit considerations, sustainability of forests and ensuring the livelihood and empowerment of vulnerable communities within the forest ecosystem. The 'green' manager has his work cut out for him, here.

Likewise with chemical industries. In Malaysia, these industries play an important role in the import and export of manufactured goods. The 'green' manager must establish a safe and sound Chemical Management System (CMS) that will enhance protection of human health and the environment which undoubtedly will contribute to sustainable development.

Managing our marine parks teneted on environmentally friendly practices is now of real concern. Marine park managers are faced with the task of maintaining a proper balance between conservation and tourism activities. Tourism within the marine parks is a lucrative industry. Nearly half a million visitors were attracted to our marine parks in 2006. Overcrowding, overdevelopment and an increase in marine pollution from oil residues are increasingly obvious. The 'green' manager's contribution in terms of more effective communication with tourists can make the difference between success and failure here. Environmentally sound practices must be incorporated into the day-to-day management of marine parks and more importantly, enforced.

Clearly, managers must 'green' their management skills. Sustainable development by going green does not require profit to be sacrificed. What is required is 'green creativity' in management and a deep rooted concern for the health of Mother Earth.

Dato' Hajah Rosnani Ibarahim
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Continued from page 1

seedlings, animal feedstuffs, farmlands etc. were continuously optimised for even higher production. Environmental considerations were often overlooked as the population pressure for food resources kept on increasing. Better quality livestock and crops specially selected for their superior production qualities and quantities, extensive use of chemical agents (such as pesticides, fertilisers, drugs), better farming practices and veterinary medical care all contributed to increased food production. Although these advances managed to preserve the balance between population growth and its resource demands, some of the practices such as irresponsible use of pesticides, in-feed antibiotics, growth promotants and other banned substances came at a great environmental cost.

Most nations in the world are currently approaching the end of the industrial age spectrum as the consequences of irresponsible agriculture are hampering further increases in agricultural production. Prominent among these are topsoil depletion (as a result of over-grazing, reckless farming or climatic change), groundwater contamination, increasing costs of production, competition for arable farmlands (for commercial and residential use) and the disintegration of economic and social conditions in rural communities, often as a result of the disappearance of smallholder or family farms. Disappearance of small farms is often attributed to a host of factors such as degradation of farm lands, urban migration and to some extent restructuring of farm land ownership as a result of government policies or takeovers by huge corporations. In the Malaysian context, increasing production costs and decreasing availability of local labour as a result of urbanisation or urban migration remains a major challenge to develop the nation's agriculture sector. For instance, high overhead costs and extremely thin profit margins often discourage smallholder farmers from venturing into broiler chicken farming, unless they become 'contract farmers' to conglomerates.

The examples above give us a microcosmic overview of the ever transforming animal agricultural landscape in our country. In the global scene, all these phenomena led to the emergence of a new agricultural approach, the post-industrial agricultural 'revolution' which is occurring in many parts of the world and in many guises such as organic farming and green farming. Advocates of post-industrial sustainable farming often recommend the addition of premium value farming activities, such as organic farming as a way to increase farm income. On the regulatory front, demand for safer foods and living conditions from societies are often translated into legal directives that regulate standards of animal agriculture. In the European Union, for example, a series of EU directives were issued that culminated in the banning of in-feed antibiotics since 2003 in the interest of public health. Numerous land bills in most developed countries also incorporate a clause on sustainable water and soil management requirements, whereas guidelines against odour pollution remain a critical component in many legislations that enable society and their farms to co-exist. These are examples of how agriculture should adapt and is expected to evolve in the near future.

Sustainable Livestock Farming in the Post-industrial Age

The consequences of irresponsible farming highlighted in the earlier part of this article definitely necessitate new approaches to livestock production. One clear distinction between sustainable agriculture and the current conventional agricultural practices prevalent in many countries is the explicit recognition of the ecology, community and other social dimensions that are intertwined with the farming environment. Sustainable agriculture would involve harmonising environmental health with economic profitability while addressing social responsibilities admirably. Simply stated, sustainable agriculture focuses on farmers' profit in the short run, while preserving rural communities and natural resources in the long run.

Farmer Actions

Sustainable livestock farming rests not only with the decisions of individual farms itself, but is the collective interaction between the local ecosystem and communities that are directly or indirectly involved in livestock production, to the retailers and end consumers. Farmers should make wise decisions on the best type and breed of livestock suitable to their locality and enterprises while minimising the impact on the environment.

A good example is operating a livestock farm within the vicinity of residential areas without provisions for waste treatment. Not only is this irresponsible, but would constitute a health hazard to the surrounding community should there be any zoonotic disease outbreak in the farm. Livestock producers should also manage their grazing land and water resources prudently. Grazing and agricultural lands can be continually regenerated using animal waste for other agricultural purposes, such as pasture. Precious water resources and waterways should not be polluted as this not only invites the ire of surrounding communities, but would also deplete the availability of clean water for farm operations in the long run.

Government Actions: Research and Development Regulation

Agricultural byproducts such as those from oil palm and cannery industries should be further incorporated in animal feeds. It is estimated that the Malaysian palm oil industry generates about 6.5 tonnes of biomass for every tonne of crude palm oil extracted. Based on 2004 figures, these would be translated into about 90 million tonnes of biomass produced annually. In the local scene, R&D efforts are ongoing to adopt oil palm frond pellets, palm kernel cake, pineapple cannery waste and other agricultural byproducts as animal feeds. These not only

Continued on page 10

Sustainable Forest Management: Green Procedures and Policies

The last decade has witnessed ever increasing global concerns about deforestation and the need for improvement in the quality of forest management. Concerns about environmental and social issues associated with forestry –such as effects on biodiversity, climate change, desertification, flooding and conflicts over rights and sustainable development generally – has led to international agreements and programmes for improving forest management practices.

Although there is general agreement that Sustainable Forest Management (SFM) should be environmentally responsible, socially beneficial and economically viable, there is not as yet a universal definition of what it means. Attempts have been made in the past few years by various bodies including both inter-governmental bodies such as the International Tropical Timber Organisation (ITTO) and independent bodies such as the Forestry Stewardship Council (FSC) to agree on a more precise definition through development of certain standards or credentials for sustainable forest management practices.

What is Sustainable Forest Management?

Sustainable Forest Management (SFM) has been described as forestry's contribution to sustainable development. This is a development which is economically viable, environmentally benign and socially beneficial, and which balances present and future needs. However in practice, interactions between the flora and fauna of a forest ecosystem are complex and often poorly understood. The consequences of any strategies and actions taken today may only show results in 50 to 100 years. For this reason, some people feel that the phrase 'sustainable forest management' should not be used to describe current management systems; other phrases such as 'good forest stewardship' or 'well managed forests' are often preferred. However, whatever term is used to describe SFM, the main elements are:

Legal compliance: This relates to the forest law regime within which forestry activities are implemented. Where forest laws are enforced, SFM includes a provision that forest activities must comply with these laws; including both national and international forestry laws, tenure and use rights and the right of local communities to non-timber forest products such as spices, medicines etc.

Optimising production of forest products: This includes requirements for management planning and harvesting practices being implemented in accordance with the forest's capacity to regenerate itself. Implementation of this provision requires some form of monitoring. It also requires maintaining proper account of all activities and related costs in relation to implementing SFM to ensure that any business enterprise which uses harvested materials from the forest as a raw material input (e.g. timber business) is maintained in a viable form.

Forest yield monitoring

Protecting the environment: This includes activities such as minimising harvesting impacts (e.g. avoiding destruction of water courses, soil compaction etc), limiting the use of chemicals, managing waste and recycling.

Ensuring the well-being of local people: This includes contribution to local development; providing employment, recognising the rights of forest-dependent communities to economic development on the basis of the forest products, ensuring good relations with employees etc.

Improving Forest Management to Achieve Sustainability

Achieving SFM is a long-term goal. To be able to improve current management practices to the level required to be sustainable, a forest manager has to

- assess current forestry practices against the requirements of sustainable forest management;
- identify the gaps in the current performance;
- develop an action plan of activities required to meet the gaps; and
- implement the action plan within a reasonable time frame.

Improving Performance with Adequate Information

SFM requires that forest managers have an adequate technical understanding of the following:

- Types of flora and fauna the forest contains including its diversity, distribution and the complex relationships existing between and among them;
- Wide range of multiple benefits derived from the forest;
- Wide array of interests on the forest including type of stakeholders and an identification of their different interests;
- Environmental, social and economic impacts of any activity in the forest and how these impacts can be addressed; and
- Annual increment of forest yields in order to optimise productivity and to harvest within the forest regeneration capacity.

Forest information on flora and fauna, growth rates and yield levels usually are maintained

Basic elements of a good forest management plan

- A good description of the forest, location, condition, list of trees and animals, their numbers and distribution and whether or not they are threatened, endangered etc.
- Timber tree management and sustained yield plan.
- Business profitability plan including accurate projections of income based on environmental and social cost.
- Operations and operational planning on how to develop best practices for all operations in the forest.
- Monitoring planning to ensure that objectives are being achieved.
- Training planning. This should be based on an assessment of skills required for each activity.
- Forest protection planning including an assessment of current and potential threats and mitigation measures required.
- Chemicals and biological control measures to minimise the use of toxic chemicals and where possible replacing them with alternatives.

by the appropriate research institutions. It will therefore be useful for forest managers to contact these institutions for relevant information.

Planning for Sustainable Forest Management

SFM involves the achievement of multiple objectives of the forest. Depending on the size of the operations, management planning is often broken down into three levels:

Strategic plan: The forest management plan for the entire forest operation, over the longer term such as entire period of harvesting rotation or a 25-year period.

Tactical plan: Sets out activity planned, normally over a five-year period, in greater detail. It may coincide with business plans.

Operational plan: Details the precise activities to be carried out over the next year. This will include month-to-month activities and should provide the most direct control over operations.

Promoting Sustainable Forest Management

SFM provides a unique opportunity for using policy to influence practical forest management. The implementation approach requires the involvement of different stakeholders and interest groups – environmental, social and economic – in addressing their own respective needs and aspirations derived from the existence of the forest ecosystem. The main ways that policy could influence SFM are:

Providing framework for definition of SFM: Definition of SFM requires a transparent process in which all social, environmental and economic interests can agree on standards that deliver practical outcomes which integrates the need and aspirations of all key interested parties. To achieve this, there must be clear rules of engagement and, the process has to be independent and adequately consultative to deliver effective outcomes, acceptable to all parties.

Empowering vulnerable groups: A key outcome of responsible forest management is a management regime that guarantees and protects the rights of vulnerable groups whose livelihoods are inextricably linked with the natural forest in question. In many situations, as in tropical Africa for example, these groups tend to be indigenous forest dwellers. Though least influential, they have rights that are very important and need to be upheld. Under such a situation, a proper policy framework process plays a very useful role in helping to protect these vulnerable groups.

Communicating direction for government's commitment: SFM implementation may require some changes to existing forestry practices; institutional restructuring; legislations and building new capacity though its returns may be long term. Thus, implementation requires a coherent vision and direction which provides a framework within which governments commit and enforce implementation equally for all stakeholders and parties.

Framework for enforcement: Philosophy, vision and a management regime for SFM implementation provides the basis for enforcement and progress monitoring. To achieve a desirable outcome, policies must include statements of clear roles and responsibilities for all parties; this must also include milestones and the time frame for achievement of various elements to demonstrate commitment to effective implementation.

Challenges of Implementing SFM

SFM is widely considered to be a difficult concept to implement (Ozinga, 2004; Higman, 2004). Particularly, for tropical countries such as Malaysia and Indonesia, implementing SFM and certification seems far-fetched from the reality of forestry practice today because of the overwhelming gap between current practice and the requirements of SFM. Some of the main challenges which are common to most tropical forest regions including Asia are:

Weak understanding of SFM in forestry practice: An adequate understanding of the implications of the meaning of SFM is therefore a prerequisite to effective implementation (Higmann *et al.*, 2004). Fundamentally, it helps in systematic determination and prioritisation of actions required for changing the existing forestry practice to conform to the requirements of SFM principles.

Ineffective governance and law enforcement: The most fundamental requirements for successful implementation of SFM are effective governance and law enforcement. The importance of this has been stressed in many international initiatives and particularly in the recent EU led Forest Law Enforcement and Governance and Trade/ Voluntary Partnership Agreement (VPA)[1] initiative involving tropical timber-producing countries where illegal timber harvesting is a problem; this includes Malaysia and Indonesia. The World Bank has estimated a revenue loss of USD10 billion a year to governments through illegal logging and corrupt practices in the last 10 years!

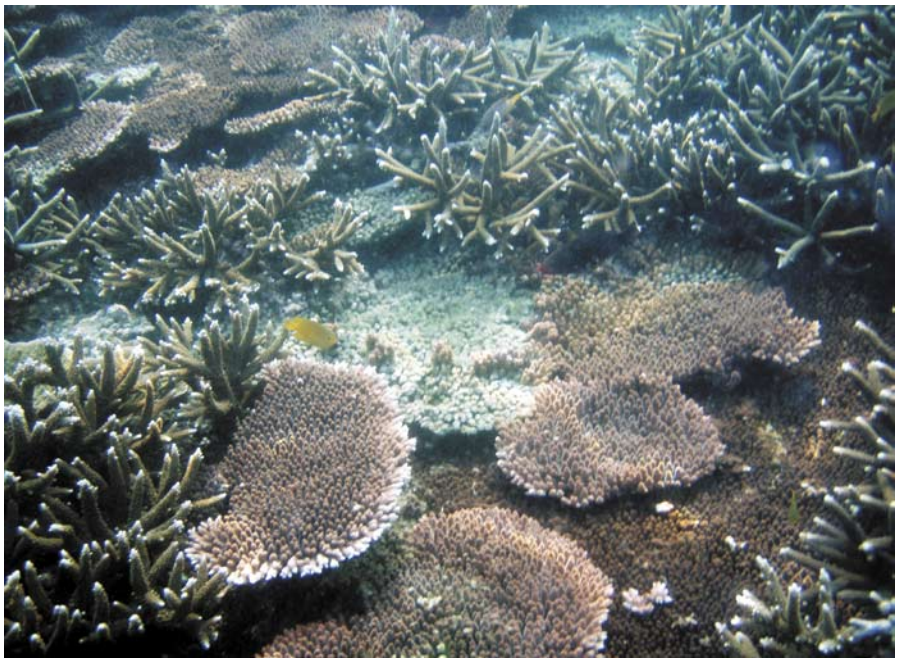
Poor forest operational planning

Inadequate technical capacity: Achieving SFM requires specific technical capacity, which in turn requires forest managers to have adequate understanding of the wide range of issues involved. Principally, SFM involves three broad disciplines (environmental, economic and social), which ought to be manipulated in such a way to ensure high quality forest management and responsible practice. In most cases, the focus of forest managers had been overly economic (e.g. yield planning and timber harvesting) lacking in the social (e.g. decision making, benefit sharing) and the environmental (especially wildlife conservation, soil management and biodiversity)

[1]The EU FLEGT/ VPA is an initiative to curb illegal timber trade between EU and timber producing countries. The VPA process will work in the form of a licensed agreement with timber producing countries which ensures that only legal timber is imported and traded in the EU from such countries.

Continued on page 10

Preserving our Marine Parks for Sustainable Tourism



Marine parks in Malaysia were established by the Fisheries Act of 1985, under Part IX – Marine Parks and Marine Reserves (Sections 41 – 45). A marine park is a protected area of the sea zoned two nautical miles from the shore at the lowest low tide point, except for Pulau Kapas in Terengganu and Pulau Kuraman, Pulau Rusukan Besar and Pulau Rusukan Kecil in Labuan which are zoned one nautical mile from the shore at the lowest low tide point. To date, the waters of 42 islands in Malaysia have been gazetted as marine parks. Generally, these parks are categorised into five groups; Pulau Payar Marine Park (Kedah), Pulau Redang Marine Park (Terengganu), Pulau Tioman Marine Park (Pahang), Mersing Marine Park (Johor) and Labuan Marine Park (Labuan).

Marine parks are primarily established for resource conservation, protection and management of the environment; habitat restoration and rehabilitation; and for the promotion of awareness and education. However, over time, marine park managers are now faced with the task of maintaining an uneasy balance between conservation and tourism activities. Tourism in the marine parks is a lucrative industry attracting people from around the world seeking to explore our pristine marine environments. This is clearly shown from the increasing number of visitors to the marine parks, which have grown dramatically from only about 1,373 visitors in 1988 to 463,458 visitors in 2006. On average, these marine parks have been receiving about 400,000 tourists annually since year 2000.

Overcrowding of visitors to the marine parks has been one of the major causes of the accumulated deteriorating impact on the marine parks' ecosystem over the years. This is mainly due to the difficulty in briefing all the visitors on the do's and don'ts while visiting the marine parks. Some of the main do's and don'ts in the marine parks area as stipulated in the Fisheries Act 1985 are listed in Table 1. For example, much of the corals on Pulau Payar Marine Park have been damaged as a result of the overwhelming presence of tourists, as the travel operators allowed between 600 and 700 tourists on the island at one time in the past. This resulted in the beaches being overcrowded with people, indirectly causing the environment to degrade. This includes the pressure of 14 chalets on the island that have been abandoned since 2002, prompting the state government to conduct an immediate study on the health of the island's natural environment.[1]

Besides, many small resorts and chalets were also built on these islands to accommodate the ever rising number of visitors. For example, the Pulau Perhentian Marine Park, which is one of the major island tourism destinations in Terengganu with an area of only 15 square kilometres, had about 43 chalets/resorts with a total of 1,140 rooms in 2004. In comparison, Marang with an area of 666 square kilometres had only about 13 chalets/resorts with 281 rooms in total in the same year.[2] It is, however, also important to acknowledge the fact that the accumulation of many small developments could, more often than not, collectively cause more negative impacts than a single major development in an area. Further, as more development and land clearing activities take place on the islands, sedimentation too has risen consequentially. A high rate of sedimentation could kill the coral colonies, decrease water visibility and dampen snorkelling and diving activities.

In addition to sedimentation problems, there has also been an increase in marine pollution from oil residues due to the increasing numbers of tourist boats, and contamination of water by sewage and garbage due to the increase in tourism activities. For example, eutrophication has been a significant threat to reefs in some of these marine parks due to the inefficient sewage treatment system in place currently, particularly in densely populated areas. Excessive discharge of raw/partially treated sewage into the water column adds nutrients into the water, fuelling growth of phytoplankton and algae, which compete with corals for light, oxygen and space on reefs. At present, most of the chalets/resorts on the islands rely on individual septic tanks and these may be inadequate or unsuitable to accommodate the ever increasing number of people on these islands. Figure 1 illustrates the level of total suspended solids (TSS), oil and grease, as well as *E. coli* contamination recorded for the marine park islands by the Department of Environment (DOE).

Table 1: Some of the do's and don'ts in the marine parks

Permitted activities	Prohibited activities
Swimming	Water skiing, speed boat racing and spear fishing
Underwater photography	Anchoring of boats over the coral areas
Appreciation of aquatic flora and fauna	Carrying and using weapons that endanger aquatic life
Snorkelling	Fishing in the park area
Scuba diving	Collecting corals and other aquatic life

Lack of awareness among the various stakeholders is another area worth mentioning. Irresponsible tourism activities due to lack of awareness could cause enormous harm to the environment and affect the industry in the long run. Table 2 lists some of the major impacts or threats from irresponsible tourism activities in the marine parks.

The rapid speed at which the tourism sector has been developing warrants adequate attention to management of tourists, as well as infrastructure planning and development to ensure that the marine environment is not adversely affected.

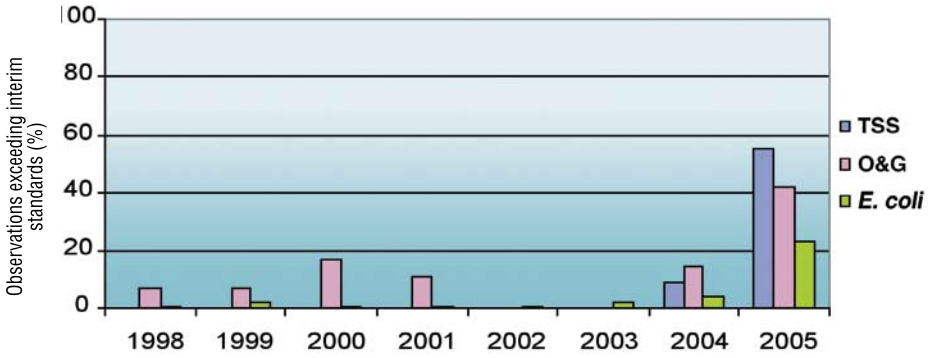


Figure 1: Water quality status for marine park islands in Malaysia (1995-2005)

Table 2: Some of the impacts / threats from irresponsible tourism activities

Stakeholders	Impacts / Threats
Tourists Tourists could create a threat to marine ecosystems through activities such as snorkelling and diving, mainly due to poor skills.	**Physical Damage** ***Trampling on corals :*** Due to poor buoyancy skills and snorkelling practice (fins are sometimes used as protection from corals by tourists). ***Underwater photographers destroying corals :*** Could cause damage if they struggle to achieve the right angle, or lure fish with food. ***Picking corals :*** Due to lack of awareness of reef etiquette. ***Spear fishing :*** Due to lack of awareness of reef etiquette. **Anthropogenic Impacts** ***Leaving trash behind at sea or on islands :*** Normally packed lunch boxes, plastic bottles or plastic bags used for fish feeding are thrown overboard. ***Living on the islands :*** Generating waste (solid & fresh water) as guests of chalets and hotels. ***Sunscreen oil :*** Pollutes the water and harms corals as well as other marine life. ***Sewage :*** Could endanger reefs as nutrients in the sewage encourage growth of phytoplankton and seaweeds which could smother reefs. Sewage should be properly treated before being released into the sea.
Trained tour guides/boat operators They have important roles in promoting awareness for marine conservation through briefing on reef etiquette, and warning tourists on the do's and don'ts in marine parks. They also play a significant role in issues related to waste-management, boat operation, fuel consumption and maintenance practices.	**Physical Damage** This is often due to poor boating practice and the lack of mooring buoys, especially during peak seasons or overcrowding. **Physical Damage** ***Incomplete briefing to tourists about reef etiquette :*** Results in tourists breaking the regulations of marine parks. ***Casual attitude towards tourists breaking regulations :*** Renders regulations ineffective. ***Pollution and non-adherence to rules :*** Irresponsible operators dump sewage, garbage or oil into the water, anchor in the park areas or use TBT paints for their boats.
Dive operators Dive operators take divers to diving sites.	**Physical Damage** This is due to poor boating practices and the lack of mooring buoys, especially during peak seasons. **Physical Damage** ***Incomplete briefing to tourists about reef etiquette:*** Results in tourists breaking regulations of marine parks. ***Taking inexperienced divers to difficult / pristine sites:*** Exposes marine ecosystem to reckless divers. Sometimes leading to floundering underwater, thus stirring sediments or thumping into corals. This leads to damage of the corals and other marine life.
Chalet & hotel operators The impact is significant for waste water management. They also have an important role in promoting awareness to their guests.	**Anthropogenic Impacts** ***Discharge of waste water :*** Some of which may not meet requirements, such as not maintaining the septic tanks system at the area, causing pollution and eutrophication leading to the smothering of corals by algae. ***Open burning of solid waste :*** Contributes to poor air quality. ***Sedimentation problems :*** Especially during the development phase. As such, careful planning should be carried out, including compliance with Environmental Impact Assessment (EIA) requirements. ***Improper fertiliser use :*** Fertilisers used for agricultural land and golf courses could seep into the sea and harm reefs. **Physical Damage** ***Incomplete briefing to tourists about reef etiquette:*** Results in tourists breaking regulations of marine parks.

Successful tourism practices should entail maximisation of environmental and economic benefits, while minimising any ecological damage to the surroundings. Tourism must therefore be managed and channelled so that it is directly in line with the objectives of the marine parks. Promoting ecotourism activities in marine parks could be a significant way to allow tourism to go hand-in-hand with environmental conservation.[3] Environmentally friendly practices that are in accordance with the guidelines listed in the National Ecotourism Plan 1997 for marine parks management is another area that needs to be emphasised.[4] Besides, raising awareness of the people on the importance of conserving the natural environment is also of paramount importance. As such, all stakeholders, including tourists, should make concerted efforts to ensure that the natural resources are conserved, so that future generations may also enjoy and benefit from them.

Footnotes

[1] *New Straits Times*, 15/9/2005.

[2] Data obtained from Terengganu Economic Planning Unit Report, 2005.

[3] According to the National Ecotourism Plan 1997, ecotourism is defined as 'travel and visitation that is environmentally responsible to relatively undisturbed natural areas in order to enjoy and appreciate nature, promotes conservation, has low visitor impact and provides for beneficially active socio-economic involvement of local populations'.

[4] The guidelines include the lists of the criteria for 'Site Planning and Management' as well as 'Operator Qualifications' towards environmentally responsible practices in the marine parks.

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Sustainable Management of Water Resources

Water has always been a fundamental but unpredictable part of life. As developed nations with adequate supply seek to improve facilities and adopt technologies on matters such as flooding and drought, developing countries which acutely lack basic water and sanitation as underlined in the Millennium Development Goals (MDGs) strive to improve access and quality of water supply. The common future challenge in both developing and developed nations is the concern over issue of sustainable management of the resources. Other than taking an integrated approach to water where water issues are coupled with land use, ecosystem process and water cycle, promoting green practices in water management and use is undoubtedly vital for sustainable development.

Malaysia is a fortunate country in which water resources are abundant. The country's proximity to the Equator is an advantage as this is translated into a hot and wet humid equatorial climate regime with heavy rainfall averaging 2,000 millimetres all year round. In some parts of the country such as the east coast, average annual rainfall reaches 5,000 millimetres. In addition, the more than 150 river systems serve as the country's major sources of water supply; we have very few large lakes or underground aquifers. Surface runoff constitutes 56% of the annual total rainfall while total groundwater is about 6% of total rainfall (the remaining 38% of total rainfall is lost through evapotranspiration). Hence, lucky Malaysians enjoy a per capita renewable water of more than 20,000 cubic metres per year compared to water starved people with a per capita renewable water of less than 1,000 cubic metres per year which means one person in Malaysia has access to more than 20 times the water available to someone in Yemen (Chan, 1998)!

However, the 1998 drought and water shortages exposed the fact that a water crisis is possible in Malaysia and while the event was blamed on the El Nino and climate conditions, one of the main contributing factors is the lack of efficient management of water. Yes, we are a country with an abundance of water, but water management has not been taken very seriously. What is important now is aligning Malaysia with other developed countries in giving due consideration to water sustainability. Essentially this means an integrated approach to water management and use.

POLICIES TO PROMOTE GREEN PRACTICES

Improving policies to protect and utilise the natural water resources include the implementation of policies on river rehabilitation, water conservation, utilisation of groundwater and water recycling in the immediate future.

Policy Changes

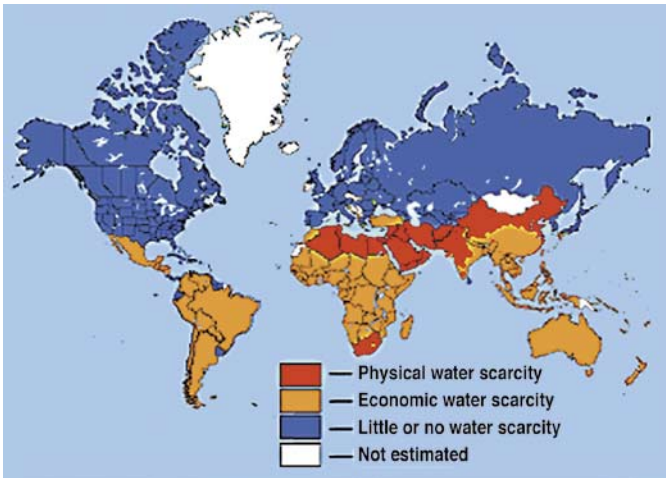
The reformation in the water sector recently saw changes in policies, management as well as approaches to managing the nation's water sources and services. A high expectation has been placed on the National Water Services Commission (Suruhanjaya Perkhidmatan Air Negara or SPAN) which will play a vital role as the as regulator for the water industry. Therefore, SPAN has to give due considerations to green practices in all decision making processes to ensure conservation of the water resources.

SPAN is expected to confer with the Ministry of Housing and Local Government in reviewing the Uniform Building by-Law to incorporate amendments for the usage of rain water harvesting, water efficient fittings and appliances as well as waste water recycling. Tax incentives for the companies undertaking water reuse, conservation and waste water recycling are also expected to be promoted by SPAN.

Demand Management

In all aspects of water supply and demand, the one issue that is most obvious is that of Non-Revenue Water (NRW) or water that is lost either through breakage, theft, seepage or other unaccountable ways. Replacing old pipes will not be the ultimate solution. In the case of private water companies who sell treated water to the government, they are not concerned about NRW since they charge the government what they treat at the treatment source. Notwithstanding all the unsavoury aspects of NRW, the water authorities should change their mindset from one of solely concentrating on increasing water supply (hence more profits) to a more balanced approach involving better management of both water supply increment and the reduction in water loss.

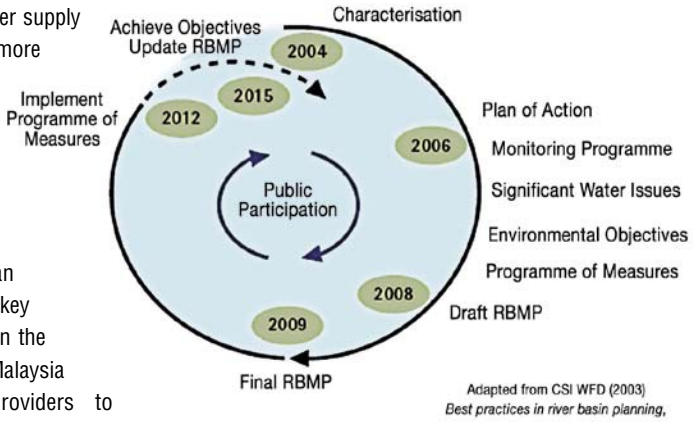
The shift towards demand management rather than supply management is a key green practice to be adopted. In the past, water abundance in Malaysia has pushed the service providers to emphasise supply management; however, with increasing population and unfavourable climatic conditions, demand management is essential to promote sustainability. This will only be possible with appropriate policies as well as economic incentives to end users. A carrot-stick approach has proved to be successful in the past in conservation efforts.



Global water scarcity map
Source: http://whyfiles.org/131fresh_water/2.html

Watershed Approaches to Water Management

The water quality of rivers in Malaysia is at an alarming level. Although 97% of the nation's water supply is from the 189 river basins covering approximately 35,000 kilometres, yet river water quality has been deteriorating in the past decade. Focusing only on the river and actions such as river cleanups are not sustainable. The concept of Integrated Water Resources Development and Management (IWRM) is not new and the Global Water Partnership (GWP) defined IWRM as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." In the European Union, the IWRM and River Basin Management concept has been translated into a framework which is the Water Framework Directive (WFD).



River Basin Management Plans
Adapted from CSI WFD (2003)
Best practices in river basin planning, guidance on the planning process

The WFD approach for managing water acknowledges the movement of water through the whole hydrological cycle and has come up with River Basin Management Plans (RBMPs) which apply to 'River Basin Districts'. These plans require each district to list environmental objectives for that particular district which follow the overall objectives set out in the directive.

There are many such developments, including the Mekong River Basin Commission and the Nile Commission. This approach offers a sustainable method of conserving and preserving our natural water resources. Therefore, similarly Malaysia should adopt such an approach where the entire river basin / water environment is managed sustainably.

Utilising Natural Water Resources

In recent days, Malaysia is facing intermittent water shortages and water scarcity in some states as the dams often run low and most importantly, there have been calls to construct new dams to ensure continuous water supply. Apart from developing more conventional water-associated infrastructure, what is crucial is emphasis on the emerging need for sustainable on-site water resources development and management, which would include harvesting and utilisation of rainwater (RWH). For instance, two types of water resources, rain water and groundwater, have yet to be fully explored in our country while in neighbouring countries these resources are one of the main sources of water for domestic, industry and for irrigation purposes.

Groundwater utilisation is a new development all over the world. To manage this resource sustainably and to avoid over abstraction, groundwater abstraction policies have to be in place before any future utilisation can be considered.

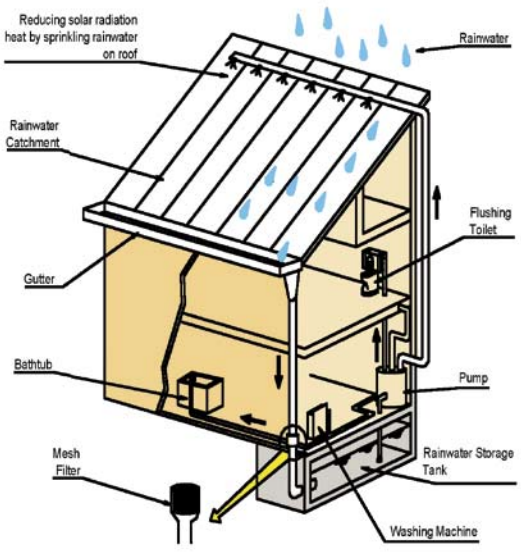


Figure 1: Elements of rainwater harvesting system
Source: NAHRIM: Strategies and future plans

RWH on the other hand, provides an integrated solution, placing less stress on the dams and will potentially reduce the need to expand or built new dams. Further, installation of the RWH system also plays an important role in reducing run-off and erosion during the rainy season, which means this system alleviates flash floods in urban areas. To date there are 500,000 RWH systems in operation in Germany, in Hawaii, 60,000 people use RWH and in China, more than 21 million people are dependant on RWH. The above figures clearly indicate that RWH is successful, if properly installed, maintained and managed.

Rainwater harvesting is not merely about reducing consumption but is about providing alternatives and reliable water to consumers. This source of water will not be subjected to outside utility control as well as pipeline interruption or power failure. During the 1998 drought, tenants of high rise buildings faced major problems not because of limited drinking water (due to the availability of bottled water) but due to the difficulties in hauling water from the tanker to their home for toilet flushing purposes. This was highlighted as one of the very reasons for research as well development of the guidelines on RWH.

Consequently, in 1998, the Minister of Housing and Local Government expressed the Government's interest for houses to be designed with facilities for collecting rainwater. In 1999, the Ministry produced a Guideline on Installing a Rainwater Collection and Utilisation System (Rainwater Guideline, 1999) which is intended as a 'guide manual' for those who want to install a RWH and utilisation system. It aims to encourage the owners to think and adopt wherever possible appropriate innovative alternatives which offer real advantages and are adaptable to their water needs.

RWH has many benefits including reducing the dependence on piped water supply for non-potable uses and economical and environmental benefits. However, the challenge in implementing this system remains high. The main issue concerning the implementing of RWH systems in the country is that no consideration is given for possible future development of new buildings incorporating RWH facilities. This system thus did not materialise in Malaysia since the document remained as a guide and developers were not mandated to adopt or adapt it. Besides, lack of understanding and awareness of the public and the local authorities on the benefits of RWH, aesthetic values, health and hygiene considerations are the key issues that need to be tackled.

Below are some of the crucial issues to be taken into immediate consideration to promote RWH in Malaysia as proposed by the National Hydraulic Research Institute Malaysia, (NAHRIM):

(i) Introducing by-laws for compulsory installation of RWH systems in all new buildings. This would ensure that RWH systems become a standard prerequisite feature of future homes and buildings supplementing the water needs of the occupants;
(ii) State Governments and Local Authorities should be more proactive in encouraging developers and building owners to install the systems. Systems should be installed in all government's buildings, such as office buildings, schools, halls, sport complexes, and quarters;
(iii) Incentives in the form of subsidies and tax rebates need to be introduced by the Government to install RWH systems;
(iv) Incentives should also be given to the manufacturers or other stakeholders involved in RWH and utilisation system production; and
(v) Promote the benefits of rainwater utilisation.

Conclusion

Water scarcity on one hand and drought on the other is considered related but need to be dealt with using different strategies. Scarcity refers to long-term water imbalances which are a consequence of water mismanagement. Therefore issues of water efficiency including green practices, a mandatory labelling scheme for water-using products, codes for sustainable homes and public education on water efficiency has been gaining much attention amongst the politicians. Incorporating demand and supply management will be the best viable option to manage the sustainability of water and the water environment as a whole, from the river to the tap!

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Continued from page 5

perspectives of forest management (Dodoo and Baffoe, 2004).

Inadequate financial resources: Implementing SFM is costly and needs adequate financial resources, although it is believed that in most cases, premiums may be realised in the long term. In the short term, however, this could be a disincentive; especially for low income countries where short-term returns is probably needed to maintain commitment towards progress; they are therefore unable to meet the associated financial and logistics costs.

Conclusion

SFM has become very topical in the wake of high rates of global forest ecosystem degradation and associated impacts on biodiversity, rural livelihoods and climate change. As a result, there will be continuing demand on forest managers to improve their forest practices and implement new strategies. At the same time, policy makers especially in highly forested countries will also continue to be under increasing international pressure to create enabling conditions to facilitate effective implementation of SFM requirements. Developing an adequate understanding of SFM in the context of forest policy formulation is therefore vital in ensuring that the policy outcomes address key issues that help to strengthen practical implementation of SFM on the ground. They are likely to achieve a desirable effect for all stakeholders.

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Continued from page 3

ensure efficient re-use and re-circulation of the waste biomass, but minimise impact of these wastes on the environment as well as minimising livestock dependence on common human foodstuff such as corn and soybean.

Prudent management of animal agriculture would also involve the use of natural enzymes to better digest plant phytates in the animals' gut. Undigested phytate often represents a huge water pollution problem when their residual phosphates are released into water bodies. The banning of in-feed antibiotics actually began a new chapter in animal nutrition development. Instead of antibiotics, farmers are now turning to organic acids derived from fruits and fermented plants that are equally capable of controlling gut bacteria while boosting growth. Responsible use of drugs and chemical agents, or their alternatives would minimise the possible emergence of antibiotic resistant microorganisms or 'superbugs'. Superbugs that are resistant to multiple drugs represent a huge challenge to the human population if they are able to cross over the species barrier and infect human populations. In summary, all these approaches represent new resources that are renewable with minimal environmental impact and cost.

Consumers and regulatory authorities should understand the limits of available livestock farming technologies and resources, as well as the effects of the business viability of the farming practice itself. One example is the continuing escalation of key feedstuff prices such as corn and soybean in the world market, which is translated into ever increasing farm produce prices. Increases in feedstuff prices are often due to speculative factors in the world market, fluctuating seasonal harvest, climatic factors, continual degradation of farm land worldwide and other volatile factors. As a result, the cost for livestock production keeps on increasing, particularly with India's and China's continued voracious appetite for commodities to fuel their emerging economies.

Consumer Actions

Consumers can play a critical role in creating a sustainable food production system. Through their purchases, they send strong messages to producers, retailers and others in the system about what they think are important. For example, the demand for better welfare treatment of broiler chickens resulted in the creation of free-range chicken farms in North America. Food cost and nutritional quality have always influenced consumer choices. The challenge now is to find strategies that broaden consumer perspectives, so that environmental quality, resource use and social equity issues are also considered in shopping decisions.

At the same time, new policies and institutions must be created to enable producers using sustainable practices to market their goods to a wider public. Coalitions of consumer groups organised around improving the food system is one specific method of creating a dialogue among consumers, retailers, producers and others. These coalitions or other public forums can be important vehicles for clarifying issues, suggesting new policies, increasing mutual trust, and encouraging a long-term view of food production, distribution and consumption.

Conclusion

In conclusion, sustainable agriculture is proving to be the new agricultural revolution towards a more sustainable future for mankind. However, to be feasible, it requires the active participation of all stakeholders, which includes everybody within the food production chain from the farmers, processors, retailers and regulating authorities, to the consumers and the concerned public. Ultimately, sustainable livestock agricultural system is based on the following principles:

- Advocating the prudent use of renewable and/or recyclable resources;
- Protecting the integrity of natural systems so that natural resources are continually regenerated;
- Improving the quality of life of individuals and communities, from farmers to the end consumers while remaining profitable; and
- Use of land and resources that is guided by a land ethic that considers the long-term good of all members of the land community.

By harmonising agricultural activity with nature and their community, humankind would be able to sustain its long term existence on earth.

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Scheduled Waste Management

Proper waste management is a fundamental need especially in countries with modern production and consumption patterns. It is envisaged that by 2020, 80% of our population will be living in urban areas. With this growth, waste management will emerge as a major problem requiring urgent attention.

Waste itself can be broadly classified into hazardous or scheduled wastes and solid wastes. In 2006, the Department of Environment (DOE) was notified that slightly more than one million metric tones of scheduled wastes were generated. This included e-waste (electrical and electronic waste), a new category of scheduled waste in the 2005 Scheduled Wastes Regulations. About 45% of the total quantity of scheduled waste generated is treated on-site within the premises of waste generators. Less than 30% are being recycled and the remaining is treated off-site or finally disposed off at disposal sites licensed by the DOE.

The DOE encourages industries to reduce, reuse and recycle waste. Various facilities have been approved for management of scheduled wastes. These include 211 licensed waste transporters, 76 recovery facilities (non e-waste), 7 full recovery e-waste facilities, 85 partial recovery e-waste facilities, 35 on-site incinerators, 3 clinical waste incinerators and 2 secured landfills.

As you are all aware, an integrated scheduled waste system has been in operation in the country since 1998. But the continued illegal dumping by waste generators is disturbing. Hence, there is a need for strict enforcement. Industries are required to comply with standards and regulations set by the government. To complement enforcement efforts, the Government has agreed to empower Members of Parliament and State Assemblymen to report on illegal disposal of scheduled wastes in their constituencies to enforcement authorities.

Towards this end, Malaysia is participating in the 'Environmentally Sound Management of Electronic Waste in Asia Pacific' project to develop the e-waste inventory. As a start, the project will target 7 types of consumer waste products namely computers, TV sets, air conditioners, mobile phones, refrigerators, washing machines and batteries. The consultant to this project will gather information through a questionnaire survey from 400 households, 400 business institutions and 400 recyclers including exporters/importers, collectors, second-hand shops, repair shops, dismantlers and processors of recyclable materials from used electrical and electronic equipment. In addition, leading handphone and computer manufacturers have been urged to intensify their 'take-back' programme for their used handphone batteries and computer components.

To further enhance knowledge and capacity building in scheduled waste management by waste generators and other relevant

Waste generation essentially means unwise use of resources, either upstream during extraction, production or processing, or downstream during use or consumption. Every unit of waste generated has a significant cost attached to it, including the direct cost of handling, treatment and disposal, indirect liability, and social and other costs. The traditional end-of-pipe approach to waste management is not tenable as pollution load would continue to grow, though at a lower rate with economic growth. The challenge is to have economic growth while decreasing pollution load. Pollution control is also increasingly expensive; hence it makes good economic sense for industries to reduce waste generation. Waste minimisation can be implemented through raw material and process change as well as reuse and recovery. This is part of the overall concept of cleaner technology that we are promoting. With technological developments and advancements in recent years, the cleaner technology concept can be easily implemented.

To further deter illegal disposal of scheduled wastes, the Environmental Quality Act 1974 was amended to impose mandatory jail sentence of not more than 5 years and a fine not exceeding RM500,000 for illegal dumping offences. This amendment has been approved by both houses of Parliament in 2004. Further, to keep top management accountable for the environmental performance of their companies, the Chief Executive Officers have been made liable for an offence committed by a corporate body in the latest amendment.

In tandem with international efforts, the Government will continue to focus on e-waste. However, to implement an environmentally sound e-waste management, the first challenge for the government is to have a complete inventory of e-wastes generated, treated, disposed off, quantities imported and exported as well as information on recovery/recycling activities within the country. A detailed inventory for all types of electrical and electronic equipment has still not been compiled.

parties including recyclers, DOE through the Environment Institute of Malaysia or E*i*MAS has conducted Certification Course for Scheduled Waste Managers. This is a 5-day course that includes field visits. Written and practical tests as well as interviews are conducted at the end of the course to assess competency of participants. A Certificate of Competency is issued to the successful candidates.

In conclusion, we will ensure that proper management of waste is enforced to meet the sustainable development goals as laid out in the National Environment Policy. In addition, research and development will be intensified to further support environmental management and sustainable use of the nation's rich resources.

Adapted from the paper presented by Dato' Hajah Rosnani Ibarahim, Director General, Department of Environment at the *Waste Management Conference and Exhibition 2007, Malaysia.*

E-waste Management

Electronic waste or e-waste is the most rapidly growing waste problem in the world. The black and white television has gone colour, a basic mobile phone functions as a camera, personal organiser and as a source of entertainment; a computer purchased this year may become obsolete the next year due to incompatibility with the latest software. Similarly, millions of diskette drivers became scrap overnight when the new USB mass storage device was invented. It is a known fact that as we continue to update and invent new products, the life of the old products gets shorter and shorter.

E-waste management is a concern not only because of the tremendous increase in quantity but also because it has grown in increasing complexity. E-wastes have reached crisis levels because of the toxic ingredients they contain such as lead, beryllium, mercury, cadmium, and brominated flame retardants. These are highly hazardous and pose both occupational and environmental health threats.

Today, e-waste is yet to be taken seriously by industries, governments and consumers of many countries mainly because its impacts on the public are not immediate unlike municipal solid wastes which affect our daily life. However, under the Basel Convention that was designed to control the movements of hazardous waste between nations, e-wastes are categorised as hazardous wastes and are presently under greater control.

What are E-wastes?

In Malaysia, e-wastes are generally defined as 'used' electrical and electronic assemblies categorised as scheduled wastes in the First Schedule of the Environmental Quality (Scheduled Wastes) Regulations 2005, administered by the Department of Environment (DOE). Under code SW 110, e-wastes are defined as wastes generated from the electrical and electronic assemblies containing components such as accumulators, mercury switches, glass from cathode-ray tubes and other activated glass or polychlorinated biphenyl-capacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated byphenyls. In layman terms, e-wastes cover a wide range of electrical and electronic products from as big as a refrigerator to as small as a calculator, alarm clock, electronic thermometer or laser pointer. Examples of e-wastes are the components of waste from but not limited to the appliances shown in Table 1.

E-waste Impact on Environment and Human Health

Basel Action Network (BAN) estimates that the 500 million computers in the world contain 2.87 billion kg of plastics, 716.7 million kg of lead and 286,700 kg of mercury. The average 14-inch monitor uses a tube that contains an estimated 2.5 to 4 kg of lead.

Disposal of e-wastes has emerged as a problem in many parts of the world. E-wastes that are landfilled produce highly contaminated leachate which eventually pollutes the environment especially surface water and groundwater. Acids and sludge obtained from melting computer chips, for example, if disposed into the ground will cause acidification of soil and subsequently contamination of groundwater. Similarly, when brominated flame retardant plastic or cadmium containing plastics are landfilled, both polybrominated diphenyl ethers (PBDE) and cadmium may leach into the soil and groundwater.

In addition, mercury will leach when certain electronic devices such as circuit breakers are destroyed, for example, the polychlorinated biphenyls (PCBs), which are highly hazardous on exposure. Not only does the leaching of mercury pose specific problems, the vaporisation of metallic mercury and dimethylene mercury from e-wastes is also a major concern.

Table 2: Effects of e-wastes constituents on health

Source of e-wastes	Constituents	Health Effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (Pb)	Damage to central and peripheral nervous systems, kidney and blood systems. Affects brain development of children.
Chip resistors and semi-conductors	Cadmium (Cd)	Irreversible toxic effects on human health.
Relays and switches, printed circuit boards	Mercury (Hg)	Accumulates in kidney and liver. Causes neural damage.
Corrosion protection of untreated and galvanised steel plates, decorator or hardener for steel housing	Hexavalent chromium (Cr VI)	Chronic damage to the brain. Respiratory and skin disorders due to bioaccumulation in fishes.
Cabling and computer housing	Plastics including PVC	Causes or aggravates asthma/bronchitis. DNA damage.
Plastic housing of electronic equipment and circuit boards	Brominated flame retardants (BFR)	Burning produces dioxin. It causes reproductive and developmental problems and immune system damage; interferes with regulatory hormones
Front panel of CRTs	Barium (Ba)	Disrupts endocrine system functions Short term exposure causes muscle weakness, damage to heart, liver and spleen.
Motherboard	Beryllium (Be)	Carcinogenic (lung cancer). Inhalation of fumes and dust causes chronic beryllium disease or beryllicosis and skin diseases such as warts.

Combustion of e-wastes will emit toxic fumes and gases that pollute the surrounding air. When e-wastes are exposed to fire, metals and other chemical substances,extremely toxic dioxins and furans will be emitted. The toxic fall-out from open air burning affects both the local environment and broader global air quality, depositing highly toxic byproducts in many places throughout the world.

Table 1: Examples of e-wastes

Television	Computer and Notebook
Photostat Machine	Printer & Other Computer Accessories
Facsimile Machine	Video Camera
Telephone / Cellphone	Digital / Other Camera
Stereo/Audio Device	Electronic Game Device
VCD/DVD Player	Oven/Microwave
Refrigerator	Vacuum Cleaner
Radio / Hi-Fi	Electrical Fan
Air Condition	Rice Cooker
Washing Machine	Iron

Table 2 summarises the health effects of certain constituents in e-wastes. If these e-wastes are discarded together with other household wastes, the toxic components will pose a threat to both health and the vital components of the ecosystem.

How is E-Waste Managed in Malaysia?

At present, there are generally two main categories of e-waste generators in Malaysia, that is, from the households (home appliances) and from business and production including industries (office appliances and industrial equipment etc). E-wastes which are categorised as scheduled wastes in Malaysia are required to be transported by licensed contractors and delivered to licensed recycling plants or disposed off in the centralised scheduled waste treatment and disposal facility in Bukit Nanas, Negeri Sembilan.

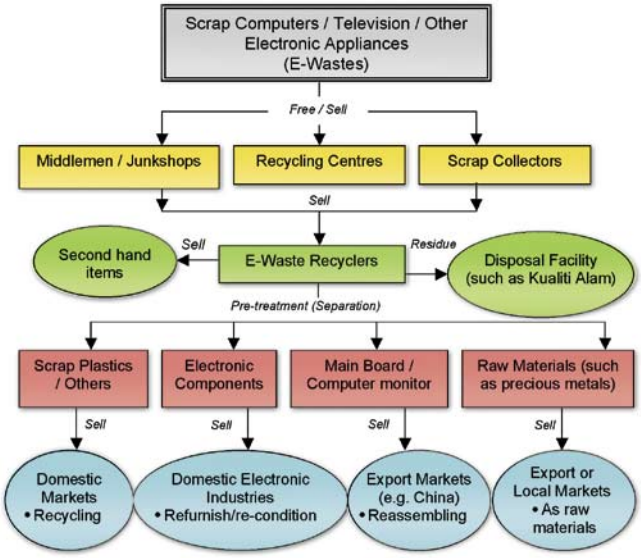

Figure 1: Material flow of e-wastes in Malaysia

A study conducted by Japan International Cooperation Agency (JICA) in 2005 found that the e-wastes generated in Malaysia are generally managed as illustrated in Figure 1.

As clearly indicated in Figure 1, the junkshops, recycling centres and scrap collectors play an important role in bridging the gap between the waste generators and recyclers, by collecting e-wastes generated from various sources and sending these to e-waste recyclers. Consequently, as part of environmental friendly practices, the e-waste generators should never mix and discard the e-wastes into their waste bins, but instead sell or give to dedicated collectors or middlemen for proper recycling.

There are currently 10 e-waste recycling categories licensed by DOE in Malaysia. These plants collect e-wastes from various middlemen, collectors and recycling centres. Besides recycling of normal recyclable materials such as plastics and metals, these recycling plants also extract precious metals such as gold, platinum, silver and lead from the circuit boards of the e-wastes.

Our Responsibilities in Proper E-Waste Management

In general, users of electrical and electronics appliances who could be individuals from households, organisations or business entities should take responsibility to ensure proper management of the end of life of the products that they have used. Some of the responsibilities are listed below.

Reduce and Reuse

The higher standard of living and purchasing power has resulted in many discarding functioning electrical and electronics appliances. 'Reduce and reuse' should be the priority compared to any other waste management option including recycling. Donating, giving away or selling usable electrical and electronics appliances to other people or secondhand shops will extend the lifespan of the products and keep them out of the waste management system for a longer time. Schools, non-profit organisations (NPOs), non-governmental organisations (NGOs), charity organisations and lower-income families are among the common receivers for second-hand electrical and electronics appliances.

Recycle

E-wastes should never be disposed off with other mixed wastes as well as other normal recyclable materials such as glasses, plastics and papers. They should be segregated and sold or given to dedicated collectors to ensure that they will reach the right destination for recycling by the licensed recyclers. Consumers can also take the option of delivering their e-wastes back to the manufacturers of the appliances. However, this applies only to certain manufacturers who have a committed policy towards the environment and have a 'take back' system for their products.

Be a Wise Consumer

While buying electronics and electrical appliances, the consumers should opt for those products that have the least toxic constituents, use recycled contents, are energy efficient, utilise minimal packaging and are designed for easy upgrading or dis-assembly. Priority should also be given to manufacturers of appliances that offer leasing or take back options for the e-wastes.

In addition, the quality of the electronics and electrical products should be emphasised because low quality products tend to have a shorter lifespan, becoming e-waste within a shorter period.

Conclusion

As the world of technology keeps progressing at an unprecedented rate, more and more diverse types of e-wastes will be discarded into the waste stream. Tremendous amounts of e-wastes will result in disastrous consequences if not managed properly because they contain highly hazardous substances that pose serious threats to human health and the environment as a whole.

Sample of products from e-waste recycling

On the other hand, e-wastes could be recycled for recovery of recyclable materials as well as precious metals such as gold and platinum which are valuable. Besides regulatory measures that regulate the overall e-waste management, effective recycling of e-wastes could be achieved with the cooperation and participation of the public. Environmentally sound practices on e-waste management operate mainly through practising 3R (reduce, reuse and recycle) in our daily life. With effective recycling of e-wastes, e-wastes could be regarded as valuable resources rather than sheer waste.

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Chemical Management in Malaysia: Some Issues and Initiatives

Chemical industries in Malaysia play an important role in the import and export of manufactured goods. The report of the Ministry of International Trade and Industry (2006) states that the chemical industry, which comprises three sub-sectors, i.e. petroleum and plastic products; basic industrial chemicals and chemical products; and pharmaceuticals contributed about RM 84.8 million (export) and RM 65.5 million (import) in value of manufactured goods in year 2006, respectively. Table 1 illustrates the import-export details while numbers employed as well as type of industries under the sub-sectors are shown in Table 2.

Chemicals play an important role in enhancing and improving the quality of our living condition. However, despite their benefits, chemicals also have the potential to pose adverse effects on human heath and the environment. The initial step in safe chemical use is to define and identify the hazards chemicals may pose to health and environment and classify them using an internationally agreed methodology. The ultimate goal of chemical management is to establish a sound Chemical Management System (CMS) that will enhance protection of human health and the environment, contributing to sustainable development.

Table 1: Imports-exports of the sub-sectors in the chemical industry

Sub-sector	Export (RM million)	Import (RM million)
Petroleum and plastic products	64,247.0	40,403.4
Basic industrial chemicals and chemical products	20,020.8	22,359.3
Pharmaceuticals	495.7	2,712.3
TOTAL	**84,763.5**	**65,475.0**

Initiatives

There are currently various initiatives at the global level that could facilitate the formation of CMS either at national, regional or international level, e.g. Globally Harmonised System of Classification and Labelling of Chemicals (GHS). For Malaysia, there are several initiatives that could accelerate the development of CMS. These initiatives are (i) GHS; (ii) Environmentally Hazardous Substances (EHS); (iii) Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment and Development (MyNICHE); and (iv) Life Cycle Analysis (LCA)

Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

The GHS was introduced in Programme Area B under Chapter 19 of Agenda 21 in the United Nations Conference of Environment and Development (UNCED) that was held in Rio de Janerio, Brazil, 1992. For the preparation of the GHS technical aspects, three focal points were established, namely the United Nations Economic and Social Council's Subcommittee of Experts on the GHS (UNSCEGHS) for the physical hazards; the Organisation for Economic Cooperation and Development (OECD) for the health and environmental hazards; and the International Labour Organisation (ILO) for hazard communication. With the culmination of more than a decade of work by multi-disciplinary experts, the GHS was adopted in 2002 by the UNSCEGHS and endorsed by the United Nations Economic and Social Council (ECOSOC) in July 2003. The GHS has the ultimate goal of providing a comprehensive and universal tool for chemical classification and hazard communication, and to make this available for workers, consumers and public. The GHS is the basis of CMS (Figure 1), and the GHS is a logical and comprehensive approach for (i) defining hazards of chemicals; (ii) applying hazard criteria using an agreed methodology to classify chemicals; and (iii) communicating hazard information on labels and Safety Data Sheets (SDS) (UNITAR 2006). It is anticipated that when implemented, GHS will

(i) enhance the protection of human health and the environment by providing an internationally comprehensible system for hazard communication;
(ii) provide a recognised framework for those countries without an existing system;
(iii) reduce the need for testing and evaluation of chemicals; and
(iv) facilitate international trade in chemicals whose hazards have been properly assessed and identified on an international basis.

(United Nations 2005)

Responsibility for maintenance, updating and promoting of the GHS at international level rests with the UNSCEGHS whereas the UN Economic Commission for Europe (UNECE) provides the Secretariat functions. The second revised edition of the GHS document (also known as the purple book) is available at the UNECE website.

Table 2: Number employed and type of industries in the chemical industry

Sub-sector	Petroleum and plastic products	Basic industrial chemicals and chemical products	Pharmaceuticals
Number employed	94,746	27,336	7,336
Type of industries	• Petroleum products • Synthetic resin • Plastic products	• Organic chemicals • Chemical materials and products • Inorganic chemicals • Fertilisers • Soaps, cleaning preparations and toiletries • Dyeing, tanning and colouring materials	• Pharmaceuticals

As far as GHS is concerned, its implementation will affect various sectors, particularly the four key sectors of industrial workplace, agriculture, transport and consumer products. Since GHS implementation involves various sectors and cross-sectoral issues, the formation of a National Coordinating Committee on the Implementation of GHS (NCC-GHS) is essential to facilitate activities related to GHS implementation. On 17 January 2006, the Ministry of International Trade and Industry (MITI) chaired the meeting on the proposal for the establishment of NCC-GHS. During the meeting, members nominated MITI as the coordinator, serving a national focal point for the GHS implementation and also as the secretariat for the NCC-GHS. In-line with this, MITI hosted the First NCC-GHS on 3 August 2006 and identified the lead agencies for the key sectors (Table 3). In addition, Terms of Reference (TOR) for the NCC-GHS was finalised during the First NCC-GHS.

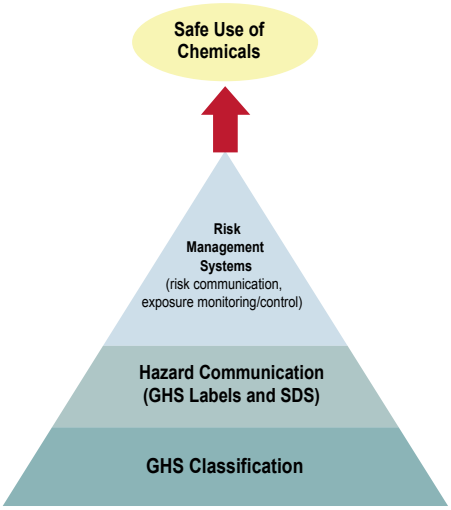

Figure 1: GHS as the basis for Chemical Management Systems (CMS) (Source: UNITAR 2005)

The Second NCC-GHS was held on 12 December 2006 and all the lead agencies faithfully updated their progress on the GHS implementation in their respective sectors. The Institute for

Environment and Development (LESTARI), Universiti Kebangsaan Malaysia (UKM) proposed that a GHS implementation roadmap be prepared for each of the four key sectors during the NCC-GHS.

For GHS capacity building, several officers from DOSH, Chemical Industries Council of Malaysia (CICM) and SIRIM had participated in the 'GHS Expert Dispatch Programme' initiated by Japan through collaboration between the Federation of Malaysian Manufacturers (FMM) and Japan External Trade Organisation (JETRO). There are four types of training courses under this programme, i.e. GHS primary course (1 day), GHS intermediate course (2 days), GHS advanced course (5 days) and finally GHS instructor training course (2 weeks). Participants to the GHS instructor course are required to have successfully completed the GHS advanced course. Currently, there are 8 persons from Malaysia who have completed the GHS instructor training courses, that is, 2 from DOSH, 3 from industry, 2 from SIRIM and 1 from LESTARI.

Table 3: Lead agencies : GHS implementation strategy

Key sectors	Lead agency
Industrial workplace	Department of Occupational Safety and Health (DOSH), Ministry of Human Resource (MOHR)
Agriculture	Pesticides Board (PB), Department of Agriculture, Ministry of Agriculture and Agro-based Industry
Transport	Ministry of Transport (MOT)
Consumer Products	Ministry of Domestic Trade and Consumer Affairs (MDTCA)

Environmentally Hazardous Substances (EHS)

Danish environmental assistance to Malaysia was initiated as part of the Environment and Disaster Relief Facility (EDRF) in 1994. In the first phase of cooperation (1994 – 1998), the activities carried out were based on mutual agreements on proposed project activities. Subsequently, the Second Country Programme (1999 – 2001) was launched on the basis of mutually agreed priorities as stated in the 7th Malaysian Plan and the Strategy for Danish Environmental Assistance.

The current phase of the environmental assistance to Malaysia is the Environmental Cooperation Programme (ECP), 2003 - 2006 that was agreed upon between the Economic Planning Unit (EPU) of the Prime Minister's Department, Malaysia and the Danish Ministry of Foreign Affairs (DANIDA), in 2002 focusing on the following thematic areas:

i) Environmental Planning and Strategy (EPS);
ii) Renewable Energy and Energy Efficiency (RE&EE);
iii) Solid Waste Management (SWM);
iv) Environmental Hazardous Substances (EHS)
v) Biodiversity (BioD)

The EHS component under the ECP is led by the Ministry of Natural Resources and Environment (NRE), and the Department of Environment (DOE) was selected as the implementing agency. There are three sub-components under the EHS, i.e. (i) Strategic and Action Plan for EHS; (ii) Notification System, Chemical Registers and Risk Assessment of EHS; and (iii) Capacity Building in Chemical Management.

Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment and Development (MyNICHE)

MyNICHE was jointly organised by LESTARI, UKM and Conservation and Environmental Management Division (CEMD), Ministry of Natural Resources and Environment (NRE), Malaysia (Mazlin *et al.* 2005). Established to initiate a network for communication and collaboration for an integrated approach to chemical management in Malaysia, MyNICHE aims to protect human health and the environment in tandem with strategies for sustainable development. The first Round Table Dialogue (RTD) for MyNICHE was held on 16 June 2005 at LESTARI-UKM where representatives from the government, research institutions, academia and other stakeholders were invited to discuss and consider the proposed MyNICHE network. The RTD relates well to the spirit of environmental sustainability, which is about ensuring continuous economic growth and industrial development while protecting eco-systems and resources through wise utilisation.

MyNICHE promotes an integrated and holistic approach in six important areas, namely: (a) Policy and Institutional, (b) Transport Movement & Storage, (c) Trade and Economy of Chemical and Hazardous Substances, (d) Cleaner Technology, Wastes Recovery & Remediation, (e) Integrated Chemical Information System & Inventories, and (f) Chemical Risk Management.

Life Cycle Assessment (LCA)

LCA is a technique for assessing the environmental aspects and potential impacts associated with a product, by compiling an inventory of relevant inputs and outputs of a product system; evaluating the potential environmental impacts associated with those inputs and outputs; and interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives of the study. The National Life Cycle Assessment project is one of the projects under the RMK-9, and its aim is to develop the National Life Cycle Inventory Database (LCI). The National LCA is implemented by SIRIM and the Conservation and Environment Division (CEMD) under the NRE which serves as the executive agency. Specific objectives of the National LCA are to

(i) develop the national LCI;
(ii) develop a critical mass of local LCA practitioners;
(iii) develop ecolabelling criteria documents for the National Ecolabelling Programme; and
(iv) create awareness among industry and consumer groups on the importance of LCA in today's manufacturing and procurement practice.

The various sectors under the National LCA project are the agro-industry sector, electrical and electronics sector, chemical sector and heavy industry sector. These sectors are led by different agencies and universities such as the Malaysian Palm Oil Board (MPOB), Chemical Institute of Malaysia, UKM and UPM.

Conclusion

To develop a sound CMS in Malaysia, there are number of on-going initiatives that could be utilised. Besides, several Malaysia sectorial directives such as the National Policy on the Environment, the Third Industrial Master Plan (2006-2020) and the Third National Agriculture Policy are also essential for the development of a sound CMS in Malaysia. However, the level of awareness among government, industry and civil society on the issue of chemical management is still lacking. Clearly, capacity building and education should be enhanced in order to establish a sound CMS in Malaysia.

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Event Highlights

Department of Environment, Malaysia

November 2007

ASEAN Plus Three Seminar on Promotion of Environmentally Sound Technologies and Cleaner Production

ASEAN Plus Three Seminar on Promotion of Environmentally Sound Technologies (EST) and Cleaner Production (CP) was held in Kuala Lumpur, Malaysia from 27 – 28 November 2007. Organised by the Department of Environment, Malaysia, the Seminar was attended by 81 participants from Indonesia, Lao PDR, Malaysia, Singapore, Thailand, Vietnam, People's Republic of China, Republic of Korea and ASEAN Secretariat.

The Seminar aimed:

i. To promote the concept as well as enhance EST and CP awareness to industries particularly at the national level and generally at the ASEAN region and also to update members on the latest technologies on preventing, controlling and reducing pollution load;
ii. To discuss role and responsibilities of the multi-stakeholders in promoting EST and CP concepts;
iii. To share information and experience on the implementation and promotion of EST and CP programmes in the ASEAN Plus Three Countries; and
iv. To discuss and evaluate the various technical options and the required financial mechanisms to assist industries in implementing EST and CP.

The seminar also saw paper presentations by various agencies on EST and CP and technical visits to electronic and food processing factories.

March 2008

Regional Workshop on Phasing Out CFC-Based Metered Dose Inhaler (MDI)

The Regional Workshop on Phasing Out CFC-Based Metered Dose Inhaler (MDI) was organised by the United Nations Environment Programme (UNEP) in collaboration with National Ozone Unit, Department of Environment, Ministry of Natural Resources and Environment. A total of 97 participants from 22 countries attended this workshop held at Holiday Villa Beach Resort & Spa Pulau Langkawi, Kedah from 13 – 15 March 2008. Representatives from several non-governmental organisations (NGOs), industries and media were also present.

A major goal of this workshop was to discuss the direction and planning for a CFC MDI transition strategy. Participants to the workshop had been appraised by a study carried out by WHO which found that 90% of deaths emanating from asthma and respiratory diseases occurred in low and middle income countries. In line with this finding, the phase out of CFC MDI needs to be expedited and parties involved in managing the programme were required to undertake programmes involving major players such as medical associations, industries, pharmacists and chemists, medical doctors, pricing regulators and regulatory bodies, government, media and patients.

Joint Meeting of the SA – SEAP Network of ODS Officers

The Joint Meeting of the SA-SEAP Network of ODS Officers was organised by United Nations Environment Programme (UNEP). A total of 70 participants from 24 countries including Malaysia and representatives from NGOs and media attended the meeting which was held at Holiday Villa Beach Resort & Spa Pulau Langkawi, Kedah from 17 – 19 March 2008. This meeting was called for further discussions on the direction of the HCFC phase-out programme.

Essentially, participants wanted the executive committee to state clearly the policy and alternative technologies or alternative products to replace the HCFC. It was suggested that pilot projects and demonstration projects would serve a useful function for implementation of HCFC alternative technologies. It was also decided that awareness-related activities be continued. The meeting also proposed that carbon emissions be reduced by controlling air conditioning temperature, planting trees and using energy efficient lighting.

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