

Municipal Solid Waste Management – What Is Happening in Other Countries?

June, 2007
Volume 9, Issue 6

PENANG
ECONOMIC
MONTHLY

In This Issue

Municipal Solid Waste Management – What Is Happening in Other Countries?	1
The Social Economic Costs of Flood: A case of the Johor Floods During North-East Monsoon 2006/2007	7
International Headlines	16

Socio-economic & Environmental Research Institute

10 Brown Road,
10350 Penang, Malaysia
Phone: 604-2283306
Fax: 604-2267042
Email: saripg@tm.net.my
Website: <http://www.seri.com.my>

Introduction

Municipal solid wastes, include all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris. Wastes with potential hazardous characteristics are treated separate from the general wastes.

Waste management strategies are characterised by the hierarchy of objectives to reduce the use and to make resources last as long as possible before the need for disposal, reuse materials and recover materials through recycling and incineration and landfill are at the bottom of this hierarchy. A guiding principle to environmental improvement is to rely as little on incineration and landfill to dispose of waste to reduce emissions from these sources.

Waste Management Options

Re-Use

There are pro's and con's in some of the waste management methods. For example, when it comes to re-use, say, of glass bottles, studies have found that more energy is required than the initial energy used in their manufacture. The energy goes into the processes where bottles must be cleaned and properly sterilized.

Recycling

Recycling is only successful when there are incentives or when there is benefit to be reaped. As such, the government may have to impose direct regulations to compel the manufacturers to use recycled product in the content of the goods. E.g., in the US, the Mercury-Containing and Rechargeable Battery Management Act was enacted in 1996. The Battery Act represents a major step forward in the effort to facilitate the recycling of nickel-cadmium (Ni-Cd) and certain small sealed lead-acid (SSLA) rechargeable batteries and to phase out the use of mercury in batteries. In Taiwan, 18 recyclables (including, PET bottles, tyres, iron cans, aluminium, mercury batteries, pesticide containers, lead batteries, medical containers, foam plastic containers, lubrication oil etc.) are regulated through the introduction of the Regulatory Plan for General Waste Recycling¹. From a policy perspective, it has been argued that recycling may not be the best practicable environmental option (BPEO) in cases where the markets for the recycled items are uncertain or transport distances consume too much fuel.

¹ H.Edward English & David Runnalls, 1997, "Environment and Development in the Pacific – Problems and Policy Options". Ch. 9, Environmental Policies and Waste Disposal in Taiwan, by Chung-Huang Huang. Published by Addison-Wesley.

Composting

Composting resembles the natural way of breaking down on organic matters such as food waste and garden waste. In nature, micro-organisms act on the organic matters. This natural decaying process is composting and the end product is the compost, which can be recycled for further growing of plants. Since home made compost is the best fertilizer and soil conditioner in organic farming, whenever possible, food waste and green waste are used for composting instead of sending them to the landfill.

Studies have reported that solid wastes of many developing countries would be very suitable for composting as they contain a much higher content of organic material than developed countries. Composting systems can be operated in various scales known as backyard, neighbourhood and large-scale centralized composting.

The composting more often being carried out is the backyard composting. However, many centralized mechanical solid waste composting plants in the big Asian cities are not functioning effectively or are closed down due to lack of market for the compost and poor operation and maintenance of the facilities.

Incineration

Incineration is a high-temperature dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and results in a very significant reduction of waste volume and weight. This process is usually selected to treat wastes that cannot be recycled, reused, or disposed of in a landfill site. Air emissions from incineration are the key concerns.

Even for medical waste where incineration used to be the method of choice, alternative treatment methods are being developed and they are fast becoming increasingly popular². Incineration is a source of greenhouse gases and toxic chemicals (e.g., dioxins and heavy metals – lead, mercury etc.).

Recovery

It could be a case of raw materials being recovered from waste to develop new products with different uses. In Hong Kong, the recovery option is associated with recovery of energy from waste and the feasibility study was dropped because of the lack of support from the community and other interest groups. In Taiwan, waste-to-energy projects are used to dispose of waste tyres. However, EU has maintained a strategic guideline that preference should in general be given to the recovery of material over energy recovery³.

Landfill

Landfill sites are a possible source of volatile organic chemicals (VOCs) and they also produce large quantities of methane gas and contaminated leachate. The toxic chemicals must be managed so that pollutants do not seep into groundwater and should therefore be kept dry, but this slows down the rate of decomposition.

²As far as medical waste are concerned, the types which are not to be incinerated include: pressurized gas containers, large amounts of reactive chemical waste, silver salts and photographic or radiographic wastes, halogenated plastics such as polyvinyl chloride (PVC), waste with high mercury or cadmium content, used batteries, lead-lined wooden panels & sealed ampoules or ampoules containing heavy metals etc.

³European Topic Centre on Waste and Material Flows, Topic Centre of European Environment Agency, reference made to 1996 Review of the Community Strategy for Waste Management <http://waste.eionet.eu.int/activities/0000091.html>

Issues

The following are some of the more critical issues in municipal solid waste management:

- i) The need to resolve solid waste problems is fast becoming a challenge because of land scarcity and population growth;
- ii) Waste disposal facility can be a financial burden to the government due to its high running cost to provide the service;
- iii) NIMBY or “not in my backyard” syndrome is of particular concern given the fast pace of urbanisation;
- iv) With the International Convention on Persistent Organic Pollutants (POPs) which limits the emission of 12 substances⁴ including dioxins/furans, incineration technology will not be a preferred waste management option;
- v) Despite the various available disposal options, there are wastes which pose distinct disadvantages when it comes to disposal. Tyres, for example, are resilience and indestructible in nature and they are virtually non-degradable and spread noxious fumes when burnt⁵.



Waste Management Under Agenda 21

There are potential problems with improper solid wastes management. It is not easy to find an acceptable solution. In 1992, under Agenda 21 adopted at the United Nations Conference on the Environment and Development (UNCED), recommendations were made on a set of measures for waste management.

They are summarized as follows:

- Prevent and minimize waste production;
- Reuse or recycle the waste to the extent possible;
- Treat waste by safe and environmentally sound methods;
- Dispose of the final residues by landfill in confined and carefully designed sites.

It should be noted that the focus was on landfill and not incineration. Agenda 21 also emphasized that waste producer is responsible for the treatment and final disposal of waste, and where possible, each community should dispose of its waste within its own boundaries.

⁴ The 12 substances included in POPs are highly toxic, causing an array of adverse effects, notably death, disease, and birth defects, among humans and animals. Specific effects can include cancer, allergies and hypersensitivity, damage to the central and peripheral nervous systems, reproductive disorders, and disruption of the immune system. These highly stable compounds can last for years or decades before breaking down. POPs released in one part of the world can, through a repeated and often seasonal process of evaporation, deposit, evaporation, deposit, be transported through the atmosphere to regions far away from the original source.

⁵ The European Commission (a committee of experts) has proposed a ban on land filling both whole and shredded tyres since 2000. “Solid Wastes and Sewage - Waste Disposal and Reduction”
<http://earthwatch.unep.net/solidwaste/wastedisposal.html>

Australia

Australia has set a policy on waste management and it was guided by a national target to reduce waste going to landfill by 50% in 2000, measured in per capita weight terms. Waste minimization and recycling schemes are available to most of Australia's population. More recently, the governments have gone beyond the focus on recycling and steered towards waste minimization to improve current levels of consumption and resource use. The Industry Commission conducted an inquiry into the packaging and labelling in Australia, with specific terms of reference addressing the environmental implications and costs of current practices⁶. In some cities, special arrangements have been made for white goods to be collected once a week on a given day. The same goes for green waste and the community can plan ahead when to chop down the trees or branches and have them turned into wood chip by the mobile truck.

Taiwan

The Waste Disposal Act, implemented in 1991, prescribes that the implementing agency shall collect fees from the residents in the areas designated for clean-up. The proxy for the calculation of charges was based on water consumption⁷. It is considered improper to use water consumption as the tax base as reduction in household waste would not be reflected in a lesser volume of water consumed. Also, the charges levied only account for 30% of the average waste disposal cost. Hence, this is a case of under pricing. However, revenues collected from the refuse disposal fees are used to make municipal solid waste management in Taiwan safer and more efficient, thus upgrading people's living standards. This sets the trend for other pollution charges in Taiwan.

An observation made from the Taiwan's waste management experience is that the reported recovery rate of the regulated recyclables has exceeded the mandatory rates in most cases. A question was raised on whether it was a false reporting by the manufacturers if consumers have not been adequately informed of their responsibilities towards recycling⁸.

United Kingdom

Waste management in UK was covered in the 1995 White Paper, "Making Waste Work". The Paper identified the following targets: to recycle 25% of household waste by 2000, and, to recover value from 40% of municipal waste by 2005. However, it was then revealed that only 7.5% of household waste was recycled in 1996/97 and concluded that the 25% target was unlikely to be met⁹. In the same year, the Environment Act (1995) requires the Government to prepare a statutory waste strategy for England and Wales "as soon as possible".

In terms of waste management, about 80% of the MSW is disposed of in landfills and only 6-8% is incinerated. This pattern of waste disposal is expected to continue because incineration is deemed as extremely unpopular¹⁰. Recycling and composting of wastes made up less than one-tenth of the municipal waste generated¹¹. However, Britain is committed to comply with the EU's target on biodegradable waste reduction. This means that Britain has to allow for 60% of household wastes to be recycled. For the period up to 2005, the Government has set aside funds to encourage recycling to meet its target rate of 25% by 2005.

⁶ See "Australia's National Report for the United Nations Commission on Sustainable Development on the Implementation of Agenda 21". Canberra:1996. p.10, <http://iisd.ca/susprod/displaydetails.asp?id=65>

⁷ The fee levied for trash disposal resulted in an increase of water charges by around 20% (e.g., Taipei City and Kaoh Siung City, the monthly tap water fees increase by 24% and 20% respectively). Source: <http://iisd.ca/susprod/displaydetails.asp?id=104>

⁸ Table 9.1 of H. Edward English & David Runnalls, 1997, "Environment and Development in the Pacific – Problems and Policy Options". Ch. 9, Environmental Policies and Waste Disposal in Taiwan, by Chung-Huang Huang. Published by Addison-Wesley.

⁹ ENDS Report, June 1998, p.41 on UK Policy.

¹⁰ The Economist, article entitled, "Waste Disposal – More Rubbish", p. 43, issue August 24-30, 2002

¹¹ Within the EU, Germany shows the highest rate of recycling/composting (47%), Australia 44%, the Netherlands 42%, Sweden 35%, Finland 32%, Denmark 30%, Spain 20%, The Economist, article entitled, "Waste Disposal – More Rubbish", p. 43, issue August 24-30, 2002.

United States

In US, the Mercury-Containing and Rechargeable Battery Management Act (the Battery Act) was enacted in 1996. This Act represents a major step forward in the effort to facilitate the recycling of nickel-cadmium (Ni-Cd) and certain small sealed lead-acid (SSLA) rechargeable batteries and to phase out the use of mercury in batteries.

Since 1997, the government has made it a financial responsibility of all owners and operators, including local governments (only State and Federal landfills are exempt) of municipal solid waste landfills to bear the costs associated with their solid waste landfills closure, post-closure care, and (if applicable) corrective action for known releases. These requirements have been established on a national basis by the U.S. Environmental Protection Agency.

Hong Kong

Hong Kong is not unique in the production of wastes. As the economy grows, more wastes are being generated. In terms of waste load per capita, the level of domestic waste has risen from 0.95 kg per person per day in 1990 to 1.11 kg/person per day in 2002.

Landfill is the current disposal option for all MSW in Hong Kong¹². There are certain activities resulting in by-products currently disposed of at the landfill sites, e.g., ash from burning waste and de-watered sludge from wastewater treatment works. However, a significant amount of construction and demolition waste (from construction, renovation, demolition, land excavation and road works) is also sent to the landfill sites¹³. As for construction waste is concerned, it places a burden on landfills. In 2000, the industry generated about 38,000 tonnes of waste per day, out of which 7,500 tonnes ended up in landfills and the rest was used for reclamation¹⁴. Construction waste accounts for about 38% of the total waste disposed of at landfills. In Hong Kong, it costs HK\$125 per tonne to build and operate landfills. According to the Environmental Protection Department, some 7.7 million tonnes were land filled in 2002. This meant that the total capital and operating cost spent since the commissioning of the landfills was HK\$9 billion.

At present, Hong Kong recycled about 35 percent of its municipal waste (mostly commercial and industrial waste) and the government has indicated that this quantity would be increased to about 60% by 2007.

EPD has made known to the public that Hong Kong is running out of landfill space far earlier than expected. The remaining landfill space will last only for 10 to 15 years if waste levels continue to increase at current levels.

As for economic-based incentives, the government has yet to introduce the polluter-pays principle to impose direct charges for household waste. Households have yet to make a fuller contribution to source separation for recycling. In general, the producer's responsibility model is not being utilised to its optimum. It is only in the recent period that collection facilities are made available for three categories of recyclables (aluminium cans, papers and plastic bottles). It should be possible to extend producer responsibility to new waste streams. Measures may also be taken to enhance the markets for recycled materials.



¹²EPD is the authority for landfill management in Hong Kong. These strategic landfills currently in operation are constructed to meet the most stringent standards. They are subject to stringent environmental and engineering controls. A 3-tiered monitoring system has been set up by EPD and they include: i) sampling and testing by laboratories; ii) review of monitoring results by professional engineers and scientists jointly appointed by the government and the landfill constructors; and iii) audit of monitoring work by inspectors.

¹³According to EPD, the quantity may fluctuate depending on how many reclamation sites can take the waste for fill, the willingness of industry to separate waste on site and the number of construction projects underway.

¹⁴The Waste Reduction Task Force for the Construction Industry has set a target to reduce the quantity to 6,000 tonnes per day by 2004.

Environmentally Sound Waste Management - The Way Forward

As in any decision making process, ultimately, trade-offs have to be made. In this case, the trade-offs would be between a large number of factors, e.g., costs, energy consumption, transportation, greenhouse gas production and other pollutants including toxic by-products. The option which is case specific will be subject to financial and engineering feasibility studies as well as environmental and health impact assessments¹⁵. Health impact assessment which enables the identification, prediction and evaluation of changes in health risk should be employed.

At this point in time when climate change and extreme weather conditions are high on the agenda of world leaders, it is apt to draw on the concept of sustainable development. Sustainable development has to encompass improvements in quality of life and wellbeing. In the long term, environmentally sound waste management should not be limited to the safe disposal or recovery of wastes. It should address the root cause of the problem, i.e., it should change our unsustainable patterns of production and consumption¹⁶. ~ **Yee Lai Wan**



¹⁵ Health and environment will be considered along with infrastructure requirements, options available for final disposal, operation and maintenance considerations, available space, location and surroundings of the treatment site and disposal facility, investment and operating costs, public acceptability, and regulatory requirements etc.

¹⁶ <http://earthwatch.unep.net/solidwaste/wastedisposal.html>

The Social Economic Costs of Flood: A case of the Johor Floods During North-East Monsoon 2006/2007¹

Introduction

The first wave of the flood occurred in December 2006. Much of Johor Baru was hit on the 20th. Kluang was flooded on the 22nd and Segamat, Kota Tinggi and Pontian were all inundated with floodwater on the 24th December. Flooding in Mersing was only reported a week later, i.e., 27th December, whereas Muar was the last to experience the first wave of the floods. There was a lapse of several weeks before the second wave of flood arrived. The flood first hit Batu Pahat only on 1st January 2007. By 13th January, Johor Baru was affected by the second wave of flood. Other towns were also flooded each consecutive day, i.e., Kluang on the 14th, Muar and Segamat on the 15th, followed by Kota Tinggi, Pontian and Mersing on the 16th January. Batu Pahat was the last town to be affected in the second wave, i.e., 22nd January.



Much of the southern states in the country suffered flood damage during the north-east monsoon 2006/2007. This paper is an attempt to study only the Johor state and it will only present an assessment of the socio-economic costs of flood damage. The havoc caused by the floods in Johor and other southern states were brought into all our homes through the media. There was extensive coverage throughout the flood and attention was drawn to the disruption it caused to people's livelihood and also the hazards it posed. Reports on damages have been assessed. However, they are more on the direct tangible losses whereas in this socio-economic study, consideration will be given to losses which cannot be readily quantifiable in addition to losses where market price are readily available.

The information on the flood impact will be applied in flood management decision making. The aim is to reduce the risk of flood damage which include hazard to life, properties and the built and natural environment. As far as flood damage is concerned, losses which have been reported are mainly pertaining to direct tangible losses and flood mitigation costs². Some indirect tangible costs such as flood relief efforts and expenses on alternative housing to provide shelter have been documented, but, estimates on the intangibles, e.g., health impact and environmental losses including destruction to heritage are often neglected. The problem is not only the lack of data, but also the absence of methodology which economists could agree upon. Different valuation techniques used will provide different values because the contingent valuation technique involves public putting economic value to the subject matter in question. It is hope that in future, the problem will be addressed when more research on socio-economic aspects of flood management is being conducted on a wider perspective.

Literature about Flood Damage

Flood is an extreme weather condition and the World Federation of Scientists' Permanent Monitoring Panel on Floods and Extreme Weather Events considers its impacts as being significantly greater than drought. This is because floods are suddenly occurring events that require almost immediate mobilization of resources to combat their severe effects.

¹ This paper was presented in the "National Seminar on Socio-Economic Impacts of Extreme Weather and Climate Changes", 21-22 June 2007, Putrajaya, organized & hosted by Ministry of Science, Technology and Innovation

² NST 30/01/2007 Govt incurs RM1.5b flood bill; and, TNB reports RM80m losses in Johor (Main Section); HOLISTIK, 1 Feb., 2007

Flood damage refers to a variety of harm caused by flooding and it encompasses a wide range of harmful effects on humans (including fatalities), on properties and public infrastructure or utilities, and on cultural heritage, the ecological systems, farm and/or industrial production, and the competitive strength of the economy (Messner & Meyer, 2005).

It is common to find in most literature, the damage from flood is divided into two main categories: i) those that can be assessed in monetary terms (tangibles) (Anal, Haktanir and Yurtal, 1999), and, ii) the intangibles (i.e., they cannot be readily valued but can be described in qualitative or quantitative terms) (Nguyen Ngov Huan, ___; and, Scottish Government, 2005). The latter would include, for example, damage to heritage sites or places of environmental and/or scientific interest. Since these places possess unique attributes, they are of considerable value to the society. They must be taken into account in an impact assessment or else the flood damage computed underestimates the true value.

Traditionally, flood protection has been an engineering-oriented approach, e.g., hydraulic engineering in drainage and flood controls. In more recent years, there has been a paradigm shift towards flood risk management (Messner & Meyer, 2005). Risk is weighed against probability in the flood damage analysis. The probability is the likelihood or the chance of an event happening. The flood damage analysis methodology is based on benefits and costs of different flood risks. There are advantages with such an approach. The technique applied takes into consideration the externalities and observed price distortions. One of the better-known valuation techniques is willingness-to-pay (Tietenberg, 1999). Researchers some times include questions on willingness-to-accept to assess the gap in the answers. Unfortunately, for this paper on socio-economic cost of the Johor floods, the proper valuation techniques were not applied since data required for were not available. However, it does not mean that studies based on an interdisciplinary approach to flood management are given less significance.

Estimating the Cost of Flooding

The approach used in this socio-economic cost analysis is one of ex-post, i.e., it measures all the economic impact arising from the floods. Any flood mitigation measures put in place before the incidence will not be accounted for. The types of losses from flood damage are divided into three main categories:

- i) Direct tangible losses;
- ii) Indirect tangible losses;
- iii) Intangible losses;

i) Direct Tangible Losses

These are losses that arise from the destruction or damage to assets/properties, for example:

- Damage to private or public buildings; residential, commercial, office premises or industrial;
- Damage to furniture and fittings, machinery, equipment, retail stock or any products with commercial value;
- Damage to infrastructure: roads, railway lines, telecommunications, sewerage systems; electricity generation or distribution lines;
- Damage to motorized or non motorized vehicles;

ii) Indirect Tangible Losses

They are losses incurred as a consequence of the flood event but they are not necessarily directly related to the physical damage that has occurred. These costs include:

- Cost incurred by emergency service in responding to the flood;
- Recruitment of additional staff to manage the flood situation;
- Emergency assistance to flood victims;
- Provision of temporary alternative accommodation or shelter to flood victims or those involved in rescue effort;
- Any financial losses incurred due to disruption to business activities;

iii) Intangible Losses

Losses other than direct tangible losses and indirect tangible losses will be categorized under this category. They cannot be readily quantified because market value is absent.

E.g.,

- Loss of life;
- Personal injury sustained;
- Effects on health; physical or mental stress;
- Additional medical cost associated with the flood event;
- Disruption to schooling;
- Loss of heritage values;
- Environmental losses;
- Loss of personal collection which are non replaceable;



How to Quantify or Estimate the Losses?

Direct tangible losses are most easily estimated because market prices are available. For example, in estimating the damage to buildings, one has to first identify the total number of properties affected by the flood. The next will be to assess the degree of damage for each and every one. The extent of the damage is expected to vary from one property to another. When the flood water does not get inside the building, the damage is referred to as outbuildings or exterior damage.

Over floor flooding or flooding inside the premise is deemed more serious compared to outbuildings damage. The depth of flooding will vary from zone to zone. Yet, in the literature available, over floor flooding is considered relatively minor unless the properties are situated within flood prone areas.

The hazard or safety risk is determined by the depth and velocity (speed and force) of the flood water. The flood victims are subject to high risk if water is flowing at a certain depth and velocity. The perceived threat or safety concerns will be categorized as intangible losses. It is not uncommon to find literature making the assertion that there is no agreed method for estimating all the losses, in particular, intangible losses, despite attempts made by some researchers who demonstrated the different methods used to quantify intangibles. Whatever the criticisms may be, the single objective in employing the different methods to account for the intangibles is, to improve on the estimates of flood damage beyond the outcome obtained by summation of only the tangibles. At this stage, it can be said that more scientific research is required to refine the methodology for quantifying intangibles to take account of the full impact of flood damage.

Case Study of Flood Damage - Data Pertaining to Johor

Tables 1 and 2 present a summary of the estimated costs of the Johor floods during the North-east Monsoon 2006/2007. The data and information are obtained from published sources. As such, the data available tend to reflect only direct and indirect tangible losses. Even in instances where intangible losses are being described, they do not go far enough to reveal the monetary values. The omission is probably the result of no valuation being conducted.

Table 1: Socio-economic data for the first wave of flood, December, 2006

	Date	No. of victims	No. of families	No. of relief centres	No. of fatalities
Batu Pahat	29/12/2006	29,981	6,663	82	3
Johor Baru	20/12/2006	7,838	1,144	30	0
Kluang	22/12/2006	9,873	2,333	38	0
Kota Tinggi	24/12/2006	12,496	2,357	76	0
Mersing	27/12/2006	780	168	7	0
Muar	29/12/2006	22,456	4,837	59	1
Pontian	22/12/2006	3,790	837	26	0
Segamat	24/12/2006	9,382	2,022	59	0
Total		96,596	20,361	377	4

Source: adapted from HOLISTIK, back cover page, Bil 002, 1 Feb., 2007 by Unit Media & Komunikasi (Medkom), Johor State Government

Table 2: Socio-economic data for the second wave of flood, January, 2007

	Date	No. of victims	No. of families	No. of relief centres	No. of fatalities
Batu Pahat	22/01/2007	51,450	12,269	115	0
Johor Baru	13/01/2007	19,399	4,557	25	0
Kluang	14/01/2007	16,254	3,803	57	0
Kota Tinggi	16/01/2007	14,281	3,162	40	1
Mersing	16/01/2007	8,730	1,876	20	0
Muar	15/01/2007	5,611	1,287	24	0
Pontian	14/01/2007	3,112	763	33	0
Segamat	15/01/2007	6,593	1,744	27	0
Total		125,430	29,461	341	1

Source: adapted from HOLISTIK, back cover page, Bil 002, 1 Feb., 2007 by Unit Media & Komunikasi (Medkom), Johor State Government

From the data shown in Table 1 and 2 above, one can get an idea of the magnitude of the flood disaster by the number of relief centers being opened to provide shelter and other basic necessities. It has been noted that there was an extensive media coverage including images being screened outside of the country during the flood events. The visual impact can be powerful, but how about the estimates on the losses?

Flood Impact Inventory

The concept is still relative new and it is tied to the increasing awareness on the need for an interdisciplinary approach to environmental management. As being advocated under the sustainable development concept, all development should strive for maintaining a balance between economic, social and the environment. Thus, socio-economic impact study is gaining popularity with an increasing environmental awareness. Maintaining a flood impact inventory is a way to introduce the socio-economics aspects into flood management.

In fact, a manual for estimating the socio-economic effects of natural disasters is now available over the internet for public access. Part One is about methodology and concepts. Details on methodology that can be readily adapted for estimating damages/losses have yet to be seen. (<http://www.eclac.cl/publicaciones/xml/8/7818/partone.pdf>)

The data provided in Tables 1 and 2 are inadequate to compile an inventory on the impact of flood damage. Table 3 shows the details which should be captured.



Table 3: Damage which should be taken into account in socio-economic impact study

i) Physical Impact

Residential buildings - extent of property being damaged	<ul style="list-style-type: none"> • Building fabric intact? • Fixtures and fittings? • Clean-up costs? • Any lost of irreplaceable items?
Commercial properties	<ul style="list-style-type: none"> • Damage to moveable equipment? • Damage to fixtures and fittings? • Damages to goods/services? • Clean-up costs?
Land use/ basic infrastructure/ utilities	<ul style="list-style-type: none"> • Any land erosion? • Any collapse of roads/bridges? • Any utility supplies being disrupted (burst pipes affecting potable water supply/ power line disrupted – black out)?

ii) Social Impact

Disruption to livelihood/loss of income/ productivity	<ul style="list-style-type: none"> • Loss of productivity for the employed; • Loss of income for the self-employed; • School children's education disrupted; • Loss of livelihood for the outdoor workers; (farmers, fishermen & other daily rated workers)
Transportation	<ul style="list-style-type: none"> • Operation of public transport disrupted • Increased travel costs (road traffic disruption)
Health and safety	<ul style="list-style-type: none"> • Diseases associated with poor hygiene &/or limited access to potable water; • Worry/fear about future flooding; • Damage to physical and/or mental health, death or injury; • Elderly or long term care cases – disruption to appointment for medical treatment; • Additional medical treatment fee;
Unavailability/ lack of accessibility to services	<ul style="list-style-type: none"> • Access denied because of disruption; • Evacuation costs and emergency services costs;
Loss of trust	<ul style="list-style-type: none"> • Loss of confidence in authorities and services;
Disruption to families	<ul style="list-style-type: none"> • Children lost contact with parents; • Loss of leisure and recreational opportunities; • Increased effort in shopping/ clean up;

iii) Environmental Impact

Damage to physical habitats/structures	<ul style="list-style-type: none">• Impact on site of special or scientific interests;• Natural habitat destruction;• Disruption to water catchments/drinking water reservoir;• Water quality problems.
--	--

Issues and Challenges in Computation

A striking fact is that the flood took away five lives in total, four in the first wave and another one when the second wave arrived. This was the statistics provided in the Johor State publication, *the HOLISTIK*. The press reported four deaths in Segamat and two in Kluang³. The information shown in Tables 1 and 2 above is descriptive although attempts have been made to quantify the data for each of the fields. From the number of flood relief centers in operation, one can proceed to estimate indirect tangible losses. The data on the number of victims and families affected as well as loss of life can be quantified in monetary terms to approximate the welfare losses although the approach in quantifying the intangibles has always been deemed as controversial among economists.

Studies on how to quantify value of life are not new. In practice, life insurance, SOCSO⁴, and burden of disease which relates to causes of loss of health or mortality, are some of the more typical calculations involving value of life. The value refers to the implied value per statistical life (VSL). All these estimates are measures of potential years of life lost or quality of life compromised due to premature mortality. The calculations take into account the gap in years between age at death and some arbitrary standard age before which death is considered premature (typically 65 or 75). In a study on the Economic Aspects of Ambient Air Pollution on Health Effects, the VSL calculated using WTP estimates was HK\$ 5 million (Yee, 1998).

In the case of personal injury sustained, insurance companies or SOCSO would have determined the rates for different degree of injuries. It should be pointed that there are still data gaps if one is to undertake valuation for injuries of the flood victims. For example, details must be provided on the employment records, age composition and type of injuries sustained, any medical fee incurred or any casualty involved hospitalization.

Problems with Tangible Losses Released by the Public Sector

Tangible losses which come under this category are losses with market values or they carry price tags. Authorities tend to focus only on tangible losses, so much so that the intangibles are being over shadowed. A case in time is the losses from the floods being released by the authorities in Johor. The information is more inclined to show losses borne by the public sector and it is about direct tangibles with some coverage on indirect tangibles.

According to the February issue of "Holistik"⁵, a magazine of the Johor State government, it was reported that the Public Works Department (JKR) experienced the biggest losses during North-east Monsoon floods 2006/2007 because of the severe road damage from the floods. Repair of roads and bridges amounted to RM350 million. The Ministry of Rural and Regional Development (Kementerian Kemajuan Luar Bandar dan Wilayah) reported that its expenditure on repair works was RM 137 million and this was for roads in the rural areas. An additional RM102 million was spent by the Education Department on equipment and buildings which were damaged by the floods. The Ministry of Agriculture and Agro-based Industry (Kementerian Pertanian and Industri Asas Tani) estimated that the losses suffered were RM 60 million. It was reported in the press that Tenaga Nasional Berhad (TNB) has an estimated loss of about RM18 million due to infrastructure and equipment damage over the two months of the floods⁶.

A breakdown of the losses incurred by the various departments by the eight towns affected by floods is shown in Table 4.

³ The Star, 22/12/2006, Six killed in Johor floods

⁴ Loss of limbs (disabled) – 50 % from monthly wages paid minimum or 65 % from monthly wages paid maximum; loss of life – at least a basic payment starting with minimum of 6 months equivalent to the wages received in the preceding period;

⁵ HOLISTIK, 1 Feb., 2007, Bil 002 by Unit Media & Komunikasi (Medkom), Johor State Government, <http://www.pmbj.gov.my>

⁶ NST 30/01/2007 TNB reports RM80m losses in Johor

Table 4: Direct Tangible Losses Incurred by the Public Sector from the Johor floods (in RM million)

Region	Batu Pahat	Johor Bahru	Kluang	Kota Tinggi	Mersing	Muar	Pontian	Segamat
JPS	63.32	50.6	39.7	40.95	2.6	14.26	9.35	28.8
JKR	13.6	8.05	4.52	8.8	4.93	11.96	1.08	8.62
Jabatan Kesihatan	3.55	0.98	0.12	0.16	0.11	1.12	0.14	2.64
JKM (1 st wave)	12.69	93.56	51.8	49.5	4.16	10.54	17.64	44.1
PBT/UPENJ	26.9	24.86	9.12	11.68	6.78	9.43	6.87	24.73
SDO	26.14	4.98	4.51	12.3	10.8	13.72	6.51	12.37
JHEOA	-	-	0.37	-	3.15	-	-	2.03
RISDA	2.3	0.09	0.85	0.42	0.49	1.19	0.18	3.31
JAIJ	1.68	0.43	0.28	0.54	0.19	1.16	0.29	0.96
Total	150.18	183.55	111.27	124.35	33.21	63.38	42.06	127.56



Source: *Holistik, Bil 0021 Feb., 2007, Bil 002*

JPS - Jabatan Pengairan dan Saliran (Drainage & Irrigation Dept)

JKR - Jabatan Kerja Raya (Public Works Dept)

JHEOA - Jabatan Hal Ehwal Orang Asli (Dept of Indigenous People Affairs)

JKM - Jabatan Kebajikan Masyarakat (Dept of Social Welfare)

PBR - Pihak Berkuasa Tempatan (Local Authority)

SDO - Pejabat Pembangunan Negeri Johor (State Development Office, Johor)

JAIJ - Jabatan Agama Islam Johor (Johor Islamic Dept)

UPENJ - Unit Perancang Ekonomi Negeri Johor (Johor State Economic Planning Unit)

Accounting for the Indirect Tangible Losses

Waiver of assessment and rental by the public sector

Indirect effects of the floods tend to be outside of the scope of analysis except for more obvious instances, e.g., in the Johor case, assessment or cukai pintu has been exempted for a period of six months in 2007 as a good gesture to the community affected by the floods. The Local Council of Johor has also waived the rental of retail premises owned by Pihak Berkuasa Tempatan (PBT) in the first half of this year. The estimated combined loss of income to the local government total RM22 million, where RM 19 million could have been collected from PBT and another RM 3 million forfeited from the assessment.

Although it is possible to present an inventory for losses to be taken into consideration in a flood impact study as shown in Table 3, in practice, data availability is a barrier to accuracy in the assessment. Much of the impacts are not being taken into account because of the nature of the subject, i.e., flood is associated with drainage, and this discipline is technical in nature.

Impact of the flood on the community from all the eight towns

The floods in Johor had inevitable affected the major economic activities of the State of Johor. When Johor Baru was inundated with flood water, economic activity for much of the state was brought to a standstill because of transportation problems. Taxi drivers have reported that they could not move around because of the rising flood water. As the town depends on tourism and retails, businesses were adversely affected. Likewise, Batu Pahat and Muar with industrial development, the losses borne by the private sector have yet to be estimated. For towns like Kota Tinggi, Muar and Pontian which are more rural, agriculture is an important sector. In Kota Tinggi, for example, Felda small holders suffered losses from crop damage. Segamat which is located along the North-South Highway depends on retails and border trade. Mersing is a coastal fishing town. The community's sources of livelihood are not spared from flood damage.

Impact on the Hotels and Travel Trade Sector

From the statistics on visitor arrivals compiled by the Johor Tourism Action Council (JTAC), it can be observed that there has been a steep decline in the number of visitors following the floods. It was revealed that February was the worst month where visitor arrivals from some countries dropped by half. The statistics presented in Table 5 shows only visitors using Johor as the first point of entry.

Table 5: Visitor arrivals to Johor pre- and post- flooding, Nov. 2006 to Feb., 2007

	Nov., 2006	Dec., 2006	Jan., 2007	Feb., 2007
Singapore	1,874,685	1,550,533	1,401,200	1,738,379
Australia	5,254	3,675	4,811	1,763
New Zealand	809	814	721	326
Canada	1085	1047	1,170	677
UK. & Ireland	3,884	4,137	3,387	2,624
Hong Kong	157	181	130	122
Sri Lanka	1060	743	541	371
Bangladesh	699	545	546	388
India	7,297	5,793	3,221	6,759
Brunei	522	279	268	77
Pakistan	480	421	536	172
Others (A)	1,267	1152	910	n.a.
USA	3,368	3,266	3,164	1,602
China	21,032	23,780	18,283	24,133
Russia	307	275	857	141
Latin America	793	458	712	518
Saudi Arabia	986	686	858	656
Germany	1,581	1976	1,622	924
France	696	797	707	402
Scandinavian	1,690	2,816	1,839	1,194
West Europe	1,047	3988	924	828
The rest of Europe	2259	2,324	2,207	1,135
Philippines	10,341	8,870	7,777	8,710
Thailand	4,666	4,250	3,478	3,754
Taiwan	2,026	1883	1,763	890
Indonesia	61,141	61,470	48,273	35,050
Japan	14,248	16,570	15,740	10,835
South Korea	8,954	10,731	13,005	4,091
Others (B)	4,594	4,367	4,138	16,164
Total	2,036,928	1,717,827	1,542,788	1,862,685

Source: Johor Tourism Action Council (JTAC)

Hotels and resorts incurred losses during the floods. Cancellation of hotel stay and resort accommodation by visitors were experienced in Johor Baru, Kota Tinggi, and Kluang. Reservations have to be cancelled because of the breakdown in the transport service when roads were being inundated and electricity supply was also being disrupted. The details and the losses are shown in Table 6. The total losses reported by the hotels amounted to RM 889,442.

Table 6: Hotels/ resorts with room-night and package tours cancelled during the floods

Hotels	Rooms cancellation	Package tour cancellation	Losses (RM)
Johor Baru			
A'vista Melati Hotel	31		2,640
Grand Bluewave Hotel	90		25,260
Mutiara Hotel	482		69,108
Puteri Pacific Hotel,		9	50,967
Kluang			
Nagaria Inn	47		1,880
Prime City Hotel	180		130,000
Kota Tinggi			
Kota Rainforest Resort			25,000
Pulai Desaru Beach	950	(200 visitors)	584,587
Total losses			889,442

Source: Johor Tourism Action Council (JTAC)



Discussions and Conclusions

An observation made on the pattern of the 2006/2007 flood was that the same towns were being affected both in the first and second wave. If these town are flood prone, it would be advisable to re-locate residents and public buildings or office premises away from such high hazard areas to minimize human health risk. In such situation, the decision to act should be taken irrespective of the financial implications of flooding. It is difficult to quantify the value of human life. Furthermore, the controversy on valuation remains. It can be argued that one can never put a dollar value to the cost of life. It is in this context that the recommendation is made to relocate residents out of the flood prone zone. One should avoid loss of life at all cost. Community awareness programme and drill on flood preparedness and flood warning involving the residents are interim measures to minimize potential flood damage. Inventory on flood impact should be part and parcel of flood management. ~ **Yee Lai Wan**

References

Manual for estimating the socio-economic effects of natural disasters, Part One: methodological and conceptual aspects
<http://www.eclac.cl/publicaciones/xml/8/7818/partone.pdf>

Messner, Frank & Meyer, Volker (2005), Flood damage, vulnerability and risk perception – challenges for flood damage research, UFZ Discussion Papers, Dep of Economics, 13/2005, http://www.ufz.de/data/Disk_Papiere_2005-132647.pdf, [accessed 7.6.2007] (the paper will be published in a revised version in the book, “Jochen Scanze, Evzen Zeman, Jiri Marsalek (eds.), Flood Risk Management - Hazards, Vulnerability and Mitigation Measures, Nato Science Series, Springer Publisher)

Ne_se AC_ANAL, Tefaruk HAKTANIR and Recep YURTAL (1999), Conjunctive Optimization of Hydroelectricity Bene_ts and Flood Damage Costs, Tr. J. of Engineering and Environmental Science, 23 (1999), pp. 423-432.
<http://journals.tubitak.gov.tr/engineering/issues/muh-99-23-6/muh-23-6-3-9905-6.pdf>
 [accessed 14.6.2007]

Nguyen Ngov Huan, (), Vietnam Coastal Zone Vulnerability Assessment, author's email:hmec@fpt.vn [accessed 21.3.2007]

Scottish Government (2005), Scopiig study into the cost of flooding using the August 2004 event as a case study. Final Report.
<http://www.scotland.gov.uk/Publications/2005/05/17151735/17498> [accessed 14.6.2007]

Tietenberg, Tom (1999), Environmental and Natural Resource Economics (5th Edition), Addison-Wesley Pub Company.

Yee, Lai Wan (1998), Consultancy Report on the Economic Aspects of Ambient Air Pollution on Health Effects, prepared for the Environmental Protection Department, Gov. of HKSAR, by EHS Consultants Limited.

International Headlines

U.S. economy to expand in coming months

The Associated Press, 21st June, 2007

The U.S. economy expanded modestly in these few months along with a healthy job market. The index of leading economic indicators rose higher than expected to 0.3 percent in May, boosted by rising stock prices, higher consumer expectations and the availability of jobs. It is estimated that jobs should continue to be plentiful, despite an unexpected surge in jobless claims. The Labour Department reported that unemployment claims totalled 324,000 last week, up 10,000 from the previous week, to the highest level since mid-April. Adding to that, the falling home prices and rising mortgage defaults won't damage the broader economy. The Federal Reserve's Open Market Committee, which sets short-term interest rates, is widely expected to leave rates unchanged as they have been for about a year. A pickup in the economy has raised worries about rising inflation in U.S.



PENANG
ECONOMIC
MONTHLY

China, foreign investment boosts port industry

China Daily, 22nd June, 2007

Companies in China are foregoing investment opportunities in overseas shipping ports in favour of a commercially lucrative domestic industry, significantly boosted by foreign capital. The movement of goods in China's ports will exceed 6 billion tons by 2020, up from 3.95 billion tons last year. Foreign investment is expected to continue to flow into the industry, having already "accelerated" its development over the last two decades. However, so far China Ocean Shipping (Group) Company (COSCO) is believed to be the only one to have invested significantly in ports abroad, with berths in the United States and Italy. The trend is an encouraging one that reflects the buoyant state of China's port industry. China's container movements would increase by 14 percent until 2011, compared to 8 percent average growth for the rest of the world. The challenges ahead for China's ports include the need to expand fairways to accommodate the ever-increasing size of cargo vessels, and improving logistics for smoother distribution and transportation of goods.

Global mergers rise to a record

International Herald Tribune, 22nd June, 2007

Global corporate merger activity in the first half of 2007 surged 53 percent to a record \$2.5 trillion as Europe equalled the United States for the first time in four years. Mergers and acquisitions in the first half exceeded the 1999 all-time high of \$1.9 trillion by a third. European deal activity increased 73 percent in the first half from a year earlier to \$1.02 trillion, while the United States gained 45 percent to \$1.03 trillion. But strategic buyer acquisitions during the period doubled in the region from a year earlier to \$828 billion. The financial services industry saw the most deal volume with \$542 billion in the first half.