Public Private Partnership for Urban Environment

Policy Framework for Solid Waste Management

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CHAPTER 1

INTRODUCTION

The state of the urban environment in most developing countries is deteriorating as public facilities and services fall short of the growing size and numbers of cities. Amongst others, the issue of solid waste management poses a phenomenal challenge. On the one hand, underdeveloped waste collection systems and inappropriate disposal of final wastes have caused environmental and health problems especially within the vulnerable section of urban dwellers of the developing economies. On the other hand, levels of economic growth, subsequent changes in consumption pattern and a high urban population growth rate have all led to increase in the quantity and composition of wastes.

In Bhutan, the two urban centers of Thimphu and Phuntsholing exhibit a complexity of environmental and social issues including the problem of municipal wastes. Inadequate management of solid waste and waste waters are some of the conspicuous environmental problems arising due to insufficient infrastructure planning and municipal facilities and services. This problem is further compounded by a population growth rate estimated between 7-10% per annum (ADB) mostly due to rural-urban migration. Currently, there are 54 urban settlements of varied sizes accommodating about 137000 people. About 21% of the total population lives in urban areas. At the rate of growth of urban centers and population added to rural urban migration, it is envisaged that by 2020, half of the Bhutanese population will live in urban areas (NBC 2002). At this rate, the issue of solid waste management and associated environmental and social problems will be more pronounced in the absence of a proper solid waste management system.

Reports on the status of environment in Thimphu and Phuntsholing indicate that the municipal authorities now collect 36.70 and 24.76 tonnes of solid wastes respectively which accrue to more than three times the amount that was produced in 1998. Over the years numerous cleaning campaigns and advocacies have failed a behavioral change in the urban residents. The general notion that the municipals alone are the responsible organizations for managing the urban environment is a serious concern. At the institutional level, there is an acute lack of partnership and cooperation amongst the various stakeholders engaged in waste management. Although some forms of solid waste management are in place in about 12 towns, the municipalities

continue to face major challenges in the absence of a well developed regulatory and legal framework with stringent enforcement mechanisms to coerce the mass to comply with the rules. It is also worth mentioning here that, with more of the rural areas becoming accessible to market and external products, garbage is a cause for concern in the rural areas as well. In essence, substantial inefficiencies in institutional and legal arrangements, strategic planning, insufficient resources and lack of civic responsibilities of the so called resident urbanites are some of the prominent issues compounding the waste management problem.

As a result, solid waste and indiscriminate open dumping are creating unsightly surroundings, choked drains and eventually polluted waterways that not only contaminate the natural environment, but also pose serious hazards to public health. This affect of rapid urbanization on the environment is well recognized by the Royal Government (Vision 2020, p30 & p60). Lack of proper waste management also jeopardizes Bhutan's reputation as a clean and green country which could affect tourism, one of the key target sectors for economic growth.

The concerns related to urban solid waste management in Bhutan was brought to public attention by Honorable Lyonpo Kinzang Dorji during the World Environment Day 2005. In his address, he said that littering and solid waste was threatening to tarnish Bhutan's reputation as a clean and green kingdom (Kuensel, June 2005). Similarly, the Deputy Minister for Environment, in his report to the National Assembly in 2004, highlighted that growth in urban areas; population and infrastructure development are fast becoming major emerging issues for the environment and natural resources of Bhutan. Furthermore, he emphasized that there is an urgent need for developing urban management plans which include air pollution, protection of water bodies and waste management systems (NEC, 2004).

Public-Private Partnership for Urban Environmental Management

Considering that the solution to the waste problem requires a concerted effort on the part of urban dwellers, households and institutions, there is an acute need to assess and provide solid waste management options for urban centers in Bhutan. As a neutral body, the Royal Society for Protection of Nature (RSPN) initiated a Public-Private Partnership for the Urban Environment (PPPUE) project with financial support from United Nations Development Program (UNDP). The PPPUE is a recent innovative approach of the United Nations Development Program where the responsible stakeholders work together with a common goal to further

improve urban environmental conditions. This facility supports the development of innovative partnerships at the local level. Focusing on assisting small and medium-sized cities, PPPUE works with all potential stakeholders, including investors, providers, regulators, users, and experts to meet the challenge of providing basic urban environmental services. Participation, local ownership, and shared responsibility are important aspects of PPPUE's innovative approach. This complementary approach with a unique international network, flexible design and a constant feedback mechanism contributes to the success of Public-Private Partnerships. The management structure reflects PPPUE arrangement as a multi-partner and multi-donor facility. PPPUE is designed as a complementary facility to the many existing initiatives and institutions, and works with a variety of partners at global, regional and country levels.

The partnership process is often complex, labour-intensive, and time-consuming and sophisticated skills are needed to ensure success. Yet, as the following results demonstrate, in terms of tangible progress toward the creation of viable environmental businesses, the capacity-building value of process, and the mobilization of public and private sector investments in time and cash, the PPPUE approach offers one of the best values in the global development community. PPPUEs promote the use of a transparent process based on clearly defined criteria to identify all private sector partners. In order to be eligible for selection, the private public participation has to:

- *be willing to contribute to the cost of the project's pre feasibility and feasibility studies*
- *be prepared to invest in the new company when it was formed*
- *have experienced operating the eco-efficient technologies to be used by the new company*
- *have experienced operating in the country where the new company was established*
- *have the support of its own government's development agency; and*
- *strongly support and advocate eco-efficiency, local participation, and respect for local cultural values*

In many cases, NGOs provide valuable local knowledge, insights, and contact networks that improve project quality and increase the level of local participation. Furthermore, NGO participation lends greater transparency to the PPP process and helps ensure that local needs and priorities are met in a cost-effective manner.

Although a major component of urban waste in Bhutan is recyclable, the private sector is still not willing to invest in recycling facilities as the volume of waste is still low to justify major investments. Various stakeholder agencies indicated that they had received several proposals from private entrepreneurs who were keen to set up recycling plants but were willing to do it only if the government offered some assistance in procuring the equipment or provided some sort of subsidy. Therefore, this might be an area where the PPPUE concept could be used to support private individuals in setting up recycling facilities. Support could be in the form of providing technology, training, subsidies, and marketing.

This PPPUE project of RSPN was aimed at establishing a steering group to review existing policies, laws, rules/ regulations on solid waste management and to develop a policy framework including an action plan to improve urban environmental conditions through partnerships arrangements that allows private sector involvement in service delivery.

RSPN, along with the Thimphu City Corporation and relevant stakeholders including private sector representatives will upscale this PPPUE proposal to an Innovative Partnership Grant (IPG) project. Therefore, this outcome from the PPPUE project forms the basis for the development of the IPG project proposal. The findings contained in this document are results from a concerted effort of the respective stakeholder agencies and the PPPUE Steering Committee that will continue to build the partnership further in the next project to find lasting solutions to urban waste and environmental management issues in Bhutan.

CHAPTER 2

PROCESSES AND METHODOLOGY

During the project period, various activities were implemented to support data collection, analysis and report compilation. These activities were conducted using appropriate processes and methodologies to fairly represent the urban waste management scenario and the opinions of the stakeholders in tackling the issue. The process/methodology comprised of the following activities:

1. Initiation of Public-Private Partnerships

The first step in the process was the formation of the PPPUE project steering group. It is envisaged the significance of a partnership as a major element for long term urban waste management. Considering that partnerships need to be developed from the initial stage of project planning, a number of stakeholders were identified to form the PPPUE steering committee. Partnership between public and private entities is also considered strategic to successfully tackle urban garbage problems and rooting out a general urbanite attitude of associating the City Corporation as solely responsible for urban waste management. Hence, a PPPUE steering committee representing various agencies that have stakes in waste management was formed.

Table 2.1: PPPUE Steering Committee Members

No	Name	Designation	Organization	Sector
1.	Dasho Zhamling Dorji	Vice President	Bhutan Chamber of Commerce and Industry	Private Sector
2	Captain Tshewang Rinzin	Legal Officer	Royal Bhutan Police	Public Sector
3	Ms. Tashi Chuki Wangdi	Environment Engineer	Ministry Of Trade and Industry	Public Sector
4	Ms. Tashi Paydon	Executive Director	Royal Society for Protection and Care of Animals	Public Sector (NGO)
5	Mr. Chengay Penjor	Head	Environment Division, Thimphu City Corporation	Public Sector
6	Mr. Namgay	Head	Bhutan Broadcasting Service	Public Sector
7	Mr. Pema Dorji	Environment Officer	Ministry Of Works and Human Settlement	Public Sector
8.	Mr. Tandin Dorji	Communication	National Environment Commission	Public Sector
9	Mr. Kinga Wangdi	Environment Education Officer	Royal Society for Protection of Nature	Private Sector (NGO)

2. Data collection, compilation and analysis

Both primary and secondary data related to urban waste management in Thimphu and Phuntsholing were collated. The primary data consisted of information on waste generation, concerns of the urban poor and stakeholder opinion and feed backs. The survey results would guide the development of future policies and projects based on the PPPUE concept.

Between 15th and 20th of August 2005, the survey was carried out in Thimphu and Phuntsholing to assess:

- *Daily quantity and composition of urban waste*: This was done through a week long survey of wastes brought at the landfill sites in the two cities. The types and quantity of wastes were measured and

recorded. However, the survey did not cover the construction wastes dumped separately along the highway in Memelakha.

- *Urban amenities and concerns related to urban poor*: The cities were divided into various zones. Phuntsholing was divided into 9 zones according to a map that was provided by the city officials. Thimphu was divided into 18 parts/zones where a door to door survey was conducted in as many as 35 randomly selected households in each zone. The survey also specifically targeted the poorer sections of the towns by locating areas/zones where residents consisted of the lower income bracket.

A survey covering the amount of waste generated by individual households was conducted in 18 different areas in Thimphu and in 8 of the nine zones in Phuntsholing. From each area about 35 households were selected randomly and surveyed.

Consultations

Periodic consultations through regular meeting and stakeholder workshops enabled collection of primary information as well as secondary information. The consultations included:

- *Steering committee meetings*: This was conducted to brainstorm a framework for institutional coordination and to gather feedback on the consultant's report and the survey findings.
- *The National stakeholders' workshop*: A stakeholder's workshop was organized by Royal Society for Protection of Nature in collaboration with the Thimphu City Corporation on 27th January 2006 at the Royal Banquet Hall. Participants were invited from all the relevant ministries and concerned organizations of the Royal Government of Bhutan, civil society groups, NGOs and private organizations, automobile workshops and from the neighboring districts of Chukha and Paro. The objectives of the workshop were:

  i. To sensitize participants on waste issues in the country

  ii. To present the findings and the recommendations of the survey report and consultants report

  iii. To develop an action plan and partnership framework for PPPUE in Bhutan

The consultation process also enabled the project to garner the support of the Royal Government in addressing the issues related to urban

environment. The national workshop was addressed by Dasho Nado Rinchhen, Deputy Minister of National Environment Commission which indicated the support of both the Royal Government and the keenness of the Thimphu City Corporation to implement the outcomes of the Publuc-Private Partnership action plan for solid waste management in Bhutan.

Review of existing policies, rules and regulations

A local consultant was employed to review existing policies, rules and regulations related to urban environment management. This was mainly done through use of secondary information contained in existing policies, laws, rules and regulations. It was aimed at identifying gaps and recommending suitable policy and legal instruments to address the existing issues and problems associated with solid waste management in Bhutan.

Data compilation and analysis

The data collection from the surveys was fed into a computer database. Using SPSS (Statistical Program for Social Science), solid waste data was analyzed to derive the current situation of solid waste management in the two cities of Thimphu and Phuntsholing. Further, the outcomes of the stakeholder workshops and contributions of the individual steering committee members provided the basis for viable solutions/ recommendations. Secondary information contained in media and discussion forums were also referred to include public concerns and solutions.

3. Awareness and advocacy Program

Simultaneous public awareness and advocacy program was an important aspect of the project. The project relied significantly on public feedback for development of viable solutions including policy changes. However, the level of public feedback depended mostly on their awareness about the issues. Therefore, public awareness about the issues was carried out to:

- Raise the level of public awareness about the extent of solid waste problem in the two cities.
- Build the local support base for policy change
- Bring into context the need for public-private partnership in urban solid waste management.

Based on the findings from the waste survey, a 25 minute program on waste management was produced and aired through the Bhutan Broadcasting Services television program. This awareness program was also aimed at advocating with the Royal Government for policy changes.

CHAPTER 3

POLICY REVIEW

While the issue of urbanization and associated concerns are well recognized and reflected in government documents, policies/regulations that directly relate to solid waste management are broad, vague and inconsistent. Some of the rules, regulations, guidelines and policy documents that potentially provide the basis for the above law include the following:

3.1 Action Plan for Thimphu 1992

The Thimphu City Action Plan was prepared by the National Environment Commission and the Thimphu City Corporation. The action plan was intended to provide the first step towards making Thimphu a model city. The following recommendations were highlighted in the Action Plan:

- Autonomy of the Thimphu City Corporation in Administrative and Financial matters. Only through such autonomy it is possible to ensure City Corporation's ability to implement its plans and to develop the necessary sense of responsibility among the citizens; e.g. by correlating fees and taxes directly with benefits derived from such sources.
- Development of necessary legislation to enable the City Corporation to implement decisions with a proper legal background
- A mobile inspection team was also proposed to ensure implementation of necessary measures to keep Thimphu clean.

Although timings were set for the various activities highlighted in the Action Plan, none of the above three recommendations which would have had immense implications on urban waste management were implemented.

3.2 Notification Banning Car Washing in Streams and Rivers, 1994

The National Environment Commission issued a notification banning car washing in streams and rivers around the country. However, the notification was not followed up with any effective implementation.

3.3 Water and Sanitation Rules, July 1995

The Water and Sanitation Rules of July 1995 by far contain the most comprehensive list of provisions related to urban waste management in Bhutan. The Water and Sanitation Rules of July 1995 was prepared by the

Public Works Division of the Ministry of Communications. The rationale for the regulation lay in the fact that uncontrolled disposal of solid waste in densely populated areas cause visual pollution, unhealthy conditions, waste of resources and use of valuable landfill sites. Therefore, the purpose of the policy was to safeguard public health, maintain good visual appearance of the community and minimize the quantity of waste that is disposed off.

Accordingly, the rules were formulated to ensure accountability, equitable access to safe and reliable water supply, and clean and healthy living environment which is one of the prerequisite for sustainable urban development. The rules spell out the modalities for efficient management of urban utilities with clear delineation of responsibilities between the City Corporation and the Residents. The rules include provisions to address urban waste management and can be categorized into general, specific and amendment rules as follows:

General rules:

Provisions for littering and unauthorized dumping clearly state that all solid wastes, unless specifically explained in the rules, shall be disposed off in receptacles provided or approved by the City Corporation. It also prohibits littering and unauthorized dumping of solid waste not only in Thimphu but throughout the country.

The rules not only prohibit any individual from damaging any public waste collection equipment, including use-me bins, bin supports, and steel containers but also restrict burning of waste, disposal of hot ashes, and activities that potentially cause damage to public waste collection equipment. Further, it prohibits any person from removing public waste collection facilities from the locations assigned by the City Corporation.

Burning of solid waste within city boundaries is permitted under no circumstances of threat to public health, safety, property and the environment. The city corporation may order the burning of solid waste be ceased under conditions including, but not limited to, nuisance smoke, fire hazard, or poor air quality. It also requires the ashes from burnt solid waste to be disposed off in the same manner as household wastes but not in a condition of causing fire.

The rules also require composting within the city limits to be conducted in a manner that prevents animals or the weather from scattering the composting materials and which does not create unreasonable odors, vermin or other nuisance.

Scrap dealing is permitted under the condition that scrap dealers are required to have valid licenses, city corporation approved location, accept legally obtained scrap, store scraps in enclosed compounds with no threats to public heath and safety; maintain cleanliness of the storage to prevent rats and vermin, segregate and store hazardous and inflammable waste under roofed area to prevent seepage/leakage into the environment. They are also required to dispose off the unsold scraps and associated solid waste in a way that is approved by the city corporation.

Specific rules:

While the above regulations focus on the various ways of disposing waste, there are also specific rules for the urban entities that generate waste. The rules require all residents, businesses and institutions, as generators of wastes within the city boundaries, to manage the solid waste that they generate in a manner that does not threaten the public health or the environment. Specifically, residences are required to dispose off all solid wastes, other than the composted or recycled ones, in a container or bin approved by the City Corporation at established locations. Business establishments such as shops and hotels are required to provide a waste container of a type approved by the City/Municipal Corporation and the containers are required to be emptied at collection locations as per schedules. Vendors and customers at the public markets are required to dispose off all solid waste generated in the bins provided by the City/Municipal Corporation.

Institutions including health care facilities such as hospitals and clinics are required to abide by certain regulations in the disposal of pathological, infectious, pharmaceutical and other wastes requiring special care. Pathological and infectious wastes are required to be collected in a sterilized container or disposable bag and incinerated at the Jigme Dorji Wangchuck National Referral Hospital or treated by decomposition in slaked lime. The rules also prohibit disposal of special hospital waste and pharmaceutical waste in the City/Municipal Corporation's public waste bins or containers. Health facilities are required to collect special hospital waste and pharmaceutical wastes in labeled boxes and dispose off in a manner that prevents accidental contact with waste collection workers or the public. Incinerated ash and fully decomposed treatment residues shall be disposed off in the same manner as waste from residences.

Offices, schools, and institutions are required to provide sufficient receptacles for solid waste. The non recycled contents are required to be emptied into a container or bin approved by the City/Municipal Corporation at an established location. Non-domestic solid wastes generated at

construction or demolition sites, including, but not limited to, concrete and brick rubble and wood waste, is prohibited for dumping without the disposal instructions from the City Corporation.

Vehicle repair workshops within the city boundaries are required to dispose off solid wastes that they generate in ways that do not threaten the environment or the health and safety of its workers and the public. They are subject to sanitary inspection for compliance of the rules including:

- Storage of waste oil in drums under conditions that minimize risk of fire and accidental spillage or leakage; prevent flow of oil into water bodies;
- Disposal to city's landfill site is prohibited. Disposal is permissible only through methods that include burning of oil wastes in appropriate apparatus or shipping to an oil recovery business.
- The rules also requires chemical industries to dispose off chemical wastes either through shipment to qualified recycling business for recovery or by minimizing the impacts through neutralization and evaporation processes.
- Industries: located within the city limits are required to minimize quantity of industrial waste and dispose off in ways that do not threaten the environment, health and safety of its workers and the public. They are required to provide reports every two years on the type, source, and quantity of industrial wastes it generates. The City/ Municipal Corporation on the basis of the report will provide directions for disposal.

It is the policy of the city corporation to encourage residences, commercial establishments, institutions and industries, located with the city/municipal boundaries to sell or otherwise recycle recyclable material rather than disposing it.

The water and sanitation rules also contain regulations for collection, transport and disposal of solid waste.The rules require that the collection, transport and disposal of solid waste that is generated within the city/municipal boundary shall be done in a manner that protects both the environment and the health and safety of the public and the waste workers. It requires the City/ Municipal corporation to conduct solid waste management by:

- providing/ approving sufficient waste collection receptacles and locations for the public use;
- collecting solid waste at a frequency and in a manner sufficient to protect public health and prevent visually unattractive conditions;
- transporting solid wastes in a manner that prevents its blowing or falling from collection vehicles;
- disposal of solid wastes in city/municipal corporation approved locations and disposal disposal sites and practices to comply with applicable Royal Government environmental standards.

The rules also provide for sanctioning of fines or labor contributions to clean up solid waste within the city as may be specified by the City Corporation from time to time. The respective municipalities are authorized to amend the rules from time to time as necessary.

This document grants the City Corporation with the authority to enforce the rules contained therein, and also enact and enforce solid waste management rules in the future.

3.4 Bhutan Municipal Act 1999

This Act was prepared by the Ministry of Works and Human Settlements. The Bhutan Municipal Act 1999 aims to enable the establishment of municipal corporations as legal entities with perpetual successions, and to confer on them such powers as required to forge partnerships between the municipal corporation, the residents, business and industries of the municipality for effective development and governance of the Kingdom's urban communities. The Act does not contain any specific provisions related to urban waste management.

3.5 Environmental Assessment Act 2000

The Environmental Assessment (EA) Act, 2000 was prepared by the National Environment Commission and entered into force on 14th July 2000. The Regulation for Environmental Clearance of Projects and the Regulation on Strategic Environmental Assessment came into effect on 4th April 2002. The EA Act, 2000 and its Regulations require all projects to obtain environmental clearances before their establishment or commencement, either from a designated Competent Authority or the National Environment Commission. The Act requires relevant sectors to address effluent, air

pollution and solid waste generated by industries. However, it does not address urban waste management.

3.6 Environmental Codes of Practice for Hazardous Waste Management 2002.

The Environmental Code of Practice (ECOP) for Hazardous waste management was prepared by the National Environment Commission. The main objective of this guideline was to promote sound environmental practices in the management of hazardous wastes. This code of practice has not been specifically incorporated in the urban solid waste management rules.

3.7 The Middle Path "National Environment Strategy" 1998

Bhutan's National Environment Strategy was prepared by the National Environment Commission in 1998. *"Preparing for Rapid Urbanization"* was included as a special focus area in the document where waste disposal and urban pollution were identified as two of the greatest problems confronting urban development in Bhutan.

The strategy recommended municipal legislation so that plans and policies to address urban development could be implemented effectively.

3.8 Ban of use and sale of plastic bags and wrappers

The Ministry of Trade and Industry's public notification No. MTI/VII-3/427 of April 20th 1999 formally banned the use and sale of plastic carry bags, package wrappers and pouches in the Kingdom.

On consultation with the Ministry of Health, Ministry of Education, Ministry of Communication, Ministry of Works and Human Settlements, National Environment Commission, Bhutan Chamber of Commerce and Industry and Thimphu City Corporation, MTI reaffirmed the Notification on June 5, 2005.

3.9 Ninth Plan Main Document (2002 -2007)

Chapter 28 of the 9th Plan Document on Environment highlights waste disposal as an emerging problem in urban Bhutan. The document emphasizes that domestic waste constitutes the largest percentage of urban waste at approximately 70-80% in both urban and rural areas. Other contributors to waste are hospitals, industries and agricultural activities.

The document further commits to reduce waste problems in future where reduction in waste generation at source will be a key factor. Communities will be sensitized on waste reduction at source by promoting use of reusable

containers and better buying habits. Solid waste management rules will be refined and implemented, along with guidelines to promote reduction of waste at source.

3.10 Bhutan 2020 – A Vision for Peace, Prosperity and Happiness

Bhutan's 9th Five Year Plan Document states that Bhutan's development is guided by the document "Bhutan 2020: A Vision for Peace, Prosperity and Happiness", that sets out goals, broad targets and overall policy principles for the next two decades.

Bhutan 2020's Part II – Chapter 6 on *Balanced and Equitable Socio-Economic Development* talks of the need for an Urbanization Strategy to deal with the increasing number of people who are leaving their rural homes and migrating to urban centers.

3.11 The Penal Code of Bhutan

Article 408 of the Penal Code of Bhutan broadly provides the basis upon which an identity can be sued for polluting the environment. The article states that "A defendant shall be guilty of the offence of environmental pollution, if the defendant knowingly or recklessly pollutes or contaminates the environment including air, water and land, and makes it noxious to the public health and safety". Broadly, this can be interpreted to cover the inappropriate disposal of solid waste that mainly contaminates the land.

CHAPTER 4

FINDINGS

4.1 Solid Waste Management Scenario 2006

Thimphu and Phuntsholing represent Bhutan's most modern cities with populations of 98,676 and 79,185 respectively. Rapid development and a vibrant economy have brought about a scenario whereby the ability of individuals, households and communities to manage their own waste has fallen short of their ability to generate wastes. The two cities portray a trend that many other satellite towns are experiencing. Garbage generation in Thimphu and Phuntsholing have increased manifold. Today Thimphu produces over 220 tons of garbage a week, i.e an average of 36 tons per day as compared to 14 tons per day in 1998. Similarly, Phuntsholing generates over 148 tons per week i.e., 24.76 tons per day compared to between 12 to 13 tons per day in 2002.

During their visit to the study sites, surveyors also assessed the cleanliness of the areas on the basis of their own judgments. 57% of survey areas in Phuntsholing and 48% in Thimphu were assessed to be dirty. Although, the perspectives would vary from one individual to another, it is clear that not many areas are very clean *(Ref. Table 4.1).*

Table 4.1: Surveyors' perspective of cleanliness in Thimphu and Phuntsholing

	Thimphu		Phuntsholing	
	Frequency	%	Frequency	%
Very clean	15	2.4%		
Clean	295	46.7%	116	41.4%
Dirty	305	48.3%	159	56.8%
Very dirty	17	2.7%	5	1.8%
Total	632	100.0%	280	100.0%

With the growing problem of garbage, the issue of finding suitable land fill sites have equally become challenging to Bhutan. The lack of suitable terrain and the risks associated with seepage of toxic substances from landfill sites into rivers, streams and water bodies pose the challenge of dealing with such issues. In Thimphu, the landfill site that was designed to last for seven years has ended its life much before its life span. Finding new sites will require valuable areas to be converted into dump sites.

Table 4.2 below shows that a large proportion of wastes that takes space at the landfills are biodegradable green materials, which could alternatively be used for composting. In Thimphu, the green matter accounts for 57.28% of waste disposed off at the landfill site. This percentage is higher in Phuntsholing, accounting for 90.21% of the total wastes generated. While this may reveal higher incidences of reuse or recycling of non green wastes, it also presents enormous opportunity for the Phuntsholing Municipality to capitalize on composting as an alternative to increasing the life of the landfill site.

Table 4.2: Weight of Green and Non-Green waste in kilograms (Thimphu and Phuntsholing)

	Thimphu			Phuntsholing			Overall		
Date of collection	**Green Matter**	**Non-Green**	**Total**	**Green Matter**	**Non-Green**	**Total**	**Green Matter**	**Non-Green**	**Total**
15-Aug-05	24677	31035	55712	19201	2616	21817	43878	33651	77529
16-Aug-05	11197	3715	14912	22731	2446	25177	33928	6161	40089
17-Aug-05	12800	2283	15083	23806	2339	26145	36606	4622	41228
18-Aug-05	17670	12081	29751	23759	2217	25976	41429	14298	55727
19-Aug-05	32850	21190	54040	22908	2392	25300	55758	23582	79340
20-Aug-05	26939	23740	50679	21624	2532	24156	48563	26272	74835
Total	126133	94044	220177	134029	14542	148571	260162	108586	368748
Percentage	57.28	42.72	100	90.21	9.79	100	70.55	29.45	100

Table 4.3: Approximate daily waste generated by the households (in Kilogram)

Waste (kgs)	Frequency	Percent
1	137	15.0
1.5	202	22.1
2	176	19.3
2.5	62	6.8
3	97	10.6
3.5	51	5.6
4	17	1.9
4.5	18	2.0
5	17	1.9
6	11	1.2
7	61	6.7
8+	63	6.9
Total	912	100.0

Table 4.3 shows that 22.1% of the households surveyed in Thimphu and Phuntsholing (N=912) produce an average of 1.5 kg of waste while 6.9% produce over 8 kgs of waste on a daily basis. This however does not include the garbage that is commonly sighted in the areas surroundings residence and open spaces. It has been observed that although both the Thimphu and Phuntsholing City Corporations collect urban waste to help maintain a clean and hygienic urban environment, littering and inappropriate disposal of waste is increasingly becoming a cause for concern. Personal assessment of cleanliness of areas visited by surveyors (*Ref. Table 4.4)* revealed that 50.9% were dirty and about 2.4% very dirty. Only 45.1% of the surveyed areas were assessed to be clean. Hence, both the cities remain dirty in spite of the efforts of the municipalities to manage wastes. The table below indicates the extent of resident accessibility to waste disposal amenities.

Table 4.4: Personal Assessment of the areas cleanliness

Cleanliness	Frequency	Percent
Very clean	15	1.6
Clean	411	45.1
Dirty	464	50.9
Very dirty	22	2.4
Total	912	100.0

4.2 Access to waste disposal facilities/ services

The survey revealed several waste disposal methods adopted by the urban residents of Thimphu and Phuntsholing. The methods include disposal of garbage in city allotted steel containers, concrete pits, private garbage pits, through door to door collection, garbage collection truck service or other ways such as open dumping and burning. In Thimphu, the use of garbage disposal trucks account for 62.2%. Disposal in the remaining concrete structures remain as the next best option (17.9%). In Phuntsholing, city allotted metal containers (28.2%) and open dumping (22.9%) are the main disposal methods. Garbage trucks account for only 21.8% of the disposal options while concrete structures and private garbage pits account for a significant 13.6% and 11.4% respectively *(Ref. Table 4.5 and 4.6).*

Table 4.5: Percentage of households using different waste disposal methods

Disposal methods	Thimphu		Phuntsholing	
	Frequency	%	Frequency	%
Movable metal containers	16	2.5%	79	28.2%
Concrete pit	113	17.9%	38	13.6%
Pvt. garbage pit	29	4.6%	32	11.4%
Open dumping	34	5.4%	64	22.9%
Door to door collection	37	5.9%	6	2.1%
Truck service	393	62.2%	61	21.8%
Other - burning	10	1.6%	-	-
Total	632	100.0%	280	100.0%

The disposal methods mentioned above are closely linked to the availability of facilities and the enabling amenities such as roads. As evident from *Tables 4.6 and 4.7*, there is maximum use of garbage trucks and movable metal containers in linear settlements. In clustered and scattered settlements, the coverage of these two facilities is limited to areas accessible by road. Unfortunately, the settlements in these two cities are more clustered than linear.

Frequency table for type of facilities used in disposal of waste in different settlement types of Thimphu and Phuntsholing

Table 4.6 (a): Thimphu Municipality

	Linear		Clustered		Scattered	
	Frequency	%	Frequency	%	Frequency	%
Movable metal containers	2	2.0%	10	2.0%	4	11.4%
Concrete pit	3	3.0%	92	18.5%	18	51.4%
Pvt. garbage pit	2	2.0%	23	4.6%	4	11.4%
Open dumping	1	1.0%	33	6.6%	-	-
Door to door collection	8	8.1%	29	5.8%	-	-
Truck service	82	82.8%	304	61.0%	7	20.0%
Other - burning	1	1.0%	7	1.4%	2	5.7%
Total	99	100.0%	498	100.0%	35	100.0%

Table 4.6 (b): Phuntsholing Municipality

	Linear		Clustered		Scattered	
	Frequency	%	Frequency	%	Frequency	%
City allotted steel containers	53	54.6%	10	11.8%	16	16.3%
Concrete pit	17	17.5%	11	12.9%	10	10.2%
Pvt. garbage pit	4	4.1%	13	15.3%	15	15.3%
Open dumping	1	1.0%	26	30.6%	37	37.8%
Door to door collection	2	2.1%	4	4.7%	-	-
Truck service	20	20.6%	21	24.7%	20	20.4%
Total	97	100.0%	85	100.0%	98	100.0%

In Phuntsholing, open dumping is a major disposal option in the clustered (30.6%) and scattered settlement (37.8%). Households located further into the cluster resort to dumping of wastes in open spaces, gullies, and into streams and rivers.

Considering use of garbage trucks as desirable and the best option for urban waste disposal, the extent of its coverage reveals how much disposable garbage remains to be disposed through other means. In Thimphu, 64.6% of the respondents reported three scheduled collection by garbage trucks per week. However, in case of Phuntsholing, the garbage collection by trucks seems to be scheduled on a daily basis in some areas while other areas (32.5%) seldom have garbage trucks visiting the area *(Ref. Table 4.7).*

Table 4.7: Number of times of collection by garbage truck per week by settlement types

Collections per week	Thimphu		Phuntsholing	
	Frequency	%	Frequency	%
0	66	10.4%	91	32.5%
2	64	10.1%	-	-
3	408	64.6%	-	-
5	34	5.4%	-	-
6	60	9.5%	-	-
7	-	-	189	67.5%
Total	632	100.0%	280	100.0%

Roads are indispensable for an efficient and effective waste collection system. Without a road network especially in the urban areas, the waste collection facilities/system cannot reach the desired population group. Many households do not have convenient access to road. 44% of the population

has access to paved roads, 36% have access to unpaved road and about 20% have no direct access to road (*Ref. Table 4.8).*

Table 4.8: Accessibility to road

Type of road	Overall		Thimphu		Phuntsholing	
	Frequency	%	Frequency	%	Frequency	%
Paved	403	44.2	280	44.3%	123	43.9%
Un-paved	330	36.2	202	32.0%	128	45.7%
Non-Existant	179	19.6	150	23.7%	29	10.4%

In addition, households have to ensure timely arrival for disposal in accordance with the arrival of the garbage trucks. They are also likely to default this timing due to distance from the road point. As a result, disposal of garbage through scheduled collection by trucks is often a disincentive. Residents are most likely to resort to other disposal options of which open dumping are the easiest.

4.3. Existing efforts in waste segregation and recycling

Fourteen schools are involved in an RSPN project to encourage recycling in Thimphu. The RSPN has provided these schools with three steel bins for recycling cans, bottles and papers. Children are encouraged to bring their domestic waste for recycling to these facilities. Once the facilities are full, the items are sold to scrap dealers and the money generated is used to finance activities of the Nature Club. The same idea could be replicated in other schools in Thimphu and Phuntsholing and in housing complexes run by the National Pension Board etc. PPPUEs could also play a big role in starting off such projects all over Thimphu and Phuntsholing.

The Thimphu City Corporation and the Bhutan Beverages Company Limited opened a pet bottle crushing unit in Thimphu on November 14, 2005. Schools, scrap dealers, households from in around Thimphu can now sell pet bottles to the unit for Nu.5 per Kg. The unit not only reduces the pressure on the already full landfill site at Memelakha but also offers an outlet for those interested in recycling used pet bottles. However, the unit still needs more support to ensure its sustainability. This is another area where PPPUEs could play a role.

Under the ESPS Project, the Thimphu City Corporation has established a composting plant in Serbithang. It is envisaged that 70% of the weekend market waste will be used as raw material for the plant. The project is intended to reduce the amount of waste destined for the landfill and generate

revenue for Thimphu City Corporation through the sale of composts. The facility also has a separation unit where wastes will be segregated into bio-degradable, recyclables and non-recyclables.

4.4 Landfill sites and waste composition

Memelakha, the landfill site for Thimphu city is located about 12 km away from the city. It was constructed in 1992 and is still being used overflowing with garbage. The site is reported to have reached its capacity even before its estimated lifespan of seven years and yet an alternative site has not been constructed. In Phuntsholing, the landfill site at Toribari is located about 7 km from the city. It was constructed in 2005 and was designed to last for ten years. The survey on the daily wastes brought in from various parts of the two cities to the respective landfill sites revealed that there is 1) a growing rate of waste generation and 2) a lack of waste segregation practices.

Green matter constitutes 84% of the weight of wastes disposed off at landfill sites Thimphu and 97% of the total weights disposed off at landfill site in Phuntsholing *(Ref. Table 4.9*). While the statistics does not indicate the volume of waste, it certainly reveals the limitations imposed by green matter content of wastes on the efficiency and cost-effectiveness. The weight of green matter content requires garbage trucks to make more trips to the landfill sites compared to disposal of segregated non-green garbage.

Table 4.9: Green and non-green matter composition of wastes dumped at landfill sites

	Thimphu		Phuntsholing	
	Green matters	Non Green	Green matters	Non Green
Weight of the waste in kilograms	1801.90	337.08	7446.06	161.58
Percentage	84.24%	15.76%	97.88%	2.12%

Other components of wastes disposed at the landfill site include plastics and PET bottles, tins, glasses/bottles, papers/cardboards and rags. Table 4.10 provides the composition of the wastes by weight. It is important not to be misled by the relatively low weight figures of other wastes compared to the green matter. Green matter, constituting mainly of kitchen wastes and vegetables have high water content and therefore heavier. It is to be noted here that most of the other waste types can also be further reduced through segregation, recycling, and reuse.

Table 4.10: Weights (Kg) of different types of wastes dumped at landfill site (15–20 Aug. 2005)

	Plastics and PET bottles	Tins	Glasses/ bottles	Green matter/ Kitchen waste	Paper/ cardboards	Rags
Thimphu	307.03	57.17	210.80	1801.90	769.06	.
Phuntsholing	216.00	147.00	115.78	7446.06	273.11	56.00

Considering waste reduction, reuse, and recycling as the approach to solid waste management, attempts were made to ascertain the extent of such practices. The survey revealed the importance of facilities and services for garbage disposal as important for both the municipalities and the residents to dispose wastes appropriately. In Thimphu, 98% of the respondents felt that the facilities and services provided by the municipality were adequate although only 81% are happy with the collection timings. In Phuntsholing, only 43% of the respondents found the facilities adequate while the rest had either 'no idea' (48%) or found it inadequate (9%). 38% of the respondents were not happy with the service timings (Ref. table 4.11).

Table 4.11: Resident views about adequacy and timings of city waste collection services

	City services adequate or not?				Happy with the waste collection timing?			
	Thimphu		Phuntsholing		Thimphu		Phuntsholing	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Yes	592	93.70%	121	43.20%	513	81.20%	173	61.80%
No	40	6.30%	24	8.60%	119	18.80%	107	38.20%
No idea			135	48.20%				
Total	632	100%	280	100%	632	100%	280	100%

The respondent perspectives about the adequacy and timing of city services were merely based on the premise of simply getting rid of whatever waste were generated. Acknowledging that the amount of waste ultimately reaching the landfill sites can actually be reduced if a systematic segregation and associated reuse and recycling programs were in place. The survey identified the following constraints in putting such a system into practice:

Lack of technical and financial capacity of the concerned municipalities: The two municipalities are constrained by technical as well as financial resources to plan and implement an integrated solid waste management with systematic waste segregation. Convenient public facilities for disposal of

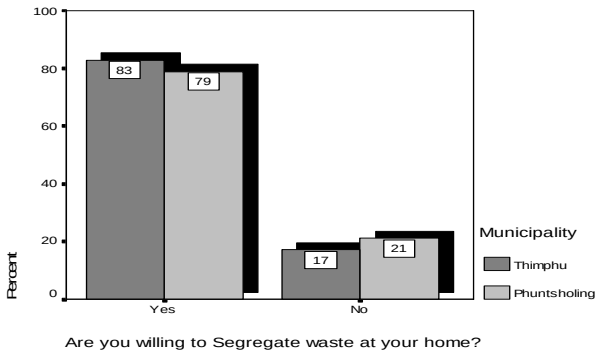
segregated waste will require huge investments. The meager revenue of the city corporation from the public coupled with restrained annual budgets is a constraint.

Low level of awareness and public responsibility: The general notion that City Corporation is the responsible entity to keep the city clean has often led the residents to ignore their own responsibilities of managing wastes. Littering is a huge problem. While lack of awareness is certainly a factor, there are also increasing evidences of individual irresponsibility, whereby the so called affluent and educated individuals (who impose cleanliness at home through their employees or workers) do not hesitate to litter the streets. Such behaviors in the individuals, if not changed will constrain the efforts to keep the cities clean.

Waste segregation is low profile job: While segregation of waste at home can be encouraged on a voluntary basis, waste segregation at other levels is constrained by the associated unhealthy conditions. Moreover, social restrictions in working with waste also limits local involvement and investment in waste segregation for recycle and reuse. Waste segregation as a business or enterprise is not socially prestigious even if it generates money. Persistence of this concept will mean all types of waste generated will end up at the landfill, thereby reducing the lifespan of landfills.

In spite of the current constraints, there is huge potential for improved and organized solid waste management system. The survey revealed public cooperation and willingness to segregate wastes. Over 81% of the residents in the two cities expressed willingness to segregate household wastes. In Thimphu and Phuntsholing, from the total of 912 respondents 745 are willing to segregate waste at home i.e. 83% of the respondents in Thimphu and 79% of respondents in Phuntsholing. The remaining proportion of the respondents (about 19%) 'not willing' to segregate household wastes cited reasons such as limited space as home and additional investment for garbage bins that make segregation practically difficult. Some expressed doubts that the segregated wastes may ultimately land up in the same landfills *(Ref Fig. 4.1)* in the absence of alternatives to dispose off the various types of wastes. This draws attention to the economic status of residents as richer households can most likely afford space and invest in segregation bins.

Figure 4.1: Percentage willingness to segregate waste



4.5 Living standards

From the total of 789 households surveyed in the two cities, maximum households (27.4%) earn a monthly income of Nu. 7000-8000. 30% of the residents in Thimphu earn Nu. 7000-8000 per month compared to about 22% in Phuntsholing (*Ref. Table 4.12).* 91.5% of the households surveyed reported monthly income ranging from Nu.3000 to 8000. 97% reported that the monthly income was sufficient to sustain their family *(Ref. Table 4.13).* However, living expenses are reported to be lower in Phuntsholing compared to the capital Thimphu.

Table 4.12: Frequency and percentage of income groups in Thimphu and Phuntsholing

Monthly	Thimphu		Phuntsholing		Overall	
Income	Frequency	Percent	Frequency	Percent	Frequency	Percent
< 3000	-	-	7	2.5	7	.9
3000-4000	88	17.3	28	10.0	116	14.7
4000-5000	110	21.6	39	13.9	149	18.9
5000-6000	86	16.9	49	17.5	135	17.1
6000-7000	56	11.0	50	17.9	106	13.4
7000-8000	155	30.5	61	21.8	216	27.4
>8000	14	2.8	46	16.4	60	7.6
Total	509	100.0	280	100.0	789	100.0

Table 4.13: Income sufficiency and secondary sources for meeting the deficits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sufficient	766	97.1	97.1	97.1
	Borrowing	6	.8	.8	97.8
	Weaving	11	1.4	1.4	99.2
	Small Business	6	.8	.8	100.0
	Total	789	100.0	100.0	

Traditional social practices and family ties remain a primary aspect of the urban way of life. Therefore, most families have dependents (those who are not earning) ranging from one to three in numbers. 34% of surveyed households have one dependent and almost 28% have two dependents in the family *(Ref. Table 4.14)*. While the household income is definitely an important aspect of urban life, this number of dependents per family has a direct bearing on the family affordability and therefore their standard of living.

Table 4.14: Frequency and percentage for number of dependents in a family

No. of dependents	Overall		Thimphu		Phuntsholing	
	Frequency	%	Frequency	%	Frequency	%
0	225	28.5	127	25.0	98	35.0
1	274	34.7	152	29.9	122	43.6
2	220	27.9	173	34.0	47	16.8
3	66	8.4	57	11.2	9	3.2
4	2	.3	-	-	2	.7
5	2	.3	-	-	2	.7

Attention needs to be given to the urban poor who have limited affordability and access to urban facilities. 15% of the respondents in Thimphu and 8% in Phuntsholing either cannot afford adequate supply of water or is inadequate even if they can afford. 47% and 29% in Thimphu and Phuntsholing respectively cannot afford telephone connections. 35% of the respondents in Thimphu and 24% in Phuntsholing cannot afford television. Further, about 87% in Thimphu and 98% in Phuntsholing reported lack of public toilets. The combined effect of low income and lack of public facilities such as toilets often lead to open air urination, defecation and disposal of household wastes that create unhygienic urban environment.

4.6 Major causes of inappropriate waste disposal

Considering that the survey revealed around 50% of the urban areas as dirty or very dirty, an attempt is made to identify the responsible factors. Inappropriate waste disposal and management at the individual, household and community/institutional levels is the overall cause of a dirty to very dirty urban environment. The PPPUE study has been deduced to arrive at the factors causing inappropriate solid waste management in the cities. The causes have been categorized into socio-economic, institutional and policy.

4.6.1 Social causes: Lack of public awareness and attitude

(i) Lack of public awareness

Majority of the population that lives in the rapidly developing towns and cities in Bhutan come from rural areas. As the system of extended families is common in the Bhutanese society, there are a significant number of dependents who reside in urban areas. They comprise of the age groups that have, not so long ago, been using leaves as wrappers or those that have significantly been influenced by rural way of life where concept of solid waste management existed merely in the form of household cleanliness. Wastes generated in the rural areas mainly comprise of organic materials such as leaves used for wrapping butter and cheese. While plastics have replaced leaves as wrappers, the throw-away habits have not only remained but also contagiously spread to the city-born younger generation.

Considering the number of clean up campaigns and awareness programs on solid waste management problems in the urban areas, it is unfair to say that there is a general lack of awareness about solid waste management. However, this awareness remains at certain groups of urban residents that have access to television and media. Certain groups of population including immigrant construction workers have low awareness levels. Moreover, considering that the rural and urban areas are closely related through the structure of Bhutanese society and through rural-urban migration, it is equally important to realize that there is a general lack of awareness about solid waste management in smaller towns and rural areas.

(ii) Lack of individual responsibility

This cause requires special attention and is therefore separated from the point on lack of awareness. With numerous years of engagement in urban environment awareness, RSPN and its partner organizations like NEC and the City Corporation are increasingly convinced of the lack of responsibility in urban residents in appropriately dealing with their own

waste. There is a general lack of responsibility towards the cleanliness of common property such as side walks, parking spaces, empty spaces and corners. These areas are prone to littering and garbage dumping from individuals, households and institutional. Although the efforts of a small section of the population for common benefit must be appreciated and encouraged, the individual responsibility for a clean environment largely remains limited within individual households and property boundaries. Therefore, there is a general lack of individual responsibility to refrain from littering or inappropriate disposal of waste.

In addition, dealing with wastes is not a respectable job in any society, be it at the household or community level. Wastes are generally handled by low income groups of people. In reality, much of the wastes that are disposed off appropriately or inappropriately are carried out by household maids/servants. Most aware and conscious individuals hardly handle wastes.

4.6.2 Economic causes

(i) Change in consumption pattern

Bhutan's isolation from the rest of the world in the past kept it away from consumerism and associated issues enabling it to maintain a pure litter free environment. However, the rapidly developing economy and associated changes in consumer patterns is bringing about ugly sights and undesirable environmental pollution. The country's move towards free and vibrant economy can be seen in the increasing range of products available in the market. Diversely packaged food and non-food items in the market have made the Bhutanese voracious consumers. This has led to change in the type and quantity of wastes generated at individual, household, institutions and community levels. This consumerism has crept in rapidly into a society that has its origin in the rural traditional way of life. The needs and wants of Bhutanese have changed from basic food and clothing to hi-fi packaged food, fashionable clothing, household items and entertainment.

(ii) Municipality facilities and infrastructure

Adequate facilities and infrastructure would be required to successfully manage solid wastes in urban areas even if the residents are fully aware, responsible and cooperative in managing their own waste. Hardware facilities such as compressor trucks, garbage bins, scientifically developed landfill sites, roads, vehicles etc. are inadequate in our cities. While these facilities are not limited for application to solid waste management only,

their enhancement would enable every corner of the municipality to be adequately covered for efficient solid waste management. Financial constraints are definitely the main cause of these inadequacies.

(iii) Rural-urban migration

Rapid socio-economic development has brought an increase in the concentration of population into confined urban areas and a change to a more affluent lifestyle that is typically less "environmentally friendly'. Currently, there are 54 urban settlements of varied sizes accommodating about 137,000 people, or about 21% (2002 statistics) of the total urban population. It is envisaged that by 2020 half of the Bhutanese population will be living in urban areas.

Urban areas such as Thimphu and Phuntsholing are seen as the opportunity centers and the rural population is increasingly being drained out and absorbed by these cities. The illiterate, semi-literate and the literate all find urban areas as *the* place for better economic life. People are aware that unmanaged waste has implications on health, hygiene and sanitation; however with more and more people migrating into the urban centers, there is a serious lack of initiative from the general public in managing waste.

(iv) Economic status of residents

It is often the lower income groups and their residential areas that are likely to be categorized as dirty compared to the areas of the affluent. The limited economic capability of the residents will demand more of their time into income generating activities leaving less time and energy for cleanliness as well as less money allocated for decent residences and cleaner surroundings. It is this group of people who are responsible in keeping the employer residences, offices, and complexes clean while it is expensive for themselves to do so.

4.6.3 Lack of coordination among institutions

A successful solid waste management should be the outcome of consistent and coordinated efforts of stakeholders. There is a general notion that the municipals alone are the responsible organizations for management of the urban environment. The city as the center for many public and private sector programs and activities requires a concerted and coordinated effort of the various stakeholders to plan and implement. There are diverse public and private plans and programs being implemented that are beyond the municipality's authority and capacity to enforce compliance. Because of the authorities and funds vested in

different entities for independent implementation in the city, there is an acute lack of partnership amongst the various stakeholders/institutions in handling the problem. Many activities are duplicated and unsustainable.

This increasing behavior of organizations and institutions in the city to act independently has prevented a coordinated approach to effective and efficient delivery of urban services including urban solid waste management. The general notion of individuals, households and even institutions to think of the city corporation as the sole responsible agency for urban waste management has proved counterproductive for the same entities in realizing their roles in urban waste management. The idea of reducing, recycling and reusing wastes at individual, institution and community levels has only remained the desire of a few concerned entities.

4.6.4 Policy and implementation shortcomings

As evident from the review of existing policies in *Chapter 3*, the policies on urban waste management remain broad and not translated into enforceable rules and regulations. The existing rules and regulations are outdated in terms of the changing needs and behavior of urban residents. Generally, countries have specific legislations mandated by the parliament that set standards for solid waste management. Such mandated policies are then utilized by relevant authorities to form a structure of agencies to implement and control solid waste management functions. This is not very well developed in Bhutan. The Water and Sanitation Rules of July 1995 and the Bhutan Municipal Act of 1999 are the existing documents that directly or indirectly but inadequately guide solid waste management in Thimphu and Phuntsholing and other upcoming towns. Other regulatory mechanisms come from notifications. In the context of significant urban population acting on rationality of convenience and cost effectiveness in waste disposal, existing laws, rules, and regulations do not serve as mechanisms to discourage residents from resorting to littering and undesirable disposals. Regulation on 'plastic ban' is a classic example where existing policies, rules and regulations have remained superficial and impractical. In addition, lack of alternatives has made it difficult for users to adhere to such regulations. Similarly, no specific regulations exist for monitoring wastes from construction sites. Disposal of construction wastes, especially in Thimphu, are left to the contractors, resulting in ad-hoc disposals and ugly sites.

Further, no regulation exists to discourage littering by individuals. While it is appreciable that there are concerned people sensitive to littering, a significant number of individuals (including literates) do not spare any

effort in refraining from littering. Several agencies have also endeavored to deal with solid waste management in Bhutan. However, most agencies have limited their activities to cleanup campaigns and awareness programs only, owing to lack of specified roles and responsibilities. Though these cleanup campaigns conducted by various organizations and groups have served to relieve temporary suffocations, it has not been effective in correcting the attitudes and in engaging the larger public in managing solid waste. Rather, clean up campaigns have become more of an event that the public look forward to for actually cleaning up dirty places.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

Conclusion

The study concludes that rapid modern development and associated consumerism in Bhutan has contributed to increasing amount of solid waste generated that is inappropriately managed. By 'inappropriate' management, the study refers to the economically, technically, environmentally and aesthetically unsound ways in which the wastes are generated, handled (segregated, recycled, reused, and/or reduced) and disposed. Inappropriate disposal and management of solid waste in Thimphu and Phuntsholing cities contribute significantly to the two cities being judged as 'dirty' by both nationals and visitors . Solid wastes are a major sight for sore eyes and contribute most to the deteriorating urban environment in Bhutan.

The sources of wastes in the two cities may be classified into 1) residential (households), 2) commercial (shops and businesses including vegetable markets), 3) institutional (government and private organizations/ offices), 4) construction sites (infrastructure and building sites), 5) municipal services (streets, parks, recreational areas), 6) Industrial (wood based, chemical, agro-based industries and automobiles workshops) and 7) agricultural (wastes and debris from home gardens, street plantations, etc.). All solid wastes generated within the city are not disposed off at the landfill sites, thereby resulting in miniature disposal sites and widespread littering within the cities. Waste reduction and segregation is minimal and lack of mechanisms for reuse and recycling have resulted in the landfill sites being fully utilized much ahead of the time they were designed to last.. Hence, there is great recognition that urban waste is an issue that needs to be addressed urgently and immediately. When asked what they would like changed about Thimphu, several respondents in *Kuensel's* feature "The Person in Me" responded that they wished that it was a cleaner city (these were mostly senior government officials). There is also frustration amongst residents and senior citizens that not enough is being done to address the issue. Tourists visiting Bhutan have also suggested solid waste management as a priority for Bhutan's rural and urban areas.

The current solid waste management situation of urban Bhutan, as represented by Thimphu and Phuntsholing may be described **as** a point in time when the amount of solid waste generated is exceeding the ability of

municipalities and their residents to manage. Similar challenges are being and will be increasingly faced by many upcoming towns under minimal or no proper solid waste management system in place.

The study deduced social, economic, institutional and policy deficiencies responsible for the issue. The social and economic causes were explained by lack of public awareness and attitude as a legacy of rural origin and gift of modern economy. The influx of rural population into urban areas creating the interface of rural throw-away habits and rapidly modernizing and changing consumer oriented consumption patterns in urban areas has led to increasing generation of solid wastes. The inability of the largely low income group to practice appropriate solid waste management was another economic cause. Similarly, financial constraints, associated lack of waste disposal facilities, and limited human resource capacity in the municipalities caused residents to litter and adopt inappropriate disposal of wastes within the city. At the institutional level, 'territorialism' or the tendency of organizations and agencies to assume absolute authority prevented optimization of the contributions of other concerned agencies. Institutional coordination is low under absence of any framework for cooperation and collaboration, which otherwise, would have served to avoid duplication, enhance complementary roles and be costs effective. The most important cause is the policy and implementation short comings. In the first place, legislation related to solid waste management is limited. Secondly, the existing rules, regulations, and notifications are poorly enforced that they appear superficial and unrealistic.

Hence, it is clear that there is an urgent need for measures to combat the increasing urban solid management issues at individual, household, institution and community levels. The following recommendations are proposed.

Recommendations

The study identified individuals, households, institutions/ organizations and the community as four main stakeholders or levels at which awareness, responsibility and mechanisms for collective and coordinated action must be put into place. The study also recommends that Bhutan urgently needs to develop an 'Integrated Solid Waste Management System'. The basic goal of integrated solid waste management system is to manage society's waste in a manner that meets public health and environmental concerns and the public's desire to reuse and recycle waste materials (George T. et al 1993). This approach relates not only to finding solutions for Thimphu and Phuntsholing but also encompasses other upcoming cities and rural areas. The following specific recommendations have been derived from the analysis

of the facts, figures and public feedback from the study, valuable inputs from steering committee members, and outcomes from meetings and stakeholder workshops.

The study takes the opportunity to present an overall institutional framework for 'Integrated Solid Waste Management System' for Bhutan that considers not only the urban but also the rural context *(Ref. Figure 5.1)*. This framework is proposed mainly in the context of the following needs for:

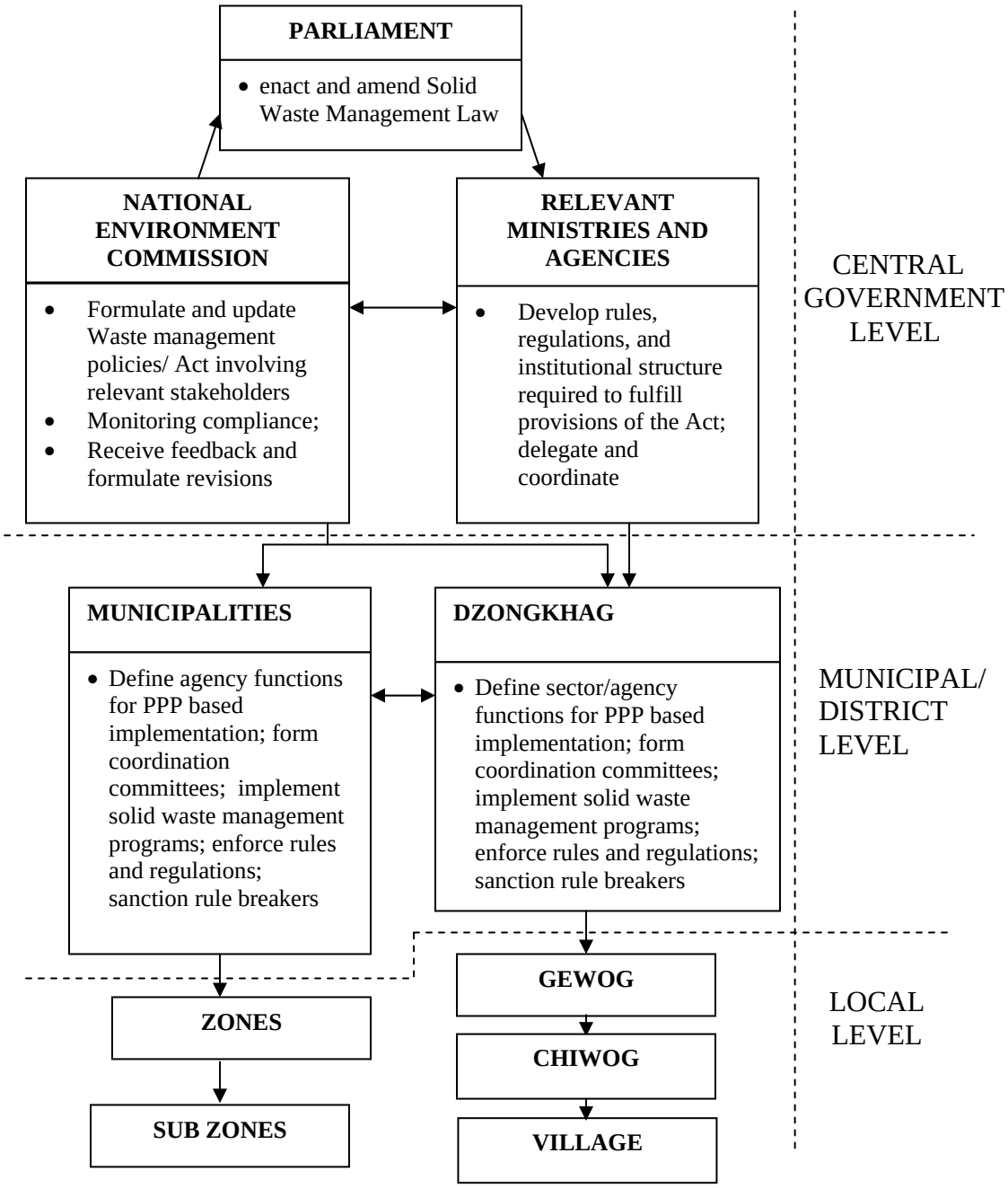
5.1 Concerted national effort to address solid waste issues in urban areas

As there is still some ambiguity in terms of jurisdiction etc. it is recommended that the National Environment Commission take the lead role in getting organizations together to work out a viable policy to deal with urban waste issues immediately. Many residents of Thimphu and Phuentsholing said that they expected the NEC to take a lead role in this endeavor. There will also be much more appreciation for the NEC if it is able to address this issue as most respondents expressed that urban waste management is right now the biggest environmental problem in Bhutan. The process needs to be started as soon as possible before the problem gets out of hand.

5.2 Develop a national policy for Integrated Solid Waste management

A comprehensive policy is needed at the national level to address solid waste management issues related not only to the urban areas but also to the semi-urban and rural areas that are increasingly facing similar issues. The policy needs to set waste management standards that authorities at district, municipality and central levels can implement for both urban and rural areas and must emanate from the national assembly. This policy must encompass provisions and procedures for waste management that is in the interest of environmental protection and public health. The following hierarchical elements of waste disposal are integral parts of the legislation:

Figure 5.1: Institutional framework for 'Integrated Solid Waste Management System' for Bhutan



5.3 Waste Reduction at source

This is the first option in the hierarchy as it is the most effective means to reduce the quantity of wastes and associated costs. Bhutan depends much on international trade, where most consumer goods are imported from the rest of the world. Categorizing products from within the country as well as those imported according to packaging, toxic contents, volume of materials, product life, reuse and recycling potentials, biodegradable or non-biodegradable etc. would provide a basis for reasonable measures of control. There is a need to develop a policy where import of certain packing materials such as plastic (non-degradable) and carton boxes (degradable) could be banned or restricted to a minimum.

Regarding the reduction of non-biodegradable waste, cutting back on the use of plastics would be a good start. However, concerted efforts have to be made by the government to find viable alternatives to plastic bags. Cooperation of the private sector is also essential to ensure private sector participation. PPPUEs can play a big role here by helping the private sector establish production units for plastic alternatives and even going as far as to subsidize the units during the initial few years. The ban on the use of plastic bags would have been very effective if ample resources were committed to finding a viable alternative to plastic carriers.

(i) Recycling

The second in the hierarchy, recycling is another important factor that helps to reduce demands for resources and resulting need for disposal. Recycling entails waste segregation (separation and collection), preparation and ultimate reuse, reprocessing, and remanufacturing.

The opportunity for recycling is high with 79% and 83% of Phuntsholing and Thimphu residents respectively willing to segregate wastes at home. The benefits of recycling as perceived by the people i.e. *1) financial benefit through the sale of the recyclables and 2) it is environmentally ethical* must be guaranteed.

As the surveys indicate, the majority of the people are interested in recycling for immediate and visible results. However, one of the biggest problems with recycling waste in Bhutan is that adequate facilities to receive the recyclable items are not available. Therefore, municipalities need to ensure adequate facilities for collection of segregated wastes.

(ii) Waste transformation

The third in the hierarchy, waste transformation refers to the physical, chemical and biological alteration of wastes. It entails recovery of *1)*

reusable and recyclable materials, and 2) conversion products and energy (e.g. biogas through composting). Considering that biodegradable wastes (kitchen and vegetable wastes) comprise more than 50% of the exiting wastes delivered at landfill sites, this can significantly reduce use of landfill capacity.

(iii) Landfilling

This relates to the stage when nothing can be done about the solid wastes except dispose them off at landfill sites. Solid wastes that cannot be recycled or reused are residual remains after segregation. Residues resulting from conversion products or energy must finally be disposed off at landfill sites. In the context of landfills in mountainous areas, design of landfill sites must take into account the potential downstream effects from toxic leaching. Further, appropriate sites for landfills are difficult to find in Bhutan's mountainous terrain. Therefore, landfill is the least desirable means of managing solid wastes.

The accomplishment of the above elements of waste disposal that can be dealt with in a hierarchical manner requires certain conditions to be fulfilled at various levels of the society. They include conscious and responsible urban residents, harmonious institutional coordination and adequate financial and institutional capacity.

5.4 Public awareness and education

Public awareness and education has been and remains a priority for Bhutan. An article titled 'Bhutanese lack Civic Sense' featured in an earlier issue of Kuensel continues to be a matter of concern. There is a need for consistent and aggravated programs to deal with this issue at various stages of human development. At the childhood and youth levels, integration of civic values and responsibilities in primary and secondary education curriculum are important for long term foundations so that today's young people grow up to become well informed and responsible adults. For the general public, media awareness, education and campaigns aimed at addressing specific issues, introducing new innovative alternatives must be conducted consistently. 'Follow through' with campaign and awareness programs are very important in the process of efficient waste management. Often, campaigns are ceremonial losing focus of the issues to be addressed and thereby garnering minimal public support. It is therefore, important to identify the right organizations for the consistent development and implementation of awareness and education programs.

As there is very little awareness on the PPUE concept in Bhutan right now, it is recommended that a presentation on the PPUE concept, case studies on

how it works in other countries and opportunities in Bhutan needs to be advocated.

5.5 Institute 'Polluter Pays Principle'

This is a special addition to the list of recommendations. Since littering and waste problems in Bhutan have much to do with human habits and rationalities, there is a strong need to institute policy mechanisms to shape human habits in the desired manner. Instituting 'polluter pays principle' is recommended as a measure to create disincentive mechanisms for inappropriate waste disposal.

In International Environmental Law, 'Polluters Pays Principle' is defined as a principle where the polluting party pays for the damage caused to the environment. In other words, companies, individual business firms, households and individuals that pollutes should pay for the cost of removing it, or provide compensation to those who have been affected by it. The Polluter-Pays Principle should be clearly mentioned in the environmental policies on waste management. This would not only ensure clean urban environment but also make every individual responsible in managing their own waste.

The policy must also incorporate provisions that specify agencies and organizations responsible for monitoring waste at source (e.g. points of import) resulting from International Trade. It must integrate strict import policies requiring importers to bear liability for cost of waste/pollution resulting from the imports. This will enable traders and consumers alike to realize the cost of wastes and thereby restrain from unnecessary use of plastic wrappers, packaging materials and resort to reuse and recycling.

5.6 Inter Organizational/agencies Coordination Mechanisms

Several attempts have been made by different agencies like the City Corporations, National Environment Commission, RSPN and institutes like schools to reduce wastes generated by the city. However, this has not had any long-term impact due to lack of coordination amongst these organizations and institutions. Lack of institutional coordination not only leads to duplication of efforts and waste of resources but also causes misunderstanding amongst the stakeholders. For instance, while researching for this report, it was discovered that the Ministry of Works and Human Settlements is already in the process of drafting a Bhutan National Urbanization Strategy and Thimphu City Development Strategy which will include most aspects of this assignment. Therefore, there is a very strong need for better institutional coordination among the various stakeholders. In

this regard, the PPPUE Steering Committee can play a valuable role by liaising among member agencies.

5.7 Autonomy and capacity building of municipalities

Autonomy of the Thimphu City Corporation in administrative and financial matters was recommended in several reports. Only through such autonomy it is possible to ensure City Corporation's ability to implement its plans and to develop the necessary sense of responsibility among the citizens; e.g. promoting public-private partnerships and correlating fees and taxes directly with benefits derived from such sources.

(i) Institutional Capacity building

There is a dire need to develop the capacity of the Municipalities in terms of additional human resources and training. One of the biggest problems associated with solid waste management right now is that enforcement is very weak. Municipalities lack adequate trained personnel to ensure effective enforcement of existing rules and regulations. Any new legislation or policy guideline or strategy will be of little use if there is a lack of capacity strengthening of the municipality to enforce legislation and implement strategies.

(ii) Financial Capacity Building

One of the greatest problems in managing urban waste in Bhutan is inadequate financial capacity to implement their mandate effectively. Waste management activities are implemented on an ad hoc basis depending on the availability of funds. Phuentsholing and Thimphu are right now being serviced by garbage compactor trucks donated by Sapporo City, Japan. The question of sustainability arises when these trucks run out on their lifespan. Although it is recognized that urban waste management is a problem and that laws and strategies need to be developed to address the issue, it is also important to realize that unless the financial capacity of the municipalities improves, municipalities will not be in a position to implement any new and improved law/strategy effectively.

In countries around the world, the costs of collecting, transferring and disposing of solid wastes are often shared between those generating the waste such as households, commercial and industrial establishments and the government. Municipalities need to:

- Lower costs by increasing management capacity
- Effective implementation of the "Polluter Pays Principle"

- Reinforce and follow through on cost recovery practices
- Using cost effective collection methods
- Maximize on opportunities in resources recovery technologies
- Promote mechanisms for stakeholders participation

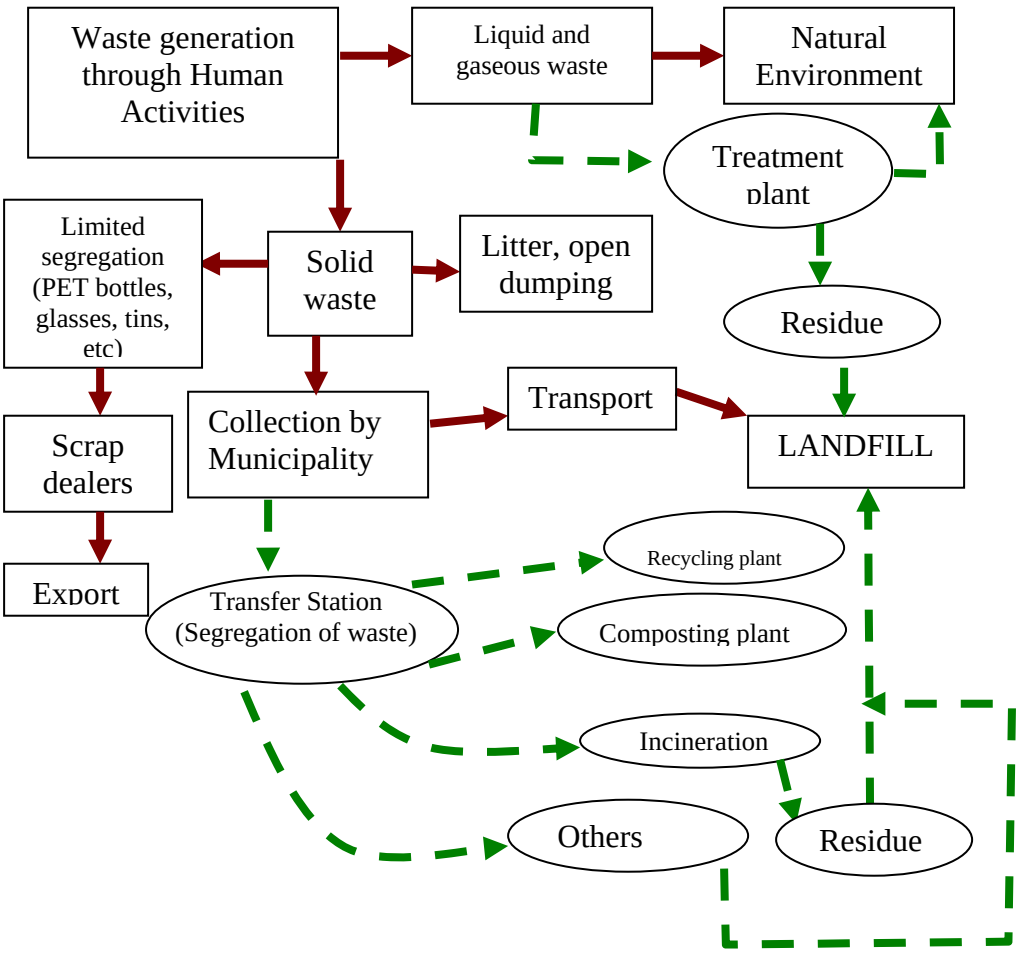
5.8 Solid Waste Management Strategy

For practical implementation of a solid waste management system for the municipalities, a strategy needs to be developed in the context of setting out clear goals, objectives, timeline and procedures. This will help prevent plans from remaining unimplemented. Further, the strategy must contain action plans that can outline how different stakeholders will cooperate to fulfill the goals and objectives at the local municipal level. The strategy is recommended to include, but not limited to, the following idealized process of solid waste management.

Fig. 5.2 is a framework showing the ideal process for management of waste in urban areas like Thimphu and Phuntsholing. In the flow chart below, the rectangular boxes with solid lines represent the existing waste management system, wherein human activities generate solid, liquid and gaseous wastes. The solid waste generated at individual households are collected and disposed off in the waste collection trucks which are provided by the municipal authorities. However, tins, cans, bottles and other waste which could be sold by individuals are collected by the staff themselves and the rest are disposed to the landfills without segregation.

The ideal situation of the waste management in Bhutan is represented by the oval shaped boxes with broken lines, where waste generated due to human activities should ideally be disposed off into the waste collection trucks. After collection, it is required to be taken to a transfer station where the final segregation of waste is carried out. The segregated wastes can then be sent for various purposes like recycling, reuse, composting etc. and those wastes that cannot be recycled, reused or composted are to be either disposed off directly to the landfill or incinerated if appropriate. The residue from incinerated waste is to be dumped at the landfill.

Fig. 5.2: Flow diagram showing existing and ideal solid waste management processes in the city of Thimphu and Phuntsholing



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ANNEXURE I

OUTCOME OF THE WORKSHOP AND PROPOSED ACTION PLAN

6.1 Outcome of National Stakeholder Consultation Workshop

The National Stakeholder Consultation workshop was organized to present the findings from the surveys and policy review to various stakeholders and to brainstorm ideas and recommendations to propose an action plan for the second phase of PPPUE project.

Participants worked in four different groups namely, Reduce, Reuse, Recycle and types of wastes to develop a coordination framework and action plan. Three groups were asked to come up with policy recommendations to support the use of the 3Rs (reduce, reuse and recycle) in waste management. One group was asked to recommend ways to support other techniques not included in the 3Rs.

6.2. Proposed Action Plan for Solid Waste Management in Thimphu

From the analysis and recommendations in the earlier chapters, it is clear that dealing with Bhutan's growing urban waste management problem requires a long-term commitment from a range of different stakeholders. There is a need for a strong regulatory structure; incentives for better performance, research into the most appropriate technologies and effective public education campaigns. Experience in developed countries has shown that dealing with the various aspects of waste management takes many years and significant public commitment.

The Draft Policy Framework is a major step forward for Bhutan. At various points, it raises the issue of urban litter and how it should be dealt with. Litter is clearly a growing problem in Thimphu. Recent surveys of local residents and tourists have indicated that it is one of the biggest concerns that respondents have about life in the capital. While eradicating waste will be a long-term objective, there are steps that can be taken in the short term to "clean up" the city. The Action Plan outlined below is a combination of both long-term and short term measures that were recommended in Parts I – IV of this document and the recommendations made in the draft integrated solid waste management strategy for Bhutan.

6.2.1. National Policy and Legislation on Solid Waste Management in Bhutan

Many stakeholders expressed the need for a more comprehensive policy on solid waste management in Bhutan. Jurisdictional ambiguity and lack of legal backing were often quoted as major constraints in enforcing existing laws and notifications. A high-level decision has already been made to develop an integrated solid waste management strategy for Bhutan and relevant policies and laws have to be a part of such a strategy to ensure effective enforcement. The following elements should be included while drafting the policies and laws:

- *Law for promotion of effective utilization of resources* so as to promote reduction, reuse and recycling of waste

- *Green purchasing Law* will promote procurement of recycled products at the national and Dzongkhag levels

- *Containers and packaging recycling law* would urge that manufacturers of containers and businesses using packing materials and containers must reuse or recycle materials that have been collected or purchased and sold

- *Construction material recycling law* would ensure that the construction companies sort and dismantle construction materials and recycle these materials

- *Waste management law* could be enforced to improve and promote the reduction of waste, encourage recycling and proper disposal methods

- *Law on recycling of end-of-life vehicle* should promote auto dealers to buy back old vehicles which are condemned so that parts and other resources can be recycled from end-of-life vehicles

Lead Agency:	National Environment Commission, Ministry of Works and Human Settlements

6.2.2. Inter-organizational/Agencies coordination Mechanisms

Several attempts have been made by different agencies like the City Corporations, National Environment Commission, RSPN and institutes like schools to reduce the waste generated by the city. However, this has not had any long-term impact due to lack of coordination amongst these organizations and institutions. Lack of institutional coordination not only leads to duplication of efforts and waste of resources but also causes misunderstanding amongst the stakeholders. Therefore, there is a very strong need for better institutional coordination between the various stakeholders. In this regard, the PPPUE Steering Committee can play a valuable role by liaising between member agencies. However, a clear Terms of Reference for the Committee and a formal endorsement of the Committee is needed to ensure that it has the necessary clout to ensure effective coordination between the different organizations.

Lead Agency:	Ministry of Works and Human Settlement
Time:	Immediate

6.2.3. Immediate Litter Clean Up

There is a clear need for existing litter in Thimphu to be dealt with. One of the simplest ways to deal with this problem in the short term is to provide one-off financial incentives for people to collect litter. While this kind of approach should work well in the short term, it is *not* a long term solution, and the Draft Policy Framework should be referred to for effective future policy initiatives.

A. Mechanics of an Immediate Clean Up Initiative

Rapid action will eventuate if an immediate clean up initiative provides financial incentives for people to collect litter. This would be especially useful if incentives could be aimed at low income residents of the city.

A program initiated by RSPN, in conjunction with NEC, Thimphu Corporation and tourism industry operators could have the following structure:

- Funds for the litter collection program to be generated from the sale of RSPN publications

- The postcard collection package would be produced on a voluntary basis by Mr. Nathan Ward. Production costs would be handled by one-off contributions from: NEC, Thimphu City Corporation and tourism industry operators.
- Income generated from the above would be applied to an incentive program where Thimphu residents would be offered a Ngultrum rate per kilogram of delivered litter. The actual payment rate could be determined after the size of the fund has been settled.

B. Financing of the Postcard Package and Marketing Costs

This would be a RSPN initiative. It is estimated that USD$5,000 would be required to fund the production of an attractive postcard package, and additional costs associated with organizing the sale of publications and the collection of income. The total fund would potentially be provided by NEC and tour operators. RSPN would organize approaches to these fund sources.

Income from the sale of publications would go to RSPN, who would then establish the litter collection incentive fund and would administer it.

Lead Agency: Royal Society for Protection of Nature

Timing:

- Organisation of initial publication fund (RSPN and Mr Nathan Ward)
  - May/June/July 2007
- Finalizing of publications for sale (Mr Nathan Ward)
  - July 2007
- Placement of publications (RSPN and Mr Nathan Ward)
  - August 2007
- Sale of publications and collection of income (RSPN)
  - September/October 200
- Establishment of incentive scheme (RSPN)
  - November 2007
- Litter collection (organized by RSPN, in conjunction with partners)
  - December 2007

6.2.5. Establishing Enforcement Mechanisms

Currently, enforcement is one of the weakest links in managing solid waste in Bhutan. Unless a clear enforcement mechanism clearly delineating the roles and responsibilities of different stakeholders is established to support the policies and laws, implementation will remain ineffective.

One example is the engagement of the Royal Bhutan Police (RBP). One of the most effective enforcers of any new laws on littering and sale/use of plastic bags etc. especially in the urban town areas will be the Royal Bhutan Police. It might be proposed that the RBP is given the responsibility to enforce laws against littering etc. in the urban town areas. It is also proposed that any fine that is collected from violators be put into the RBP's welfare fund rather than being surrendered to the Ministry of Finance. Such a proposal might serve as an incentive to the RBP to ensure stringent enforcement of the laws and notifications. The involvement of the RBP in solid waste management might also be a positive outlook for the RBP.

Lead Agency: Ministry o Works and Human Settlement, City Corporations, RBP

Time Frame: As soon as polices and laws are drafted

6.2.6. Awareness and Education Programs

BBS can contribute on the subject of waste management by creating awareness and educating the public through its television and Radio programs.

The following proposal was submitted by the BBS member on the PPPUE Committee and should be supported as soon as funds are available.

Lead Agency:	BBS
Timing:	As soon as funds are available

Table 6.1: Work Plan

Sl No.	Activity	1st program (Jan-June)	2nd program (July-Dec)
01	20-25 minutes TV program production on reusing and recycling of waste	-Research -Scripting -Reckey -Shooting -Editing -Broadcasting	
02	20-25 minutes TV program production on reducing of waste		-Research -Scripting -Reckey -Shooting -Editing -Broadcasting
03	20-25 minutes Radio program production on reusing and recycling of waste	-Research -Recording -Editing -Broadcasting	
04	20-25 minutes Radio program production on reducing of waste		-Research, Recording, Editing, Broadcasting

Table 6.2: Institutional coordination framework

Lead Agency	Collaboration	Area of Activities
BBS (Agriculture and environment unit) TV Section	-RSPN -TCC -NEC -Individual -Household -Community	Television program production on waste management in relation with the 3 Rs (Reduce, Reuse and Recycle)
BBS (Agriculture and environment unit) Radio Section	-RSPN -TCC -NEC -Individual -Household -Community	Radio program production on waste management in relation with the 3 Rs (Reduce, Reuse and Recycle)
BBS (Social Issues unit)	-RSPN -TCC -NEC -Individual -Household -Community	Radio program production on waste management in relation with the 3 Rs (Reduce, Reuse and Recycle)

6.2.7. Ensure Stakeholder Participation

As recommended in the Draft Solid Waste Management Strategy for Bhutan prepared by the Ministry of Works and Human Settlements with support from UNEP, "the most efficient way of source reduction is through public education and awareness. This could be only partly true. Direct involvement is the third and probably the most important factor. If, for example, "environmental protection" or "pollution control" becomes part of the school curricula, a courageous step has been taken. However, if students form "recycling committees" in their schools pay their fellow students for bringing recyclable materials, real action has would start. Or if Bhutanese women groups are given talks and leaflets on waste reduction, an important waste producer group would be addressed. However, if they are involved in selecting the most suitable size and type of bin or if they take part in developing a monitoring approach for a clean neighborhood, they may contribute to waste reduction and participate in monitoring the cleanliness of their own neighborhood.

Secondly, if all waste producers pay an appropriate fee for their waste removal, the cost burden becomes more manageable for the government. In

many communities solid waste removal costs 30% to 40% of the annual budget of the municipality".

Therefore, motivational activities must be developed and carried out to involve a diverse range of stakeholders.

Lead Agency:	Royal Society for Protection of Nature
Timing:	Immediate

6.2.8. Capacity Building

There is a dire need to develop the capacity of the Municipalities and other stakeholder organizations in terms of additional human resources and training. Any new legislation or policy guideline or strategy will be of little use if the capacity of the municipality is not strengthened to enforce legislation or implement the strategy. Capacity building in terms of developing technical expertise for the different aspects of solid waste management (collection, segregation, composting etc.) and exposure trips to familiarize Bhutanese on recycling, reusing and reducing waste in other countries is needed in order to develop a pool of local expertise in waste management.

Lead Agency:	Municipalities
Time:	Immediate

6.2.9. Assess Options for Waste Disposal

Sanitary landfills are the most common forms of waste disposal in Bhutan right now. However, experience over the years has shown that selecting a landfill site in Bhutan is becoming more and more difficult because of the "not in my backyard" syndrome. Moreover, due to financial and other resource constraints, landfills in Bhutan have not been constructed or operated in the most environment-friendly manner. Due to Bhutan's topography, there is a scarcity of suitable and available sites in the proximity of urban areas. Therefore, alternative disposal techniques need to be compared and assessed on how they may complement or replace landfill disposals. The draft integrated solid waste management strategy for Bhutan proposes that assessments and viability studies be made on large-scale composting and environmentally safe incineration of waste with high-cost equipment as options/complements to landfill sites.

Lead Agency:	Municipalities
Time:	Immediate

6.2.10. Support Composting

Under the ESPS Project, the Thimphu City Corporation has established a composting plant in Serbithang. It is envisaged that 70% of the weekend market waste will be used as raw material for the plant. The project is intended to reduce the amount of waste destined for the landfill and generate revenue for Thimphu City Corporation through the sale of compost. The facility has a separation unit where wastes will be segregated into bio-degradable, recyclables and non-recyclables.

Although construction of the facility is complete, the plant is not operational as more financial resources are needed to complete the access road to the facility and to construct the necessary power infrastructure. Once completed the compost plant will be a beneficial investment in promoting any reuse, reduce and recycle strategy.

Lead Agency:	Thimphu City Corporation
Timing:	Immediate

6.2.11. Support Reuse and Recycling of waste

As supported by the findings from the RSPN survey there is willingness to recycle wastes as recycling *1) as there is some financial benefit through the sale of the recyclables and 2) it is ethical environmentally.*
As the surveys indicate, the majority of the people are interested in recycling. While reducing waste generation and promoting reuse are more long-term approaches to reduce waste, recycling waste offers immediate and visible results. However, one of the biggest problems with recycling waste in Bhutan is that adequate facilities to receive the recyclable items are not available. Therefore, one of the recommendations is that the Municipality work to assure that there are adequate facilities available for people to dump or sell their recyclable goods.

Support by the government to successful recycling ventures could be in the form of:

- Identifying present recycling practices in the country
- Assist with publicity on recycling
- Support formation of recycling bodies such as school recycling clubs
- Develop guidelines to support waste collectors (occupational safety, access to waste)
- Assess the viability of implementing a refund scheme for buying back reusable bottles. For instance, in Denmark a surcharge is automatically levied on reusable bottles such as coke and beer bottles at the checkout counter. However, the surcharge is refunded once the bottles are returned to the store
- Bhutan depends much on international trade, where all the goods are imported from the rest of the world, therefore there is a need to develop a policy where import of certain packing materials such as plastic (non-degradable) and carton boxes (degradable) could be banned or restricted to a minimum
- The government can also play an effective role by encouraging the consumption of say fewer but bigger cooking oil bottles which have more reuse value than using smaller and more bottles of the same good which have lesser potential for reuse. Consumers can be encouraged to use the bigger bottles by lowering the tax for the same item packaged in the bigger bottle. Such mechanisms must be explored and addressed when coming up with policies and laws on waste management
- As the cost of storage is one of the most important factors affecting the reuse and recycling of waste, one of the most helpful interventions that the government can make to promote the reuse and recycling of waste is to provide private entrepreneurs the necessary space for storing their goods

Lead Agency:	City Corporations; Department of Revenue and Customs, Ministry of Finance, NEC

6.2.12. Organize the Disposal of Hazardous Waste

Although the NEC has already produced the Environmental Codes of Best Practice (ECOP) for Hazardous Waste Management aimed at addressing the challenges of hazardous waste disposal, there is very little enforcement of the ECOP. Presently there is very little regard being given to what sort of waste finds its way to the landfills. There is very little appreciation that "some waste

materials need special care because their properties make them more hazardous or problematic than general wastes. Used oil can be refined for reused or burned in properly equipped furnaces. Slaughterhouse wastes should be buried in special trenches at suitable sites. Car tires should be reused and carefully protected from open burning. Chemical wastes from some industries including tanning, dry-cleaning, photographic processing and from many chemical production industries and unwanted pesticides and other agricultural chemicals should be collected under close supervision and treated in appropriate ways. The management of hazardous chemicals is not only a matter of technology and legislation, but also of enforcement, funding and financial instruments. Some wastes are hazardous and expensive to treat that priority attention should be focused on changing to processes that use substitutes that are less hazardous, and to minimizing the quantities that are discarded. Indeed, minimization and substitution should be seen as the preferred option in dealing with any difficult waste" (Draft Integrated Solid Waste Management Strategy for Bhutan, 2006).

It is very timely that steps are taken right now to organize the safe disposal of hazardous wastes. Some of the most urgent steps according to the Draft Integrated Solid Waste Management Strategy for Bhutan, 2006 are to:

- Identify all hazardous wastes generated and present removal practices
- Identify most dangerous types and their impact
- Develop proper removal, treatment and storage procedures and make cost estimates
- Train all staff accordingly
- Order treatment equipment and establish hazardous waste facilities if required
- Identify hazardous wastes the handling of which has to be subsidized
- Develop and carry out impact monitoring of hazardous wastes and of compliance with enforcement procedures

Lead Agency:	NEC
Timing:	Immediate

6.2.13. Promote/Support Public-Private Partnerships for Urban Environmental Management

As PPPUE is still a new concept in Bhutan, more work has to be done to educate the public on the potential benefits of PPPUEs in Bhutan. The questionnaire survey that was carried out under this project should form the

basis for developing a few feasible projects that could be piloted to demonstrate PPPUEs in action. Programs on PPPUEs aired on BBS might also be an effective channel to educate the general public on the success of PPPUEs elsewhere.

Lead Agency:	Royal Society for Protection of Nature
Time:	Immediate

ANNEXURE II

GROUP WORK REPORT OF THE NATIONAL CONSULTATION WORKSHOP

Group I: Policy Recommendations to Reduce Waste Generation

Policy	Implementation	Responsibility
Policy to encourage segregation at source	• **Regulatory framework** • **Communication participation** • **Facilitation (bins, trucks, others) services**	• **Municipal authorities or city corporation** • **RGoB for resources and necessary support** • **Civil society and NGOs for awareness creation**
Policy in place for repeated reuse of materials and encourage healthy buying habits	**Awareness creation through institutional education programs and relevant media**	• **RGoB** • **Civil society and NGOs** • **Education institutions**
Discourage importers to bring in avoidable packing materials Pouches etc.	• **Through restrictive Policies, orders, by-laws, licensing conditions etc.** • **Mass awareness creation**	• **RGoB, DRC, MTI/RO** • **Civil Societies and NGOs** • **Law enforcers**
Encourage scrap dealers, flea markets	• **RGoB to grand licenses and necessary support, tax exemption, small loans** • **Designated areas/space, subsidies etc.**	**RGoB, MTI, Financial Institutions, BCCI, Municipalities and community**

Group 1: Coordination Mechanism and Action Plan to Reduce Waste

Lead Agency	Collaboration with	Area of activities	Inputs
City corporation and Municipalities	• **Individuals** • **Household** • **Community**	**Collection of segregate waste**	**Financial support** • **Manpower** • **Technologies**
RSPN	• **MoE** • **BBS (broadcast media)** • **Kuensel (Print media)** • **City Corporation**	**Awareness**	**Financial Resource**
Ministry of Trade and Industry	• **BCCI** • **Revenue and custom**	• **Ensuring re-use of materials** • **Polluter pays principle**	**Regulations**
City corporation and Municipalities	• **Ministry of Trade and Industry** • **Ministry of Agriculture**	• **Ensure, encourage, facilitate scrape dealers and flea market**	**Space and Transportation**

Group 2: Policy Recommendations to Reuse Waste

POLICY	IMPLIMENTATION	RESPONSIBILITY
Buy-back of reusable waste	• **Regulatory framework** • **Awareness and education** • **Individual responsibilities** • **Common interest for welfare of the community** • **Incentive for initiatives** • **enforcements of laws** • **possible arrangements**	• **Municipal authorities or city corporation** • **RGoB for resources and necessary support** • **Civil society and NGOs for awareness creation** • **Education institutes to educate** • **Community to cooperate** • **Individuals to be responsible** • **Royal Bhutan Police**
Promote scrap dealer	• **Awareness creation and education** • **Designated areas for the dealer** • **Waste segregation notification** • **Certified scrap dealers (Licensing)**	• **RGoB** • **Civil society and NGO (RSPN)** • **Education institutions** • **Financial institutes for small scale loan** • **BCCI**
Polluter pays Principal	• **Awareness creation on polluter pays principle** • **Enforcement of Polluter pays principle**	• **RSPN** • **MTI** • **DRC** • **BCCI**

Group 2: Coordination Framework for Reusing Materials

Lead Agency	Collaboration with	Area of activities
Ministry of Trade Industry	• **Individuals** • **Household** • **Community** • **NEC** • **RBP** • **MoF**	• **Enforce rules and regulation for buy back policies** • **Tax incentives** • **Licensing for the scrap dealers**
RSPN	• **MoE** • **BBS (broadcast media)** • **Kuensel (Print media)** • **City Corporation**	**Awareness (reusing)**

Group 2: Action Plan for Reusing Waste

Lead agency	Action List	Input needed
National Environment Commission	**Framing National Policies , rules/ regulations for reusing waste with other environment conservation Acts, rules , regulation etc.,**	• **NAs approval** • **Statistics/ data** • **HRD** • **Financial and Technical resources**
Ministry of Trade and Industry	**Licensing to the scrap dealers**	• **Agreement between the parties** • **Municipalities**
Municipalities	• **Designate areas for scrap dealers** • **Guide the dealers in proper channel**	• **HRD** • **Financial Resources** • **NECs support**
RSPN	**Awareness** **Capacity building**	• **Financial Resources** • **MoE** • **Media**

Group 3: Policy Recommendations to promote Recycling

Policies	Implementation	Responsibility
Formulation of relevant acts/laws	**Formulation of laws/acts –Relevant acts/laws/regulations formulated with clear directives on implementation (agencies)**	**Individual – -aware/concerned/responsible –Acceptance of policies, laws and norms –Commitment for waste management**
Encourage recycling through various means – incentives, awareness campaigns	**Encourage recycling –Segregation of all wastes that can be recycled at source –Create awareness**	**Household – collective of individual**
Establish mechanisms for the principal suppliers to take back the packaging materials, e.g. agro-industries.	**Establish mechanisms for the principal suppliers to take back the packaging materials –Integrate with issuance/renewal of trade license**	**Community – –cooperation and commitment (eg. Cleaning campaign)**
Encourage private sector to invest in recycling	**Encourage private sector to invest in recycling –Assist in exploring markets**	**Civil Society – –Catalyst to carry out recycling/SWM**
Make recycling an integral part of SWM plan/strategy..	**Make recycling an integral part of SWM plan/strategy –Establish transfer station from where it will be segregated**	**Government – –support, funding, capacity building**

Group 3: Coordination Framework for Recycling

Lead agency	Specific tasks/ Area of cooperation	Cooperate/ collaborate with
MoWHS & NEC	Relevant acts/laws/regulations formulated with clear directives on implementation (agencies)	Municipalities, BCCI, MTI
Municipalities	Segregation of all wastes that can be recycled at source	RSPN, BCCI, NEC
RSPN	Create Awareness	NEC, BBS, Kuensel, TCC, MoE,, BCCI
MTI & BCCI	Establish mechanisms for the principal suppliers to take back the packaging materials	Municipalities, DRC, MoA,, NEC
MoWHS	Make recycling an integral part of SWM plan/strategy	Municipalities, NEC, BCCI, MTI

Action Plan for Waste Recycling

Agency	Action list	Inputs needed
RSPN	Awareness Campaign	Media participation,
MoWHS	Formulation of laws/acts, e.g. Anti-littering Act,	TA, stakeholder meeting, PPPUE document; NEC consultation
MoWHS with NEC	Establish centers for waste that can be recycled	Public participation and awareness
MTI & BCCI	Establish mechanisms for the principal suppliers to take back the packaging materials	Arrangement for by-back by city, MTI, NEC, BCCI
Municipalities	Segregation of all wastes that can be recycled at source	Awareness, By RSPN, Financial Support arrangement MOWHS/RSPN/BCCI/ NEC

Group 4: Other Wastes

POLICY	IMPLIMENTATION	RESPONSIBILITY
Buy-back of reusable waste	• **Regulatory framework** • **Awareness and education** • **Individual responsibilities** • **Common interest for welfare of the community** • **Incentive for initiatives** • **enforcements of laws** • **possible arrangements**	• **Municipal authorities or city corporation** • **RGoB for resources and necessary support** • **Civil society and NGOs for awareness creation** • **Education institutes to educate** • **Community to cooperate** • **Individuals to be responsible** • **Royal Bhutan Police**
Promote scrape dealer	• **Awareness creation and education** • **Designated areas for the dealer** • **Waste segregation notification** • **Certified scrap dealers (Licensing**	• **RGoB** • **Civil society and NGO (RSPN)** • **Education institutions** • **Financial institutes for small scale loan** • **BCCI**

Group 4: Coordination Framework for other types of waste

Lead Agency	Area of cooperation	Collaboration with
RSPN	**Environmental Education and Awareness**	• **Media** • **Monasteries** • **Municipal Authorities**
NEC	**Incineration, Transport and disposal**	• **Hospital Authorities** • **City corporation**
NEC	**Enforcing Polluter pay policy**	• **MTI** • **BCCI** • **RSPN** • **RBP** • **Municipal Authority**
Municipal Authority	**Institute disposal on payment basis**	• **MTI** • **NEC** • **Revenue and custom** • **BCCI**

Group 4: Action Plan for Other Types of Waste

Lead Agency	Action	Inputs
RSPN	**Environment Education**	• **Resource Person** • **Funding** • **Logistic**
NEC	**Safe disposal of waste**	• **Resource Person** • **Funding** • **Logistic** • **Individuals and institutional capacity**
NEC	**Monitoring Polluter pay policy**	• **Resource Person** • **Funding** • **Logistic** • **Individuals and institutional capacity**
Municipal Authority	**Disposal on payment basis**	• **Infrastructure** • **Funding** • **Logistic** • **Individual and institutional capacity building**

ANNEXURE III

SOURCE AND WEIGHT OF WASTE COLLECTED IN THIMPHU (KILOGRAM)

Place of collection	Weight of waste in kilograms		
	Green	Non -Green	Total
Town and industrial areas	28886.00	4550.00	33436.00
Residential, town and industrial area	55159.00	5756.00	60915.00
Residential and industrial areas	49984.00	4236.00	54220.00
Sunday market,Kawangangsa and lanjophakha	7512.00	1905.00	9417.00
Kalabazerand changbangdu	5722.00	4181.00	9903.00
Hongkong market	5908.00	6075.00	11983.00
Main street	14594.00	14328.00	28922.00
Tashichhodzong area	825.00	580.00	1405.00
Along Norzin Lam	4431.00	7930.00	12361.00
Mothithang,Zulikha,Changangkha and Finance colony	12886.00	9891.00	22777.00
RICB colony	1292.00	1460.00	2752.00
Lanjhophakha and Kawangjangsa	6302.00	5712.00	12014.00
Changgangkha Area	2845.00	2765.00	5610.00
Yangchenphu, samazingkha	6082.00	5271.00	11353.00
Sunday Market	22722.00	7979.00	30701.00
UNDP area	4420.00	4909.00	9329.00
Chanjiji	4527.00	3459.00	7986.00
Police camp	4810.00	2558.00	7368.00
Dechenchholing	2415.00	1520.00	3935.00
Chubachu	4930.00	4041.00	8971.00
Changzamtok	795.00	527.00	1322.00
Taba	350.00	245.00	595.00
Mothithang Palace area	2285.00	1478.00	3763.00
JDWNRH	2380.00	1695.00	4075.00
Lungtenphu	460.00	315.00	775.00
Hejo	665.00	245.00	910.00
Kawangangsa	805.00	360.00	1165.00
BCCI area	2925.00	2555.00	5480.00
Changbangdu	3245.00	2060.00	5305.00
Total	260162.00	108586.00	368748.00

ANEXURE IV

LIST OF STAKEHOLDERS CONSULTED

Royal Government of Bhutan

1. National Environment Commission
2. Ministry of Trade and Industry, Policy and Planning Division.
3. Ministry of Works and Human Settlement, Policy and Planning Division.
4. Ministry of Health, Policy and Planning Division
5. Ministry of Information and Communication, Policy and Planning Division
6. Ministry of Labour and Human Resources, Policy and Planning Division
7. Ministry of Home and Culture Affairs, Policy and Planning Division
8. Ministry of Finance, Department of Aid and Debt Management and Policy and Planning Division
9. Ministry Of Education, Policy and Planning Division
10. Ministry of Agriculture, Nature Conservation Division and Policy and planning Division
11. Ministry of foreign Affairs, Policy and Planning Division
12. Paro Dzongkhag, Municipality

Corporate Sectors

1. Phuntsholing City Corporation
2. Thimphu city Corporation

International Organization

1. World Wild life fund
2. United Nation development Program

Media

1. Bhutan Broadcasting Service
2. Kuensel corporation

Private and NGO

1. Bhutan Chamber of Commerce and Industry
2. Automobile workshop
3. Hotels
4. Association of Bhutan Tour Operators
5. Representative from town committee
6. Scrap Dealers

ANNEXURE V
PICTURES

Waste at landfill






Air and water Pollution by waste



Open Dumping



Study of waste

National Consultation workshop on Solid Waste Management

Opening by Executive Director, RSPN

Keynote address by Dasho Nado Rinchen Dy. Minister for National Environment Commission

Group Presentation and Question answer session

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