

Wastes Management For Bhutanese Happiness: Priority Should Be Public Awareness And Education

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1 Introduction

“Gross National Happiness (GNH)” philosophy is the hypothesis that Royal Government has adopted for its developmental progress (CBS, 2004). It is also very clear that the GNH can be pursued through four avenues, so called the four pillars; sustainable economic development, environment conservation, cultural conservation and good governance. Wastes generation and management is an issue that has both direct and indirect linkage to all the four pillars of the GNH. Therefore, wastes management cannot be undermined to achieve the noble concept. Bhutan, winner of the 2004 “Champion of the Earth” (Kuensel, 2005) and the “World Conservation Leadership Award” (Kuensel, 2006) bears additional responsibility to maintain the environment conservation prestige.

To maintain good human health of the small population, wastes management is the primary solution. A subsistence agriculture farming country will face catastrophic consequences if soil and water are contaminated. Perennial streams and spring water pollution risk immediate human health hazards. River water contamination with hazardous wastes can corrode downstream hydropower components. Tourism, the main hard currency source could deplete with aesthetic hazards and potential health risks from the unmanaged wastes. There are hundred and one reasons why wastes management is crucial in Bhutan.

Nevertheless, waste management is not a simple task. Even the developed countries with better resources and capacity fail to achieve an appreciable wastes management paradigm. Countries like Bhutan are obvious to feel the challenge daunting with limited resources, technological options and manpower capacity. The fragile mountain ecosystems of the Himalayas add to the obstacles for Bhutan to find a sustainable wastes management technique. Inherent human desire in resources consumption governs the waste generation capacity. Therefore the municipal solid wastes (MSW) quantity and composition highly depends on population density, source diversity and the income of the people. With increase in population, economic activity and the income, the MSW quantity and composition including the non-biodegradable and hazardous wastes escalates. The evolutionary waste quantity and characteristics accordingly challenge the municipal authorities in wastes management, demanding more and more resources and technological capability.

As of now, the major population in Bhutan remains innocent about the consequences of the wastes and the “hard to die old habits” continue disposing the wastes irrationally. Even in the capital city Thimphu, the municipal wastes collection service does not cover the entire municipal area. Only the municipal authority, Thimphu City Corporation (TCC) undertakes the collecting, transporting and disposing of the MSW (RGoB, 1999). The limited authority, fund, manpower and technological options have always been the excuses. No institutionalized public responsibility sharing systems exist. The school authorities, few government agencies and the Royal Society for Protection of Nature (RSPN) have initiated periodical cleaning campaigns to create nominal public awareness. This, adhoc cleaning campaigns has in fact encouraged the general public to dispose

wastes irrationally. The schools also have initiated to segregate wastes in their compounds, but without systematic collection, the initiatives are discontinued. Therefore, a greater heights of public awareness and education needs to be explored followed by appropriate collection and disposal mechanisms for a sustainable waste management.

2 Concept of municipal solid wastes (MSW) management

Resources consumption and the waste generation are inbuilt in the living process of a human life. Human activities alter all the wastes composition conditions and pose a challenge in the waste management. The wastes, if unmanaged or inadequately managed pose threats of epidemic diseases, air pollution and groundwater contamination besides space constrain, odor and aesthetic problems. The situation is worse in a municipal waste management where wastes is generated in bulk, composition of wastes ranges from biodegradable organic wastes to toxic, infectious and hazardous wastes due to varying sources (Tchobanoglous *et al*, 1993).

Public and the local authorities have the responsibility to dispose municipal solid wastes to protect public health and the environment. Managing municipal waste, industrial waste and commercial waste has traditionally consisted of collection, followed by transportation and disposal. The particular concerns of unmanaged wastes arise during rainy seasons, high temperature and when there are settlements in close proximity or the low-lying areas. The run-off and high humid conditions increase the health hazards. The not well maintained landfill sites become prone to soil and groundwater contamination due to leachate percolation. Open dumping of garbage serves as breeding ground for disease vectors like flies, mosquitoes, cockroaches, rats and other pests. High risk of spreading diseases like typhoid, cholera, dysentery, yellow fever, encephalitis, plague and dengue fever also exist in such an environment (TERI, 2006). Other risks of burning of wastes and open dumping are the air pollution to instigate respiratory and skin diseases besides contributing greenhouse gases (GHG) into the atmosphere. Therefore, it becomes a paramount importance for a mountain encased country like Bhutan to have in place a system that addresses safe and sustainable municipal solid wastes management. The MSW management becomes increasingly important as countries expand their economies and urban population keeps increasing (IGES, 2006; Fernandez, 1997).

3 An emerging MSW option, 3Rs

The concept of minimizing waste impacts in terms of quantity or ill-effects, by reducing quantity of wastes, reusing the waste products with simple treatments and recycling the wastes by using it as resources to produce same or modified products is usually referred to as “3Rs”, Reduce, Reuse and Recycle (Shimizu, 2006). Purchasing and using resources with care can reduce the pace of consumption of resources and further connected energy and resources. Ultimately reducing wastes in multifold streams. When long lasting goods are reused time and again, it offsets harvesting of new similar or same products. This saves fresh resources exploitation and waste generation quantity. Some waste products can be consumed as resources for production of different goods or the same product, meaning recycling the same resource. This too saves fresh resources and offsets waste generation. All in all, the 3Rs individually or collectively saves fresh resources exploitation, add value to the already exploited resources and very importantly minimizes the waste quantity and its ill effects.

Since late 1990s and especially after the 2002 World Summit on Sustainable Development (WSSD) at the Johannesburg, 3Rs concept has become a limelight in the solid waste management paradigm (TEI and Sasaki, 2006). The developed countries have adopted the concept with strategic policies and legal instruments. In developing countries, the concept is taking time to gain its popularity mainly due to low literacy rate, limited technological options and the economic factors. The Japanese government is asserting immense efforts to elevate 3Rs initiative in the region (TEI and Sasaki, 2006). The bigger neighboring countries like India, Thailand, Malaysia and China have begun to accept the concept and exercise pilot projects.

Following are some of the identified 3Rs options for the predominant wastes in Asian countries (IGES, 2006):

- (i) Organic waste: Compost and methane fermentation for organic wastes instead of conventional system of incineration and landfill disposal.
- (ii) Medical waste: Either incineration or autoclaving to prevent infectious disease outbreak or soil/water contamination from untreated medical waste.
- (iii) Waste electrical and electronic equipment (WEEE): Promoting and formalizing regional/international collaboration in trading and recycling recyclable materials between countries to prevent release of hazardous materials from WEEE wastes.
- (iv) End-of-life vehicles: Similar to WEEE wastes, end-of-life vehicles also should be recycled through international/regional collaboration and prevent their hazardous materials release to the environment.

For countries like Bhutan, the policy and institutional arrangement options of the 3Rs concept may be more cost-effective. To this the public awareness and education has to be the priority. Implementation of the first two Rs (Reduce and Reuse) is purely dependent on every individual. Therefore, its success fully depends on public knowledge and participation. Even the third R (Recycle), has to depend strongly on public participation. The quality and market of the organic wastes compost and paper and plastic wastes recycled products depend on the quality of raw material wastes segregated at the source point. And the wastes segregation at source has to be qualified by every individual's effort. An appropriate facility for collection and disposal of course has to follow to complete the wastes management channel.

4 State of MSW management; e.g. Thimphu

The solid wastes collection, transportation and disposal at Memelakha for Thimphu was initiated since May 1993 (TCC, 1992). Over the years there has been no improvement or changes in the system. The site at Memelakha is overflowing with wastes. Yet, there is no alternative site or options to stop disposing the wastes at this site. An alternate site identified lacks fund to construct an access road and to develop the site (MoWHS, 2007). Recycling of wastes has been practiced by only the informal waste pickers including business ventures, scavengers and municipal waste collection laborers.

MSW inventory

The TCC project document (TCC, 1992) assuming 0.7 per capita waste generations for a population of 25,000 people estimated daily total wastes generation of 17.5 tones in 1992 to develop the Memelakha wastes disposal site. The Royal Society for Protection of Nature's survey in 2005 (RSPN, 2006) found 36.7 tones daily wastes collection from

Thimphu municipality. My Master Degree thesis survey in 2007, endeavored to understand the composition of the wastes, variety of sources, per capita waste generation capacity of Thimphu city revealed few interesting information. A weeklong physical survey at Memelakha disposal site saw 16 trucks/containers in average coming to the disposal site daily to unload the wastes collected from Thimphu municipality. The trucks/containers carry in average less than 2 tones of commingled wastes. The waste carrying trucks/containers are deprived to carry more wastes in terms of density because of the high volume content of carton/cardboard boxes from every source point. The average sum of the daily waste collection therefore is around 31.5 tones. This is around 49% of the source waste generation capacity. All the 51% uncollected waste is not expected to remain in the environment since the study survey did not cover the percentage of wastes separated/collected by informal waste pickers for exporting. Also, organic wastes (food and vegetables) consumed by the cattle and the stray dogs scavenging freely at the disposal site is not accounted.



Figure 1 Photos of the scavengers at the Memelakha MSW disposal site

From the survey of the wastes at the source point for three months, it was seen that the daily waste generation capacity of the city is around 64.5 tones per day. The residential households constituting around 91% of the source components contribute the highest percentage, around 70% of MSW. The per capita waste generation capacity of the residential households confirms to 0.56 kg/person/day, calculated from its 44,400 kg/day waste generation quantity against the 79,185 persons, population figure of the year 2005.

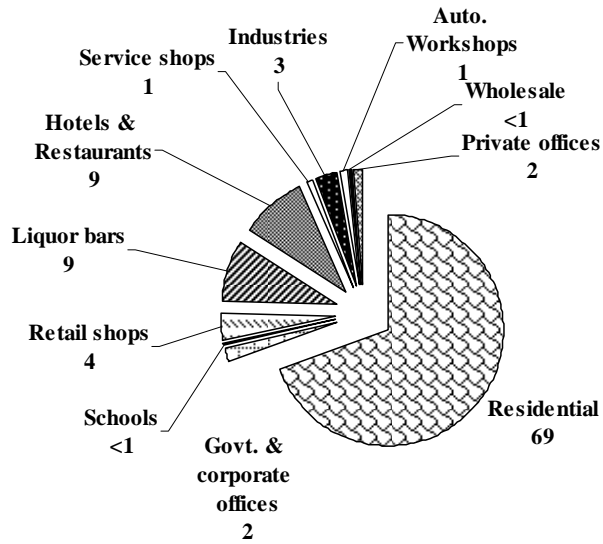


Figure 2 Percentage waste generation by sources of the total 65 tones

Waste % by composition

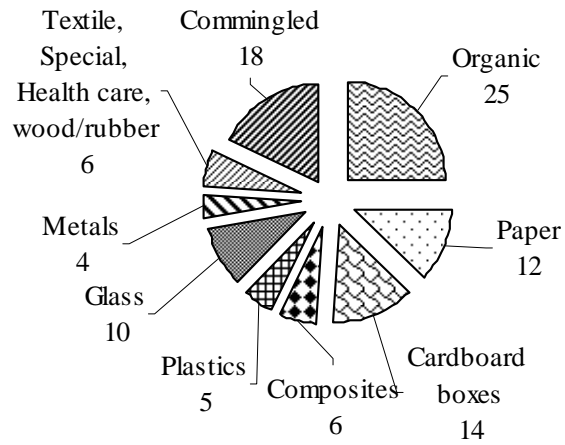
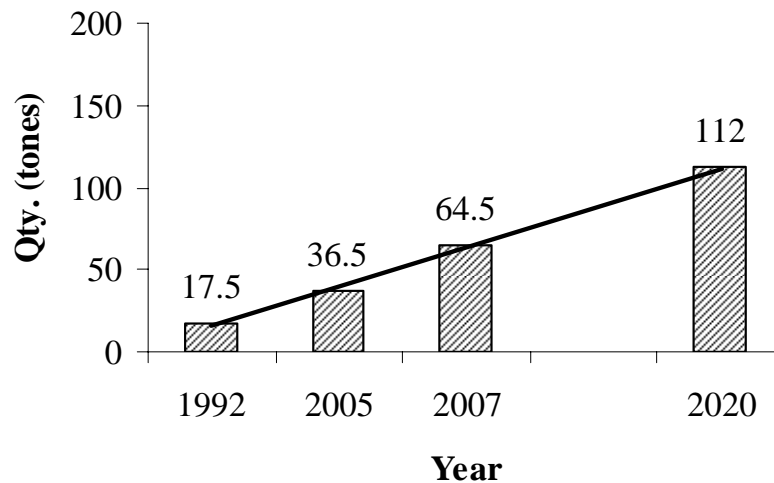


Figure 3 Percentage waste generation by compositions of total 65 tones

Wastes escalation trend

Comparing the result outputs of various studies in 1992, 2005 and 2007, the waste quantity in Thimphu has escalated by almost four folds in a span of 15 years. The waste quantity increase has been mainly due to population increase. With this trend, should Thimphu harbor more than 200,000 residents by 2020, the daily waste generation quantity will be more than 110 tones.

Waste escalation trend



Source: TCC, 1992; RSPN, 2006; Penjor, 2007

Figure 4 Waste quantity escalation trends in Thimphu

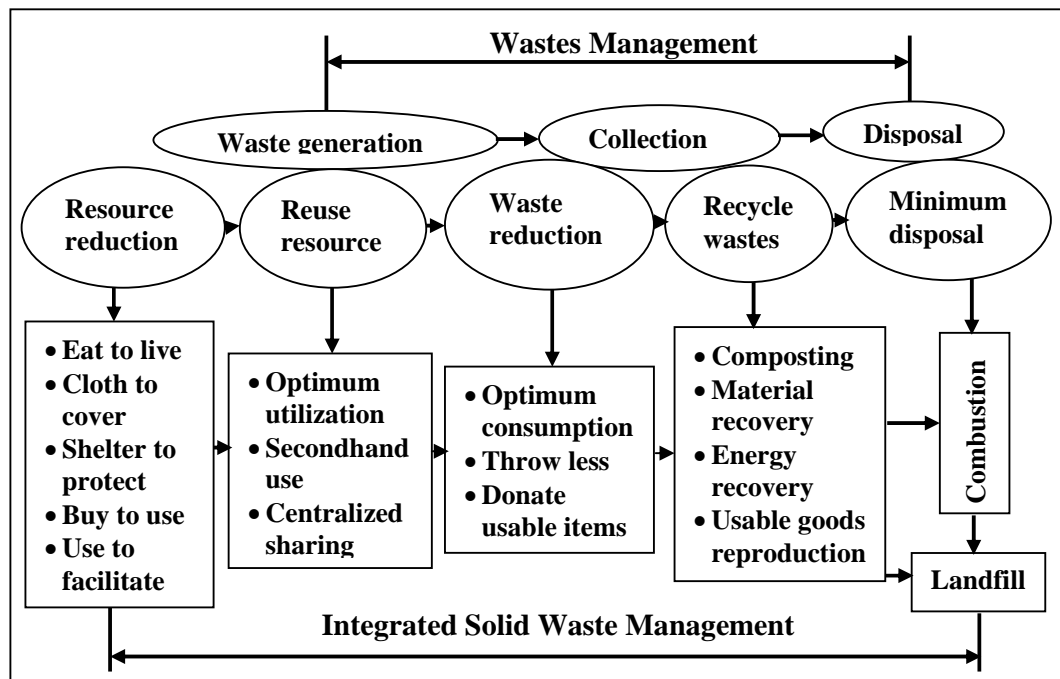
5 MSW management options

If compared with the size of urban areas and the waste quantities in the region, Bhutan's solid wastes is so small that it should be manageable. It should be manageable with appropriate policies and institutional setup in place. Not necessarily requiring sophisticated and expensive technologies. To implement policy and institutional options, public awareness and education is a must. The thesis survey questionnaire interview of 148 residential households representative sample distributing 37 representatives for each four main parts of the city and considering having more than one car, only one car and no car as living standard indicators, it was found 4% of Thimphu's population is with high level income, around 60% middle level income and 36% low level income societies. The public awareness and education scheme and the waste management options therefore must target the middle and lower income groups.

A situation that improves the situation in Thimphu further can be replicated across the country.

5.1 Integrating options in wastes management systems

The conventional systems of solid wastes management involving collection, transportation and disposal fails to confront the challenges posed by the modern wastes evolution. It is therefore important to keep integrating innovative techniques in the prevailing systems to tackle the challenges. The innovative techniques to be integrated must be capable of reducing the quantity of wastes, recovering materials for recycling, producing energy or alternate resources from the wastes, and ultimately reducing hazardous effects for more safe and efficient disposal. A system that integrates various effective techniques towards achieving safe and sustainable wastes management is called the Integrated Solid Waste Management (ISWM). Every individual role is crucial and can be integrated in a waste management process as displayed below.



Source: Modified from (Hickman, 1999)

Figure 5 Individual roles integrated in the Solid Waste Management systems

5.2 Public awareness and education

Public awareness is a mass capacity building instrument. With adequate information dissemination, more and more people will understand the benefits of the wastes management. Increase in number of people understanding the problems of wastes and knowing how to manage it adequately will benefit the MSW management implementers and the public at large. Other than the ad-hoc cleaning campaigning conducted by various governments, NGO and private agencies, no regular public awareness program exist. The media actually can play a crucial role in disseminating public information. However, the financial resources limit both the media agencies and the environmental agencies to advocate regular public awareness programs.

Also, the educational institutes have a continued lead role to play in public awareness and education. From the lessons learned as of now, school authorities and the students have been very instrumental in influencing general public on the solid waste management. The schools in Thimphu practice pilot waste segregation to demonstrate the benefits of waste segregation. The schools also adopted one stream each, flowing next to the school premises, posting sign boards to refrain from littering wastes into the streams. However, the same constrains; resources and manpower also have strike a balance to make further advancement in the systems. For long term benefit, Education Ministry and NEC should explore possibilities of introducing waste management education in the regular school curricula.

Other agencies can share the responsibility of public awareness and education through practical means of;

- i) The municipal authorities (City Corporations) can mandate the building owners and the landlords to maintain cleanliness in their property premises through fees or monitoring penalty imposition,
- ii) The Road Safety and Transport Authority (RSTA) can mandate the public transport services to provision wastes collection bag/bin in the buses and the taxis, and before beginning each journey, the drivers can announce use of the collection bins to the passengers instead of littering out of the window,
- iii) Department of Trade (DoT) can mandate the business communities to cross-check unnecessary packages while importing and accepting back the obsolete goods and packages from the customers with inbuilt costs,
- iv) The Department of Industry (DOI) mandating the industries to manage their own wastes and explore consuming MSW components,
- v) The Department of Revenue and Customs (DRC) can introduce environmental taxes on goods potential to produce hazardous and non-biodegradable wastes and relax PIT, BIT, and Sales taxes on the wastes management ventures,
- vi) Civil Societies like RSPN can research and demonstrate practical wastes management options that can be later adopted at full scale by the private and the municipal agencies,
- vii) Media agencies can have at least one programme on waste issues everyday.

6 Recommendations

For an effective wastes management system, the up-coming National Assembly must adopt the draft Wastes Prevention and Management Act and the Royal Government should immediately sensitize the provisions of the Act. Enhancing public awareness and education is the backbone for success of an effective wastes management. This draft Act has widespread provisions to enhance public awareness and education through responsibility sharing by various agencies.

References

- CBS, (2004). Gross National Happiness and Development. In *Proceedings of the First International Seminar on Operationalization of Gross National Happiness* (pp. vii-xi). Thimphu: The Centre for Bhutan Studies.
- Fernandez, A. L. (1997). *Recycling in Asia: Partnerships for Responsive Solid Waste Management-Introduction*. Nagoya: United Nations Centre for Regional Development.
- Hickman (Jr.), H. L. (1999). *Principles of Integrated Solid Waste Management*. USA: American Academy of Environmental Engineers.
- IGES (2006). Asia Pacific Forum for Environment and Development (APFED) Policy Dialogue Working Paper Series No.2. In *Proceedings of the APFED Expert Meeting on the 3Rs in Asia* (pp. 1-26). Tokyo: Institute for Global Environmental Strategies.
- Kuensel, 2005. *Champion of the Earth. Bhutan's weekly National Newspaper, Kuensel issue of April 23, 2005*. Retrieved on 31st October 2006, from Bhutan National online Newspaper, Kueselonline website:
<http://www.kuenselonline.com/modules.php?name=News&file=article&sid=5346>
- Kuensel, 2006. *His Majesty conferred Conservation Leadership Award. Bhutan's weekly National Newspaper, Kuensel issue of October 25, 2006*. Retrieved on 31st October 2006, from Bhutan National online Newspaper, Kueselonline website:
<http://www.kuenselonline.com/modules.php?name=News&file=article&sid=7632>
- MoWHS, (2007). *Final draft of Thimphu City State of Environment Report*. Thimphu: Ministry of Works and Human Settlement.
- Penjor, Y., (2007). Enhancing Municipal Solid Waste Management with 3Rs Option in Thimphu, Bhutan. *Masters Degree Thesis*. Bangkok: Asian Institute of Technology.
- PHCB, (2005). Population and Housing Census of Bhutan, 2005. *Results of population and housing census of Bhutan, 2005*. Thimphu: Office of the Census Commissioner.
- RGoB, (1999). *The Bhutan Municipal Act, 1999*. Thimphu: Royal Government of Bhutan.
- RSPN, (2006). Public Private Partnership for Urban Environment (PPPUE). *Policy Framework for Solid Waste Management*. Thimphu: Royal Society for Protection of Nature.
- Shimizu, K. (2006). Environmental Management: 3R (Reduce, Reuse, Recycle)/sustainable Production and Consumption (SPC). *Training course material (34th International training course in Regional development in Japan, 18 May-28 June 2006)*. Nagoya: United Nations Centre for Regional Development (UNCRD).
- TCC, (1992). Solid Waste Management for Thimphu City, Bhutan. *Final draft project document by Carl Bro International*. Thimphu: Thimphu City Corporation.

Tchobanoglous, G., Theisen, H., and Vigil, S. (1993). *Integrated Solid Waste Management: Engineering principles and management issues*. Singapore: McGraw-Hill, Inc.

TEI and Sasaki, (2006). Better Practice of Waste Management in Thailand. *Proceedings of the APFED Expert Meeting on the 3Rs in Asia* (pp. 1-17). Bangkok: Thailand Environment Institute.

TERI, (2006). *Types of solid waste*. Retrieved on 1st August 2006, from The Energy Research Institute, New Delhi website:
<http://edugreen.teri.res.in/explore/solwaste/types.htm>.