

The Needs of Sustainability Solid Waste Management in Perhentian Island, Terengganu

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Abstract

Malaysia is blessed with many idyllic tropical islands favoured by many an ecotourist. Perhentian Island, located in the South China Sea at the northeastern corner of Peninsular Malaysia, has been one of the favorites whose tourism activities have increased considerably. The recent annual tourist arrival for the island is about sixty thousands, compared to a local population of only one thousand three hundreds residing in the only village on the island. Located about 21 km offshore, the 15 km island has seen its number of resorts grow from five (~100 rooms) in 1985 to more than forty now (~1200 rooms). With growth comes the problem of managing the solid waste generated by the island's tourism industry. The large amount of wastes produced by tourist is a difficult problem for small islands particularly since it is typically generated over a short period, thereby often overloading existing disposal and treatment facilities. Onsite burying of solid waste that was practiced during its early days of tourism business is no longer suitable and sustainable due to land scarcity. The current practice of hauling the waste to be landfilled on the mainland 21 km away is viewed by many to be uneconomical and is putting unwanted stress on the fast-shrinking landfill space. The local authority administering the island is now looking for a better way of managing this waste. Therefore, protection of the environment from pollution is extremely important in small island, since aside from other reasons that are common to all countries, two important industries, tourism and fisheries, depend on a pristine environment. This paper overview the current waste management plans of Perhentian Island in Malaysia and the problems that are being encountered, both by local municipal and chalet owners and its effectiveness. The purposes of this study is to investigate the collection system and handling of solid waste in Perhentian Island. The study outline strategy laid out to improve the current waste management plan such as focusing and going back to composting and recycling method which is seen as more economical and environmental friendly.

Keywords: Sustainability, waste management, island resort, recycling, composting, collection system

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Introduction

Increasing population and tremendous urbanization growth and other factors influence directly the municipal solid waste generation in Malaysia. In 2002, population living in the local authority areas in Peninsular Malaysia generated about 17,000 tonnes of solid waste daily according to the Ministry of Housing and Local Government (2003). The same ministry also estimated an average generation of 0.85 kg/cap/day. According to the ministry again about 76 % of this waste were collected but only a meager 1-2 % were recycled while the remainder were taken to disposal sites. In its effort to change the current unsustainable practice of solid waste management, the ministry has identified the need for more research on strategic plans for solid waste management, solid waste composition and characteristics, recycling, composting, refuse-derived fuel, etc. Sustainable solid waste management is among the key principles to guide the ministry's strategic plan on solid waste management. Through sustainable solid waste management the ministry is targeting to change the waste hierarchy of 95 % landfill/5 % recovery to <65 % landfill/15 %intermediate processing/>20 % recycling by the year 2020. Most of the current and past studies on solid waste management in Malaysia concentrate on municipal areas whose solid waste are commonly categorized into residential, commercial, institutional and industrial wastes(MHLG,2003).

The disposal of solid waste on island resort is a particularly critical problem. Limited land area makes the option of landfill unsustainable in the long term and other options of collection and disposal, such as incineration have so far proved to be economically unfeasible. Solid waste is produced in a much larger volume by tourist resorts than local inhabited islands.

Not that many studies have been done on sustainable management of solid waste generated on island resorts. (M.Rafee et.al 2007). Those studies that were done focused more on one specific treatment of waste such as thermal treatment or incineration. There are several factors that make management of wastes from island resorts an interesting case to study. Firstly, is the limited land available on the island itself which puts a strong case for a sustainable integrated waste management. Secondly is the peculiarity of the waste which a high proportion of it comes from the resorts' restaurants/kitchens whose limited number make them easy to manage. Third is the probability that the level of awareness on sustainable waste practice is high among the tourists holiday at the resorts. On the basis of these factors, a study was carried out to investigate the possibility of implementing a better and more sustainable solid waste management program on the resort island of Pulau Perhentian in Terengganu.

Solid waste management in Malaysia

One of the most dramatic examples of the environmental policy paradox may be found in the area of solid waste management. (Hostovsky, 2006). For example, for many years municipalities in Malaysia still faced problem to find a suitable site for new landfill and yet policy makers have been slow to act. The problem and its solution have been well known to policy makers for decades. However, the best long term solutions to municipal waste problems are expensive, while short term solutions seem to be cheap. Policy makers in some areas are being forced to take what they consider drastic measures that they might not otherwise be willing to consider.

Solid waste management is also considered as major environmental problems in small islands in Malaysia.

The major problems in waste management in small islands are: (B. Stephen and D.C Barry. 1995)

- a) Pollution of groundwater, surface water and marine environment from land based sources such as solid wastes, and domestic sewage: they carry risk to human health and can degrade habitats such as coral reefs and tourist attractions such as beaches. Consequently, small islands will outbreaks of diseases and the destruction of fisheries, which can cause major adverse economic impacts.
- b) Lack of solid waste disposal facilities and sites: gullies and the marine environment are still used as disposal sites by some small islands because of the shortage of land and inadequate capacity to collect garbage for centralized disposal.
- c) Lack of facilities for storage and management of hazardous wastes.
- d) Ineffective regulations: some small islands have spent a considerable amount of time and financial resources on developing regulations; However regulations have not been very effective in many cases because of inadequate institutional and human resource capacities to enforce them.

Solid waste management in Malaysia also has a number of implementation problems, including low collection coverage, irregular collection services, inadequate equipment used for waste collection, crude open dumping, institutional deficiencies, inadequate legal provisions and resource constraints. These problems are caused by complex factor, which mitigate against the development of an effective national policy of a solid waste management (SWM) system

Perhentian Island: Background and Tourism

Pulau Perhentian or Perhentian Island is located in the South China Sea some 21km northeast of Kuala Besut in the State of Terengganu (Figure 1). The name Pulau Perhentian is commonly used to refer to a group of islands in the vicinity made up of two major islands -Perhentian Besar and Perhentian Kechil and several small islands surrounding these major islands. The islands can be reached by boat either from Kuala Besut in Terengganu or Tok Bali in Kelantan which is closer by 6 km. A boat trip to the islands can take between 30-45 minutes depending on the sea condition. The land area of this group of islands is about 1500 hectares. The most important economic activity on the islands is tourism. Tourists go to Perhentian Island for a variety of reasons including the beach, snorkeling, scuba diving, fishing, etc. Tourist season begins in March until late October when the South China Sea is calmer. Due to their popularity, the islands have seen the number of resorts grow from five (~100 rooms) in 1985 to more than forty now (~1000 rooms). The recent annual tourist arrival or the island is about sixty thousands, compared to a local population of only 1300 residing in the only village on the island, Kampung Pasir Hantu on Perhentian Kechil (Majlis Daerah Besut,2006)



Figure 1: Perhentian Islands

Current Solid Waste Management on Perhentian Island

Pulau Perhentian is under the administration of Majlis Daerah Besut (MDB). As such, all matters pertaining to solid waste management on the islands are under the administration of MDB. Onsite burying of solid waste that was practiced during early days of tourism business is no longer suitable and sustainable due to land scarcity. At present, solid wastes from the island generated by the resorts are still managed in a conventional way. This conventional practice which requires hauling the waste to be landfilled on the mainland 21 km away is viewed by many to be uneconomical and is putting unwanted stress on the fast-shrinking landfill space. The process involves three parties/actors, i.e. the resort operators, a waste collection contractor appointed by MDB and MDB (Figure 2)

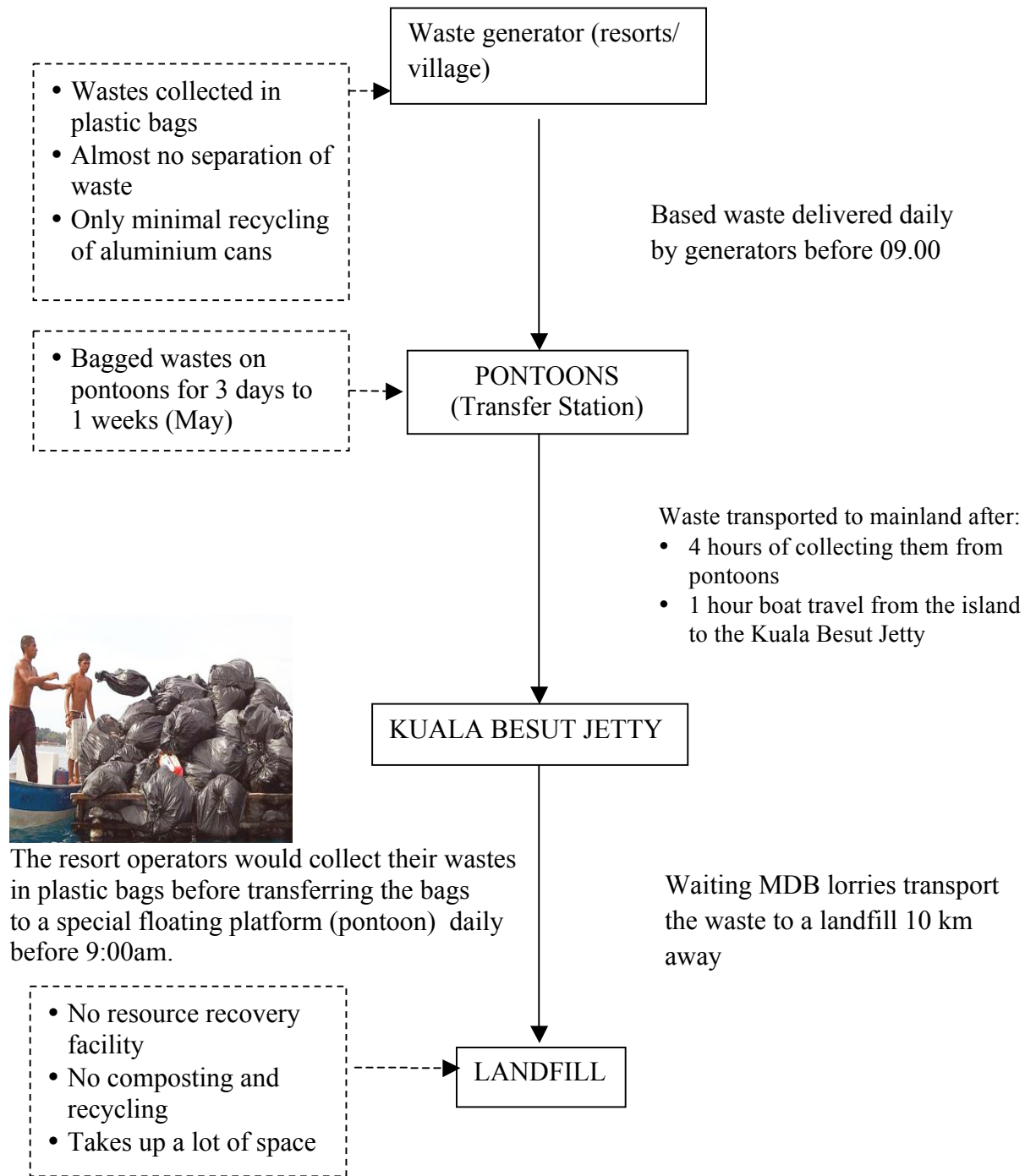


Figure 2: Current Solid waste Management on the Perhentian island

Source: developed for this study from fieldwork conducted in 2015

A quick survey on the operators revealed that most of the operators did not recycle anything except for 20 % of them who recycled some aluminum cans. The pontoon acts as a transfer station for these bags of wastes before they are collected for transportation to a landfill on the

mainland in Kuala Besut . The appointed solid waste contractor (transporter) would then use a big boat to make his round around the islands collecting the bagged wastes from the pontoons and then transporting them to Kuala Besut jetty on the mainland. Though appointed by MDB, the solid waste contractor is paid directly by the resort operators. The collecting fees paid vary according to number of resort rooms and they range from less than <RM 100 to more than >RM 600 ringgits per year. Depending on the weather and some other reasons, these bags of wastes could be sitting on the pontoons for three days to one week before getting transferred to the landfill. Also depending on the weather, the contractor may take up to four hours collecting wastes from these pontoons and then another hour to travel from the islands to the Kuala Besut jetty. From the jetty the wastes would be then be loaded to the waiting MDB lorries for disposal at a landfill operated by MDB.

The trash collection service is only operated during peak season, usually around mid-February to mid- September; it cannot operate during monsoon season or bad weather as the waves are to high. The trash generated during the off-season is considerably less due to the limited number of tourist on the islands, but what is generated is usually burned. The difficulty comes when the service stop operating, but tourist are still arriving or workers are still on the islands. In these situations some resorts will ferry their trash back to the mainland, others bury or burn it behind their resorts. At the start of the 2008 season there were numerous examples of partly buried and partly burned trash piles at many of the resorts. Even during peak season when trash is routinely collected, a number of the kitchen areas on resorts would burn their waste materials and several staff living quarters would burn trash rather than dispose of it in trash cans.

The trash is collected offshore on floating pontoons which prevents the concentration of pests around the trash and also removes an unsightly and unpleasant problem from the islands. Smalls boats will leave a resort loaded with trash to deposit on the pontoons and return empty, leading a number of tourists to believe the trash is dumped at sea. There are a number of problems identified by many islands residents with these trash pontoons. One of the key problems was the lack of schedules for the service collection.

Additionally, some of the trash barges are in poor state of repair and sections may be falling apart which means that the bags may fall from the platform and end up in the water. There were several examples of black bags being found washed-up on the beach which had receipts or paperwork linking them to particular resorts. The platforms are also not collected as regularly as needed, leading to some being piled higher than sensible for the particular platform. Many islands residents suggested that the trash pontoons needed improving and told stories of trash falling from pontoons and being washed into coral reefs or onto beaches. When asked about the trash falling from the pontoons, many western participants blamed the local workers. Another described how some of the workers had thrown the bags on and missed, but had not attempted to retrieve them. Around many of the resorts there is no frequent collection of trash from outside guest quarters or staff quarters.

Looking at the current practice of solid waste management described above, there is no doubt that there are some weaknesses and potentials. Considering the fact that most of the wastes are kitchen wastes from the resorts, there is a very high chance that a good percentage of the wastes are organic wastes that can be composted (Table 1). Source-separation of these wastes would not

be much of a problem due to their minimal number of generators. Leaving these wastes in black plastic bags out in the open does not go well with the image of the islands as a tourist destination. When left too long in the hot sun the wastes can produce an offensive fetid smell, especially down wind. To make things worst, the plastic bags are not secured on the pontoons subjecting them to the rough sea during bad weather. Having to transport the wastes to the mainland for disposal is also not sustainable. It requires a lot of fuel to drive the big boat for almost five hours each trip in order to collect the waste bags from all the pontoons around the islands and then transport them to the mainland. Better ways of managing these wastes should therefore be explored and one possibility is through encouraging composting and recycling.

Table 1: Composition of the solid waste in Perhentian island

Waste Category	Average Weight (kg/day)	Average Weight (%)
Organic Waste (food wastes)	858.75	71.73
Paper	69.14	5.77
Timber	18.64	1.56
Cans	96.52	8.06
Plastics (Bottles/bags)	60.65	5.07
Glass	32.08	2.68
Yard Wastes	62.45	5.13

Source, .Rafee, M.(2007).

A Need for Waste Management Plan in Perhentian island

The Perhentian Island faces challenges in their sustainable development effort, the same as those encountered by other small islands in Malaysia. The National Conservation Strategy has recognized that the principle of sustainable tourism must include the conservation and sustainability of natural, social and cultural resources and reduction in waste to avoid restoration cost (Economic Planning Unit, 1993). The Commonwealth Secretariat, (2000), identified the following characteristic of small islands that post special development challenges. These are their remoteness and isolation, openness and vulnerability to global markets susceptibility to natural disasters and environmental change, poverty, limited capacity in public and private sectors.

The projected population growth in the Perhentian Island is expected to increase the generation of municipal waste arising. The historic level of growth in tourism is not the main reason; instead focus is on the upgrading existing capacity. However, seasonal fluctuations in tourist levels are likely to have associated waste management implications in term of collection, transportation, treatment and capacity.

For environmental sustainability solid waste management needs to work towards the following objectives; (OECD 2000)

- a) The generation of waste, both by consumers as producers, should be minimised. At the production site, waste minimisation can be achieved through a new organization of

production process, which makes use of clean technology and use less packaging materials. At the consumption site, waste generation can be reduced by awareness-raising campaigns on the environmental impacts of waste and on recycling and re-use. Attention should be paid to the waste generation behaviour of the target group. For example, upper and middle income households import a lot of products and therefore the amount and kind of waste is different e.g: more plastic and packaging materials, than waste produced by low income groups. Poor people produce less waste since they often re-use or sell valuable materials and the main of their part consists of organic materials.

- b) Re-use and recycling should be maximised. This includes recognising and making use of the informal sector and micro-enterprise that are already involved in collecting and selling recyclable materials.
- c) The remaining waste should be disposed in a controlled manner in order to stay within the absorption capacity of local and global sinks. For developing countries the best method regarding technical and financial means, is disposal at landfills (Chris 2000). However, the ultimate goal is to reduce waste generation and optimise recycling in such a way that waste becomes a closed-cycled system, preventing loss of raw material, energy and nutrients.

Others argue that interpretations of sustainable waste management systems should be expanded include participation for all stakeholders (Petts, 2000; OECD, 2002) and in particular between localities. The Rio Declaration on Sustainable Development (UNCED, 1992) defined sustainable waste management as the application of the integrated life cycle management concept in waste management. This was later elaborated by the United Nations (2005) as;

“Environmentally sound waste management must go beyond the mere safe disposal or recovery of wastes that are generated and seek to address the root cause of the problem by attempting to change unsustainable patterns of production and consumption”.

In effect, the declaration suggests an approach to waste management that incorporates environmental, social and economic perspectives into environmental policy, planning and practice. However, it is only recently that waste management policies, plan and programmes have begun to consider all of these different stands of sustainability.

The concept of sustainable development, as set out in the Bruntland Report (1987) report of the World Commission on Environment and Development) is that development should be carried out in a manner, which will not prejudice the ability of future generations to meet their own needs. This is extended to include the concept that we should not leave a legacy of problems to be resolved by future generations (for examples, land, air and water which is polluted or poorly restored) and the scarce resources should be conserved. Such an approach is particularly appropriate in dealing with waste. Therefore, the approach of the planning authorities in dealing with waste for Perhentian Island is that waste handling, treatment and disposal should be dealt with in an environmentally acceptable manner minimising the long-term impact of waste. Therefore, the research revealed a number of recommendations of waste management plan for Perhentian Island :

- 1) The planning should proposed for new waste management facilities in accordance with the principles of sustainable development and the following waste management hierarchy:
 - i) Reduction
 - ii) Re-use and recycling including composting
 - iii) Recovery, including energy from waste
 - iv) Final dispose
- 2) Disseminate appropriate information and education about waste issues throughout society. This information needs to be developed by sources that are respected by all waste management actors for it to be effective.
- 3) The local authorities should support public, private and voluntary sector initiatives to reuse, recovery, recycle waste in accordance. Public awareness of waste management in Perhentian Island is low. A public education and awareness rising programme needs to be developed in support of the establishment of any future recovery and recycling schemes. This should highlight the extent of the problem and highlight the benefits of minimising, separating and recycling wastes.
- 4) All civil society organizations, all spheres of government and all individuals should come together to implement the overall principle of sustainability.

Conclusion

The environment problems of small islands are related to issues that pertain to the sustainable use of natural recourses and the environmentally sound management of wastes. The unique social, economic and environmental characteristics of small island, such as limited availability of land space and the lack of human and financial resources, reduce the choice of appropriate options for sound management of waste. Furthermore, tourists produce large amounts of wastes, especially during the peak tourism period, compounding the difficulty of small island authorities to manage waste with their limited capacities. One person or organization needs to be given overall responsibility for implementing the plan and reporting to government on progress in achieving the objectives. Procedures for coordinating the activities of different agencies need to be set out. Budgets for the various actions needs to be established and approval sought. Therefore, the authorities need to develop local strategies and capabilities for the implementation of sustainable waste management within the context of sustainable development. In most cases, the resulting municipal strategy will be a mix of private and public sector activities.

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