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NATIONAL STRATEGY & ACTION PLAN

Integrated Solid Waste Management

Ministry of Works and Human Settlement
Thimphu, Bhutan
January 2007

AGENDA 21

Bhutan is one of the unique and advanced countries which implement the Sustainable Development Principles of the Agenda 21, formulated at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, and strongly reaffirmed at the World Summit on Sustainable Development held in Johannesburg in 2002.

NATIONAL STRATEGY + ACTION PLAN

The Royal Government of Bhutan requested assistance for the formulation of a National Strategy on Integrated Solid Waste Management. The United Nations Environmental Program and the Regional Resource Centre for Asia and the Pacific provided support to the preparation of this document.

PREVENTION POLICIES

UNEP promotes preventive policies among policy makers and industry through initiatives on sustainable urbanization, health and environment, education, environment and livelihood security and waste management, including e-waste.

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Annexes

Abbreviations

ADB	Asian Development Bank
CWG	Collaborative Working Group on Solid Waste Management in Low- and Middle-income Countries
DUDES	Department of Urban Development and Engineering Services of Ministry of Works and Human Settlement
DYT	District Development Committee
ECOPSW	Environmental Codes of Best Practice for Solid Waste Management
ECOPHW	Environmental Codes of Best Practice for Hazardous Waste
EIA	Environment Impact Assessment
GYT	Block Development Committee
HWC	Hazardous Waste Consultant
ICOS	Information, Communication and Outreach Section of the National Environment Commission
ISWM	Integrated Solid Waste Management
LC	Legal Consultant
MDG	Millennium Development Goal
MoA	Ministry of Agriculture
MoE	Ministry of Education
MoF	Ministry of Finance
MoTI	Ministry of Trade and Industry
MoWHS	Ministry of Works and Human Settlement
MT	Mobile Integrated Solid Waste Management Action Team, In short, Mobile Team
NEC	National Environment Commission
NGO	Non Governmental Organization
PPD	Policy and Planning Division of MoWHS
PPPUE	Public/Private Partnership for Urban Environment
RRC.AP	Regional Resource Centre for Asia and the Pacific
RGoB	Royal Government of Bhutan
RSPN	Royal Society for Protection of Nature
SKAT	Swiss Resource Centre and Consultancies for Development
SWSS	Solid Waste and Sanitation Section of TCC
TCC	Thimphu City Corporation
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme

1. Rationale

1. The Royal Government of Bhutan recognized the need for formulating a **National Strategy on Integrated Solid Waste Management**.

2. Whereas the **National Environment Commission** remained the governing body for environment related affairs and collaborated in the preparation of this document, the **Ministry of Works and Human Settlement** had received the mandate to take the lead role in formulating the strategy as well as an action plan for implementation.

3. The National Strategy on Integrated Solid Waste Management is to outline how all waste which may have a negative impact on public health and the environment can be removed regularly and in an affordable way. This is to:
    - **safeguard public health;**
      referring to waste accumulation from where diseases can spread
    - **protect the environment;**
      referring to the negative impact which waste can have on the environment and
    - **reach sustainability;**
      only affordable systems with proper management survive in the long run.

4. The main **focus** has been set on:
    - ensuring that waste producers become responsible
    - addressing the root cause by reducing waste to a minimum
    - gaining control over waste related pollution
    - and establishing a well trained work force.

5. **Public participation** has been considered as the underlying principle for all implementation activities.

6. Nothing in this strategy is new to Bhutan with the exception of establishing a mobile work force. The strategy is to include all efforts already made in involving the waste producers in environmental protection and pollution control. Successful activities are to be replicated countrywide.

7. The ACTION PLAN for implementing the strategy has two main components:

1) a program on community mobilization addressing the **waste producers** and the method of reaching them
2) a program on capacity building for the **service providers.**

8. The **Community Mobilization Program** is to address all waste producers from the youngest to the oldest citizen. Whilst the education and awareness of young people is necessary for a sustainable solution (S.Shiriin Barakzai), the groups related to youth listed here are possible examples and do not reflect their proportion among all waste producers:

- SCHOOL CHILDREN
  The Ministry of Education is going to revise the science curriculum for the 10th Five-Year-Plan to upgrade environmental studies. The future Curriculum Consultant of the MoWHS is to assist in preparing special teaching materials on environmental protection and pollution control reflecting the intentions of this strategy. Special emphasis is to be given to the eradication of littering.

- STUDENTS FORMING NATURE CLUBS
  This is a successful program as an extra-curriculum activity, already active in many schools. It is to be extended country-wide, also to put emphasis on the eradication of littering.

- STUDENT GROUPS DOING RECYCLING IN SCHOOLS
  The present recycling program in schools raising money for school programs is to be extended to all schools where recycling is feasible.

- MEMBERS OF SPORTS AND YOUTH CLUBS AND THE SCOUT ASSOCIATION
  Older boys and girls are willing to take over responsibilities. Mobilization programs are to be developed for youth and sports clubs as well as for scouts.

- GROWN-UPS
  Motivation programs are to be developed for the household level for reducing/reusing/recycling, household composting, eradicating littering and road- and riverside dumping.

- INTEREST GROUPS SUCH AS INDUSTRIAL WASTE PRODUCERS
  Under the Ministry of Trade and Industry, the inventory of industrial waste is to be updated, jointly disposal methods designed and an agreement reached with industrial waste producers.

- INTEREST GROUPS SUCH AS HAZARDOUS WASTE PRODUCERS

Similarly, the inventory of hazardous waste is to be updated, disposal/ storage/transport methods designed and then negotiated with the hazardous waste producers.

9. In the special case of Bhutan, in order to protect the tourist industry, priority in the motivation programs is to be given to the eradication of **littering, road- and river dumping and controlling the dog population** as immediate measures**.** The long-term priority goes to waste reduction.

10. Experienced organizations are to be identified and coordinated for taking over the mobilization of the above specific waste producer groups.

11. This extensive mobilization program goes beyond cleaning campaigns and is to make the waste producers responsible. It is to be complemented by a system of motivation and penalties, backed up by rules and regulations and a waste management act.

12. The second component of the Action Plan is the **Capacity Building Program** for assisting the service providers to do a better job. Since this strategy is to cover all urban areas, a solution is required which reaches all towns and is still economically feasible. The core of the capacity building program therefore is to establish a **Mobile Integrated Solid Waste Management Action Team**. This Mobile Team, consisting of highly rated professionals, is to assist first the Solid Waste and Sanitation Section of TCC to improve their services and then to move to the other towns to do there the same. For smaller towns they are to develop a model approach reflecting more rural conditions. Their assistance is to include all waste management components from reducing/reusing/recycling, solid waste collection and disposal, composting, hazardous waste treatment, tariff system development, enforcement, monitoring, training, to community mobilization, always reflecting the local conditions. Initially, this Mobile Team is to operate for three years.

13. Important will be the **institutional integration** of both programs. Initially, the **Information, Communication and Outreach Section** (ICOS) of NEC is to coordinate the Community Mobilization Program. The Capacity Building Program is to be coordinated by the **Department of Urban Development and Engineering Services** (DUDES) of MoWHS, until a permanent Task Force for the coordination of solid waste management has been established within MoWHS.

14. For the implementation of the Community Mobilization Program and the Capacity Building Program a **project proposal** is to be formulated by MoWHS, in order to secure the funds required for implementation.

2. NATIONAL STRATEGY ON INTEGRATED SOLID WASTE MANAGEMENT

15. Outlined here has been a long-term sustainable waste management strategy for the country and a detailed action plan for implementing it.

2.1 Background

16. "Bhutan is undergoing **rapid change**. Increasing numbers of people are moving from rural to urban centres. The recent Population and Housing Census of Bhutan 2005 show that there are 61 towns with a total population of 634,982 out of which the urban population comprise of 196,111 (about 31%) of the total population. It is envisaged that by 2020 half of the Bhutanese population will be living in urban areas. The towns are not well equipped to deal with this rapid movement of population with regard to meeting adequately the basic urban services as they are getting overstretched beyond the means and capacity of local authorities.

17. Though some forms of solid waste management are in place in about 12 towns, the municipalities continue to face **major challenges** in managing the urban waste generated by rapid population increase, low capacity and lack of civic responsibility of the urban residents. Therefore, it is vital to look into the future of developing **integrated solid waste management concepts** such as waste minimisation, recycling and reuse, and informal sector micro -enterprises that link income generation to environmental protection".....

18. ……"In earlier times, societies in Bhutan were overwhelmingly rural and so the disposal of human and other wastes did not pose a significant problem, since the population was small and available land for the assimilation of the waste was large. However with increased urbanisation there is 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". These factors contribute to a proportionally greater increase in urban waste generation and of the **need for proper management**.

19. Compounded by public ignorance and a lack of sense of civic responsibility, the waste and open dumping is creating unsightly surroundings, choked drains and eventually polluted waterways. This not only pollutes the **natural environment**, but also poses a serious hazard to **public health** as the open garbage dumps become a breeding ground for rats, flies, and other disease vectors. This lack of proper waste management **affects tourism** which is seen as one of the key target sectors for economic growth of the Kingdom. The effects of improper waste management are major contributors to increasing water and air pollution in urban areas. The garbage from drains, open litter and illegal dumping on hill slopes eventually all gets washed into the waterways contaminating surface and ground waters. Although nature has the capacity to dilute, disperse, degrade, absorb, ecological imbalances can occur where the natural assimilative capacity is exceeded."……

20. ……." The physical negative impact is complicated by lack of appreciation of the problems and poor coordination of stakeholder agencies and even departments within local governments such as administration, finance, legal, planning, and operations. There is an urgent **need for capacity building** and strengthening of stakeholder agencies.

21. In summary, there is an acute need to assess and provide **integrated solid waste management** for urban centres in Bhutan" by developing and choosing between different options for collection, treatment and disposal.

2.2 Definitions

22. This is to clarify what is understood under the term of Integrated Solid Waste Management. Among the many definitions offered, the following proposed by SKAT for solid waste management and for solid waste seems to come closest to describing the Bhutanese reality:

23. **"Solid waste management includes all activities that seek to minimize health, environmental and aesthetic impacts by solid waste.**

24. **Solid waste can be defined as material that no longer has any value to the person who is responsible for it, and is not intended to be discharged through a pipe. It is generated by domestic, commercial, industrial, healthcare, agricultural and mineral extraction activities**

and accumulates in streets and public places. The words "garbage, "trash", "refuse" and "rubbish" are used to refer to some form of solid waste."

25. An ISWM system then should safeguard public health, protect the environment and be sustainable. Sustainability may be reached through financial affordability by producers and service providers and an efficient management.

26. **"Domestic waste, also known as 'residential waste' consists of wastes produced by household activities such as food preparation, sweeping, cleaning, fuel burning, and gardening. They also can include old clothing, old furnishing, abandoned equipment, packaging and newsprint."** (WB Technical Paper No.426).

27. Since the removal of hazardous waste is part of the ISWM obligation, added is here a definition for hazardous waste as offered by the Hazardous Waste Codes developed by NEC in 2002:

28. **"Hazardous wastes are substances that cause harm to human health and to the environment, unless adequately handled, stored, treated, transported, and disposed. The level of risk depends upon the type and amount of substances and the level of exposure. Hazardous wastes often consist of many components, which complicate their management".**

29. E-waste is a popular informal name for electronic products nearing the end of their "useful life" such as computers, televisions, VCRs, stereos, copiers, fax machines, microwaves and washing machines. Many of these products can be reused, refurbished or recycled. Electronic discards is one of the fastest growing segments of many countries' waste stream. Certain components of these products contain materials that render them hazardous, depending on their condition and density.

2.3 Guiding principles

30. This strategy is to contribute to reach the following overall objective:

    "In line with the Gross National Happiness philosophy of His Majesty the King, the ultimate aim of the Royal Government of Bhutan is to improve the health and well being of the population, create cleaner and more liveable environments, and to develop a model of sustainable solid waste management in the Kingdom."

31. This strategy is perceived as guideline on how all wastes that may have a negative impact on public health and the environment can be removed in an affordable way and regularly.

32. It sets achievable targets for:
    - Ensuring that waste producers become responsible
    - Addressing the route cause by reducing waste to a minimum
    - Gaining control over waste related pollution
    - Establishing a well trained work force.

33. All stakeholders, the waste producers, service providers and others affected by pollution from solid waste are to jointly take action. To achieve this, it is not enough to do public education and awareness of the waste producers, their views have to be asked, their comments followed and they have to be allowed to take over responsibilities.

2.4 Methodology for

34. The following are integrated components of proper solid waste management and need to be addressed.

2.4.1 Reduce/Reuse/Recycle

35. Waste reduction is achieved by reusing some waste items, recycling selected materials and composting of green/organic/biodegradable waste. In most of this service providers are involved. However, the impact of waste reduction on collection and disposal services is highly increased

when **waste is segregated at the source** through the people, the waste producers.

36. **Reduce:** Waste prevention, or "source reduction," means consuming and throwing away less. It includes:
    - purchasing durable, long-lasting goods;
    - seeking products and packaging that are as free of toxics as possible;
    - redesigning products to use less raw material in production, have a longer life, or be used again after its original use.

37. Source reduction actually prevents the generation of waste in the first place, so it is the most preferred method of waste management and goes a long way toward protecting the environment. In the Bhutanese context, it is envisaged that waste reduction can be exercised through two instruments; regulations and economic incentives.

38. **Reuse**: Reusing items by repairing itmes, donating items to charity and community groups, or selling items; also reduces waste. Reusing products, when possible, is even better than recycling because the item does not need to be reprocessed before it can be used again.

    - **Ways to Reuse:** Reusing plastics, refilling bottles, using cloth napkins or towels, donating old magazines or surplus equipment, especially to schools, reusing boxes, turning empty jars into containers for leftover food, purchasing refillable pens and pencils.

39. **Recycle:** Recycling turns materials that would otherwise become waste into valuable resources. It generates a host of environmental, financial, and social benefits.

40. Materials like glass, metal, plastics, and paper can be collected, separated and sent to facilities that can process them into products. In the Bhutanese context, it would be to encourage informal waste collector/dealers to transfer the recyclable wastes to India.

41. Benefits of Recycling:

    - Reduces the need for new landfills and incinerators
    - Conserves resources for our children’s future
    - Supplies valuable raw materials to industry

- Prevents emissions of many greenhouse gases and water pollutants
- Saves energy
- Stimulates the development of greener technologies
- Creates jobs

PRESENT SITUATION

42. Environmental Codes of Best Practice have been produced for Solid Waste Management stressing specifically **reduction of waste at the source**. Although data collected by the RSPN PPPUE Project show that there are lots of opportunities for reducing the pressure on the landfill site, not much is presently happening in waste reduction on the ground.

43. **Reusing** of certain items has been started in the country. Due to the ban on plastic bags, town people have started reusing bags and containers. However, plastic bags seem to be making their return. Empty cartons of printing paper are being reused by civil servants. Customers in the near future may have to pay a deposit for glass bottles in addition to the price of the content. On return of the bottles, they will get their deposit refunded and the bottles can be reused.

44. **Recycling** also has been introduced. There is the PET bottle crushing unit introduced by TCC and the Bhutan Beverages Company Ltd. in Thimphu which produces about 20 kg of shredded plastic per day. Plastic bottles are now sent also from Paro to the shredding unit in Thimphu, since its scale of operation is not cost covering yet. In 14 schools, cans, bottles and paper are collected in three differently colored containers. School children introduced separation of recyclable items to their homes and are taking those items to school. However, the materials collected at the schools are not regularly picked up by the scrap dealer/waste trader. At the border much of the packaging/cartons of imported goods are being resold to India.

45. **Home composting** is done by many households, not necessarily in the most effective way.

46. In many cases, there were complaints by **volunteers** who wanted to assist with removing solid wastes, but could not do so, since facilities/services were not in place.

ACTIONS TO BE TAKEN

47. As part of **Community Mobilization** of the Action Plan**,** waste reduction at source through reusing, recycling and home composting is to be extended to all households and as many schools and as many youth groups as possible, with all available mass media activated.

48. Experienced community mobilization professionals/organizations/NGOs such as the RSPN are to be identified and contracted for motivating specific waste producer groups such as households, schools, youth/sport clubs and scouts. The work of the contracted community mobilizers is to be coordinated and monitored by the Information, Communication and Outreach Section of NEC.

49. Bhutan imports packaging materials like plastics and goods that generate waste from its packaging. The Mobile Action team is to access if a Regulation could be introduced to control or impose municipal tax on packaging materials at entry points (like Paro Airport and Phuentsholing gate). This is likely to control the flow-in of the unnecessary packaging materials, including plastic bags.

50. There are many industries in the south which need heat energy and all the raw materials for burning in the furnace and clinkers are imported. The Mobile Action team is to access if an Act or Regulation on Solid Waste Management could introduce industries collecting and using wastes as subsidiary burning material. If not, tax on import of burning materials could be imposed to the range that waste burning becomes cost-effective.

51. Through MTI, streamlining of the business system to benefit and reduce cost of waste segregation. The Mobile Action Team is to access if the business licenses needs to be streamlined to run a business on specific items so that the shopkeepers can make provisions for waste collection in respective shops. The waste collection can include returning of the respective wastes from consumers of similar products sold from the shop. For example; the hardware and hazardous composition material (batteries, paints, cosmetics, medicines and other chemicals) where the dealers must be mandated to sale only the specified items and they must provide waste bins to collect wastes of their products when the customers or other consumers return it to the shop. The grocery and textile merchants should not be allowed to sale metallic and toxic substance containing materials (Razor-blades, torch and pencil batteries, fluorescence lamps and other electrical accessories) together with their specified items. This way, the segregation of waste will be easier and less cost would be invested. The waste collection by the municipal authorities also must comply with the segregation effort.

52. Educate and create general public awareness to have segregated waste at least in three streams at household level (biodegradable, hazardous and the rest of the waste compositions) to facilitate composting, recycling and transferring (hazardous wastes) of the wastes and reducing the waste going to landfill sites. The need for a transfer station is to be accessed by the Mobile Action Team for each segregated waste to confirm adequate segregation and also to store the recyclable and hazardous wastes prior to transportation to their respective destination.

53. Through the **Capacity Building Program** of the Action Plan local solid waste management units are to be strengthened so that they improve facilities and their services complementarily to the Community Mobilization Program.

2.4.2 Solid waste collection

PRESENT SITUATION

54. All larger towns are running waste collection services. “The per capita waste generation is assumed to be 0.3 kg/day irrespective of whether it is urban or rural, in the absence of reliable data. National level data do not exist for municipal solid waste generation, collection and disposal due to the lack of a nation wide inventory.” (State of the Environment 2001). Municipalities are not only facing financial constraints, but also manpower and equipment deficiencies. Often, professionals are promoted into managerial posts without having experience. Equipment is not maintained properly and repairs take long. There is no separation of biodegradable waste or hazardous substances. Waste is picked up irregularly. Green and black plastic bins are not used as planned. In most municipalities clean-up campaigns, also with the help tourists, are done without any long-term impact.

55. The disturbance during the night by packs of barking dogs roaming through the streets and attacking people has reached such proportions that there is no tourist who is not acknowledging this if asked. Removing about 200 dogs and keeping them in a shelter or doing sterilization campaigns did not have the expected result.

ACTIONS TO BE TAKEN

56. Alternative methods, such as house-to-house, curbside and container collection need to be compared and assessed through the Mobile Team of

the **Capacity Building Program**, in order to arrive at a method or a mix of methods most appropriate to the conditions of the respective municipality and most economically feasible.

57. The Mobile Team is to assist making collection services more efficient and cost effective. In smaller towns without waste collection services, the Mobile Team is to assist in starting basic collection services. Pilot demonstration schemes are to be developed with location specific and generic guidelines.

58. The **Community Mobilization Program** is to prepare the community for waste reduction and eradication of littering and roadside/river dumping.

59. The nightly nuisance created by large numbers of dogs needs to be removed. A solution for controlling the dog population is to be developed jointly with the department responsible.

2.4.3 Solid Waste disposal

PRESENT SITUATION

60. The Thimphu landfill capacity at Memeylhakha has been exceeded years ago. Its continued operation is only made possible by removing soil from the slopes above the landfill for waste coverage thus enlarging the present dumping area.

61. A new site, 3 km further of the present site, has been chosen out of three proposed sites and surveyed, but not yet approved. Through the new Urban Infrastructure Development Project, supported by the Asian Development Bank, the costs for design of the landfill including waste separation area and operators' quarters and for the purchase of site machinery comprising excavator, bulldozer, backhoe and three tipper trucks are to be covered, but not for construction of the landfill. The site would be properly engineered for leachate and rainfall runoff control, thereby minimizing any environmental impacts. It is envisaged that in the waste separation area biodegradable material would be separated out for carting to the new compost plant at Serbithang, located almost on the other side of the town.

62. Also included in this work package are some minor drainage improvements and environment protection works at the old landfill. The specific works proposed include: perimeter cut off drains to divert rainfall runoff around the

site from upstream areas; interceptor drains to capture site runoff; and observation wells to monitor leachate seepage from the site.

63. There is a scarcity of suitable and available sites in the proximity of urban areas. In most towns landfills have not been constructed properly.

ACTIONS TO BE TAKEN

64. Alternative disposal techniques need to be compared and assessed by the Mobile Team under the **Capacity Building Program** to see how they best compliment landfill disposal.

65. In case the new landfill site may not qualify after the EIA, a location closer to Serbithang may reduce the transport cost of separated green waste from the new site location to the compost plant.

66. Operation procedures of the new landfill may be reviewed by the Mobile Team and improvements suggested if required.

67. Waste reduction at source through the **Community Mobilization Program** may extent the lifetime of the landfill.

2.4.4 Hazardous waste handling

PRESENT SITUATION

68. As one of the prioritized areas of the urban sector, Codes of Best Practice for Hazardous Waste Management have been formulated in June 2002, in order to promote sound environmental practices in the management of hazardous wastes. Categories of hazardous waste have been identified and the responsibilities of producers of hazardous substances clearly specified.

69. Under the Environmental Assessment Act, 2000, all commercial and industrial new ventures need environmental clearance (EIA) when applying for a license. Later on, checks are being made on compliance with the respective ECOPs. There is an annual assessment of all existing industries. However, a recent case where a boy suffered life threatening injuries through chemical waste (carbide dust), which had not been disposed off properly for years, shows that compliance with regulations is weak.

70. Hardly any provisions have been made for the disposal of hazardous wastes nor for e-waste, and no provisions at all at the present landfill. The incinerator of the main hospital is out of order, a replacement has been planned. At the Changzamtog industrial area in Thimphu provisions have been made for the collection of old motor oil. This is collected in drums and transported to a designated site 170km away. However, much of it is still ending in the drains. Plans have been made to move the industrial area to three other sites with proper disposal facilities. Plans for the disposal of future hazardous wastes such as the computers of 1700 civil servants or the negative by-products of 11 000 vehicles in Thimphu alone have not yet been made.

ACTIONS TO BE TAKEN

71. Under the **Capacity Building Program,** the Mobile Team is to update the inventory on presently produced and future hazardous wastes, then to develop proposals for reduction, substitution, treatment + disposal, storage and export.

72. To establish a central depository for e-waste on a small scale in Bhutan. A framework of policy incentives and restricting taxes is to be formulated as support to the operation of this unit, in order to reduce/eliminate this type of waste.

73. This is to serve as a sub-regional demonstration facility for neighboring countries and may be considered as one step towards the MDG No.8: “DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT

74. The **Community Mobilization Program** is to supplement the above efforts by creating awareness on the dangers of hazardous waste and involve the public in monitoring hazardous wastes.

2.4.5 Composting

PRESENT SITUATION

75. In Thimphu the new plant at Serbithang is to start operation after electricity and water supply has been fully connected, the perimeter fencing built and the access road sealed. Most of the green waste for composting is expected to come from the main vegetable market. After completion of the new landfill in Thimphu, separation of green waste also will be done there which is to be transported to the Serbithang compost plant on the other side of the town. No transfer stations are existing.

76. The Serbithang compost plant is not expected to cover costs, but to reduce the waste volume going to the landfill.

77. Communal composting is already being done at places such as the Royal Police compound which requires assistance.
78. Home composting is being done by a number of households.

ACTIONS TO BE TAKEN

79. In order to reduce transport cost of separated green waste in Thimphu from Memeylhakha to Serbithang and operation cost of the compost plant, all efforts need to be made under the **Community Mobilization Program** to mobilize waste producers for reduction at the source, separating their wastes at home and starting/improving home composting.

80. In order to reduce transport cost further, the installation of transfer stations is to be assessed by the Mobile Team under the **Capacity building Program.**

81. The Mobile Team is also to assess the operation of the Serbithang plant and may introduce improvements if required.

82. Small-scale community composting as done at the Royal Police compound is to be promoted and assisted by the Mobile Team.

2.4.6 Public/private partnership

PRESENT SITUATION

83. The Government is promoting commercial sector development. Public/private partnership in solid waste management may be among such ventures. Presently, there is no such undertaking in the country.

84. The RSPN with financial support by UNDP has launched a **Public/ Private Partnership for Urban Environment Project** developing a comprehensive policy document for guiding, among others, the future involvement of people in solid waste management. The latest draft report is to draw the attention of government to what needs to be done. A Steering Committee has been formed and a National Stakeholder Workshop conducted. The impact of this project on people' attitude is yet to come.

ACTIONS TO BE TAKEN

85. The Mobile Team under the **Capacity Building Program** is to collect more information on this subject, to be prepared when interest is shown by private entrepreneurs.

2.4.7 Tariff system

PRESENT SITUATION

86. There is a tariff system in place in Thimphu. One comment made seem to describe the present situation: “Nobody pays”. “The situation for cost recovery of solid waste services is critical in Thimphu and will be in Phuentsholing as well. Figures presented to the TMC in 2001 indicate that there are very large deficits every year. Action has not yet been taken on this issue.”

ACTIONS TO BE TAKEN

87. The Mobile Team under the **Capacity Building Program** is to develop a tariff system where the waste producers pay for the removal of their waste at cost price, whereas the **Community Mobilization Program** is to motivate all waste producers, not only to reduce their waste and stop littering, but also pay their fees.

2.4.8 Monitoring

PRESENT SITUATION

88. Not much of monitoring on solid waste management is done in Thimphu. Data is being collected whenever a new project is planned, in order to get funds approved. Apart from comments by the tourist industry on littering and uncontrolled dumping of waste in the path of tourist groups hardly any feed back on solid waste services is reaching the capital. (Urban Sector Programme Support, 2003)

ACTIONS TO BE TAKEN

89. Under the **Community Mobilization Program**, each motivation program designed for specific waste producer groups is to include progress or

impact monitoring. Similarly, will the Mobile Team under the **Capacity Building Program** assist the Solid Waste and Sanitation Section of TCC in developing and use monitoring for each of the solid waste management components.

90. Basic monitoring of solid waste management needs to be applied to all urban areas. Furthermore, the Mobile Team is to assist the other urban municipalities to select data on cleanliness to be sent to Thimphu regularly.

2.5 Enforcement mechanism

PRESENT SITUATION

91. Solid waste management is not necessarily one of the highest priority of some municipalities, whereas the RGoB has recognized the negative impact which pollution through waste may have on tourism. The tourism industry is considered as the sector with the highest potential for employment and needs to be protected.

ACTIONS TO BE TAKEN

92. The central government is to inform all municipalities through executive order that due to the need for a clean environment:
    - they have to upgrade their solid waste management services on a long-term basis
    - that their solid waste management units are to be assisted in upgrading services by the professionals of the Mobile Action Team on Integrated Solid Waste Management by starting with an assessment of existing operations
    - that their District Development Committee (Dzongkhag Yargay Tshogdue) and their Block Development Committees (Gewog Yargay Tshogdues) are to be assisted by the community mobilizers of the Community Mobilization Program
    - that they jointly with the people and the Mobile Team are to develop a monitoring program on services and motivation impact and regularly report to central government.

93. The community mobilizers of the **Community Mobilization Program** jointly with the Mobile Team of the **Capacity Building Program** are to:

- first assist the Solid Waste and Sanitation Section of TCC in upgrading their services covering manpower, equipment and facilities if required
- then to assist those municipalities most important for tourism
- then those towns supported by the 2nd Urban Development Project of the World Bank, if not already part of the above
- then those 5 towns supported by DANIDA, if not already part of the above
- and then the rest of municipalities.

94. In larger urban areas the assistance provided is to include all components listed under **Paragraph 2.4 Methodology**. For smaller communities, a more basic and preventive model approach is to be developed.

95. These efforts are to be supported by rules and regulations, a motivation and penalty system and a waste management act including anti-littering provisions, reduction of packing materials, handling of construction materials and recycling.

2.6 Institutional arrangements

PRESENT SITUATION

96. There are several ministries and institutions with environment sections or divisions. Most of the staff is already overloaded with different responsibilities. Coordination on environmental issues takes place, however there could be improvement. Often it is not known what the others are doing. The Solid Waste and Sanitation Section of TCC is part of the Environment Division of TCC.

ACTION TO BE TAKEN

97. The take-off and continuous supervision of the extensive Community Mobilization Program and of the multifaceted Capacity Building Program will add a rather large workload to existing environment sections/divisions. The progress of both programs may be slowed down.

98. A new continuous **Task Force** responsible for both programs is to be established within the MoWHS. Until the time this Task Force is in place, ICOS of NEC is to coordinate the Community Mobilization Program and DUDES of MoWHS is to coordinate the Capacity Building Program. The

core officers of ICOS and DUDES handling both programs may then be transferred to the new Task Force, in order to ensure continuity.

3. ACTION PLAN FOR STRATEGY IMPLEMENTATION

99. Overall responsibility for environmental management rests with the National Environment Commission, whereas the responsibility for day-to-day environmental monitoring in connection with urban infrastructure lies with TCC. The action plan outlined here is to be implemented by the Ministry of Works and Human Settlement in close cooperation with NEC and TCC. The first activity under this Action Plan is to be a **meeting of all stakeholders** in ISWM to define the roles each of the stakeholders is to play in the implementation of the National Strategy on Integrated Solid Waste Management and to identify immediate actions.

3.1 Community Mobilization Program

100. "The outside world's reaction to Bhutan tends to swing between two extremes – it is perceived either as a paradise on earth or as a country completely isolated from the rest of the world and trapped in a time warp….with its spectacular natural beauty, pristine environment, its fabulous architecture and living spiritual culture…." (A Portrait of Bhutan, 2006)

101. This image has suffered in recent years. Indiscriminate littering, road- and riverside dumping and an oversized dog population which does not allow anyone to sleep through the night or walk in the street is said to have done damage to the tourist industry.

102. Past waste was biodegradable; people used to wrap their butter or cheese in banana leaves, which they threw away afterwards, no impact. Many have kept this habit and now throw away all sorts of packaging made of plastic, paper or foil. Even after cleaning campaigns they do not change their habits.

103. On the other side, even if they throw their waste out of their courtyards, there is a sense of discipline when they clean their compounds or wait long for the arrival of the collection truck.

ACTIONS TO BE TAKEN

104. The **Community Mobilization Program** is to reach all waste producers from the youngest to the oldest citizen and involve them. The key for success is making certain waste producer groups responsible for the cleanliness of a specified area which they are familiar with such as their own neighborhood, the office and school compound, the sports field or areas for the cleanliness of which certain groups may volunteer. This does not only need continuous encouragement but a well coordinated community mobilization program.

105. ICOS is to contract **experienced organizations** for jointly developing such a program. Steps to be taken:

- define the boundaries of areas which may be controlled by certain groups
- identify influential personalities and volunteers of that area
- identify their interest in assisting the motivation program
- jointly with the volunteers identify the waste producers belonging to such an area
- jointly with the volunteers identify their interest in cooperation, especially the factors which may lead to ownership in the program by the waste producers
- jointly with the volunteers define the method how to motivate the people belonging to such an area
- include long-term topics such as WASTE REDUCTION AT SOURCE THROUGH REUSING, RECYCLING AND HOME COMPOSTING and immediate topics such as ERADICATION OF LITTERING, ROAD AND RIVERSIDE DUMPING AND CONTROLLING THE DOG POPULATION
- define specific topics for each specific group
- jointly with the waste producers define what they can do and which support they need
- develop motivation materials and mass media support programs
- do test motivation programs
- train staff for wider application
- set targets and do monitoring.

107. The assistance of other organizations with potential for motivation such as the monkhood, the National Women's Association of Bhutan or the Royal Bhutanese Police is also to be sought.

108. Similarly, individual motivation programs are to be developed for specific waste producer groups such as:

- SCHOOL CHILDREN
  The Ministry of Education is going to revise the science curriculum for the 10th Five-Year-Plan including environmental studies. The future Curriculum Consultant of the MoWHS is to assist in preparing special teaching materials on environmental protection and pollution control reflecting the intentions of this strategy. Special emphasis is to be given to the eradication of littering.

  The extension of nature clubs to all schools as extra-curriculum activity, also to put emphasis on the eradication of littering.

  The extension of recycling in schools where recycling is feasible.

- MEMBERS OF SPORTS AND YOUTH CLUBS AND THE SCOUT ASSOCIATION
  Older boys and girls are willing to take over responsibilities. Mobilization programs are to be developed for youth and sports clubs as well as for scouts.

- TOURIST INDUSTRY
  In order to create ownership among the staff, assist with staff training on environment issues and jointly identify their inputs.

- INDUSTRIAL WASTE PRODUCERS
  Under the Ministry of Trade and Industry, the inventory of industrial waste is to be updated, jointly disposal methods to be designed and then agreed upon with the industrial waste producers.

- HAZARDOUS WASTE PRODUCERS
  Similarly, the inventory of hazardous wastes is to be updated, disposal and storage methods designed and then negotiated with the hazardous waste producers.

109. For each of these groups a special motivation program with set targets is to be developed with the assistance of the **Community Mobilization Specialist** of the Mobile Team, if possible based on models of good practice and evidence of effectiveness. All programs are to include impact or progress monitoring in which the people take part.

110. Part of community mobilization is to identify resources/funds/contributions either in form of contributions e.g. from Tourist Corporation or through sales of certain products. Such funds then

can be made available for certain activities which may be difficult to be financed by the government.

Output:

Motivation programs for waste producer groups done, over three years

111. The following requires close cooperation between ICOS, DUDES, SWSS and the Mobile Team.

Activities		Responsible
3.1.1	In larger urban areas, identify the most potential groups of waste producers as under Paragraph No.97	ICOS + DUDES + SWSS + MT
3.1.2	Identify and contract community mobilization professionals/organizations/NGOs	ICOS
3.1.3	Develop and test motivation/involvement approach and motivation materials with clear targets for each group selected	Contracted community mobilization organizations/NGOs + waste producers
3.1.4	Carry out mobilization campaigns in close cooperation with local bodies	Contracted community mobilization organizations/NGOs + waste producers
3.1.5	Develop and carry out impact monitoring	Contracted community mobilization organizations/NGOs + waste producers

3.2 Capacity Building Program

PRESENT SITUATION

112. Thimphu has several times received support by government and donors for building up solid waste management services. In the near future, the ADB is to assist the TCC with some support for waste disposal through the Urban Infrastructure Development Project. Ten further towns have been assisted in improving solid waste management by the Second Urban Development Project of the World Bank. Presently, four further towns do receive assistance to solid waste management by DANIDA. However, in

most cases capacity is low, services irregular and disposal sites not engineered, nor properly constructed.

ACTIONS TO BE TAKEN

113. For controlling the present situation and taking preventive steps for the future in all urban areas of Bhutan, a **Mobile Integrated Solid Waste Management Action Team**, stationed at TCC, and a **Task Force for Solid Waste Management**, integrated into the MoWHS, are to be established.

Output

Mobile ISWM Action Team + Task Force established, within 6 months

114. The Mobile Team is to be operating for 3 years, whereas the Task Force is to be permanent consisting of 7 to 8 members including motivation specialists and community stakeholders.

Activities		Responsible
3.2.1	Brief ICOS + DUDES on the National Strategy	PPD of MoWHS
3.2.2	Prepare job description for all Mobile Team members	DUDES
3.2.3	Prepare TORs for all Mobile Team members	DUDES
3.2.4	Secure funds through project proposal	PPD of MoWHS
3.2.5	Advertise posts	MoWHS
3.2.6	Do interviews and select candidates	MoWHS + SWSS
3.2.7	Hire selected candidates	MoWHS
3.2.8	Provide office space + office equipment	MoWHS + SWSS
3.2.9	Provide equipment + vehicle	MoWHS
3.2.10	Establish Task Force on solid waste management within MoWHS	MoWHS

3.2.1 Profile of Mobile Integrated Solid Waste Management Action Team

115. This Mobile Team is not to replace any operating solid waste management unit in the country. Instead, it will assist existing and new ones to be established. The Mobile Team is to strengthen local capacity.

The Mobile Team is to consist of:

- a **Community Mobilization** Specialist (national)
- a short-term **curriculum development** consultant
- a Solid **Waste Collection** Specialist with practical experience on well run schemes (national or international)
- a Solid **Waste Disposal** Specialist with practical experience on well run schemes (national or international)
- a short-term **hazardous waste** consultant with experience in neighboring countries
- a short-term **legal** consultant and
- a **project manager** responsible for all programs and liaison to the government.

116. The priorities are set that they:
    1. first assist the Solid Waste and Sanitation Section of TCC in upgrading their services covering manpower, equipment and facilities if required,
    2. then assist those municipalities most important to tourism,
    3. after this those towns supported by the 2nd Urban Development Project of the World Bank, if not already part of the above,
    4. then those 5 towns supported by DANIDA, if not already part of the above, and
    5. then the rest of municipalities.

117. Initially, the Mobile Team is to operate for three years.

118. Their assistance is to include all areas from reducing/reusing/recycling, solid waste collection, disposal, composting, hazardous waste treatment, tariff system development, enforcement, monitoring and training, to community mobilization, always responding to local conditions.

119. For smaller communities with more rural conditions, a **basic and preventive model** approach is to be developed for waste reduction, eradication of littering, road and riverside dumping and an appropriate method of disposal.

120. The Mobile Team are to start their assignment by making themselves familiar with the ground situation.

Output

Existing services in Thimphu reviewed + upgraded; service providers coordinated, within 6 months

121. Stakeholders such as the RSPN and the Association of Bhutanese Tour Operators are to be included among their informants.

Activities		Responsible
3.2.1.1	Meet with all service providers and relevant stakeholders in Thimphu, get a clear idea on present waste management practices + who is doing what	MT + service providers
3.2.1.1	Identify bottlenecks, areas for improvement and overlapping and adjust	MT + service providers
3.2.1.3	Coordinate services provided	DUDES + MT

3.2.2 Areas of inputs by Mobile Team

122. In early times, societies in Bhutan were overwhelmingly rural and so the disposal of human and other wastes did not pose a significant problem, for the population was small and available land for the assimilation of the waste was large. However with increased urbanisation there is 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”. These factors contribute to a proportionally greater increase in urban waste generation and to the increasing need for its proper management. Compounded by public ignorance and a lack of sense of civic responsibility, the waste and open dumping is creating unsightly surroundings, choked drains and eventually polluted waterways. These not only pollute the natural environment, but also pose a serious hazard to public health as the open garbage dumps become a breeding ground for rats, flies, and other disease vectors. This lack of proper waste management does affect tourism which is seen as one of the key target sectors for economic growth of the Kingdom.

123. The effects of improper waste management are major contributors to increasing water and air pollution in urban areas. The garbage from drains, open litter and illegal dumping on hill slopes eventually all gets washed into the waterways, thereby contaminating surface waters and ground waters. Although nature has the capacity to dilute, disperse, degrade and absorb,

ecological imbalances can occur where the natural assimilative capacity is exceeded.

124. In summary, there is an acute need to assess and reorganize the present solid waste management services.

125. In the following, activities are listed as a guideline how the proposed Mobile ISWM Action Team can contribute to mitigating the above challenges.

Strengthening of local manpower

126. The staff of service providers can reduce costs if well trained. They may design collection routes more economically and may select vehicles which can be loaded more easily, consume less fuel, have a longer life span and do not need expensive spare parts.

Output

All urban ISWM teams consolidated, within 3 years

127. This is to be based on official government directives as under 2.5.

Activities		**Responsible**
Str.1	During work with the Thimphu scheme identify manpower needs of the Thimphu ISWM operations	MT
Str.2	Prepare job descriptions for the new posts	MT
Str.3	Prepare TORs	SWSS + MT
Str.4	Secure funds	SWSS
Str.5	Advertise posts	SWSS
Str.6	Do interviews + select candidates	SWSS + MT
Str.7	Hire selected candidates	SWSS
Str.8	Provide office space + equipment	SWSS
Str.9	During work with other municipalities identify manpower needs of their ISWM schemes	MT
Str.10	Prepare job descriptions and TORs	Municipality + MT
Str.11	Secure funds	Municipality
Str.12	Advertise, interview + hire candidates	Municipality
Str.13	Provide office space + equipment	Municipality

Output

On-the-job-, short-, long-term training provided + exploration visits to other countries, done within 3 years

128. Visiting successful solid waste management systems is the fastest training method.

Activities		Responsible
Str.14	Organize a team building workshop for the MT with SWSS members + stakeholders	DUDES
Str.15	Identify candidates for on-the-job training and assign supervisors	MT
Str.16	Identify candidates for short-term training	MT
Str.17	Identify appropriate training courses	MT
Str.18	Secure funds	DUDES
Str.19	Identify candidates for long-term training	MT
Str.20	Identify training institutes	MT + DUDES
Str.21	Secure funds	DUDES
Str.22	Identify ISWM operations in other countries for exploration visits by Bhutanese staff members	MT + DUDES
Str.23	Identify staff members for visits	MT + municipalities
Str.24	Organize visits	DUDES + MT
Str.25	Undertake visits	Staff members + MT

Solid waste collection

129. The solid waste collection services are to remove regularly and in an affordable way all waste which may have a negative impact on public health and the environment. In the following, the efforts by service providers are detailed which only can become sustainable if supported by the people, the waste producers.

130. In order to safeguard the tourist industry, special emphasis is to be placed on uncontrolled waste accumulations through littering and waste dumped on roadsides and into rivers. Here again, supporting waste producer groups are required.

131. Another set-back for the tourist industry, is the nightly disturbance by packs of barking dogs roaming through the streets and is to be removed. The MT jointly with the SWSS is to take appropriate action.

Output

Solid waste collection in Thimphu reorganized, within 1 year

132. Initial data collection in all municipalities is to provide a sound basis for monitoring and to create a nation wide inventory.

Activities		Responsible
Col.1	Carry out baseline surveys on waste characteristics, type, volume, location where deposited, weight per capita, etc., use existing + collect new data	MT + volunteers
Col.2	Assess curbside, house-to-house and container collection + equipment	MT + SWSS + waste producers
Col.3	Assess the need for transfer stations	MT + SWSS
Col.4	Assign priorities to waste types, e.g.: 1st priority domestic waste (largest quantity) + hazardous (most dangerous)	MT + SWSS
Col.5	Design + do cost estimates for collection options and different technologies following the ECOPSW	MT + SWSS
Col.6	Select most efficient and most economic collection mode	MT + SWSS
Col.7	Redesign most economic collection routes accordingly	MT + SWSS
Col.8	Assess collector vehicles + redesign accordingly if required	MT + SWSS
Col.9	Order additional most appropriate + economic equipment accordingly, if required	SWSS
Col.10	Design maintenance procedures and select maintenance equipment accordingly	MT + SWSS
Col.11	Redesign operation procedures accordingly	MT + SWSS
Col.12	Do test runs on new program and adjust	MT + SWSS
Col.13	Develop + install monitoring procedures for waste collection with public participation	MT + SWSS + waste producers
Col.14	Develop annual work plan.	MT + SWSS
Col.15	Carry out regulatory reforms for enforcing compliance to the newly developed approach for the country (incentives, regulations, fines, laws).	MT + legal consultant
Col.16	Identify the department responsible for keeping urban areas free of roaming dogs	MT + SWSS
Col.17	If responsibility is not clear, MT + SWSS is to take action themselves	MT + SWSS
Col.18	Either jointly with department responsible or on their own develop program for controlling the dog population e.g.new design of collection pits	MT + SWSS
Col.19	Secure funds	SWSS
Col.20	Carry out program for controlling the dog population	MT + SWSS

Output

Solid waste collection in other towns reorganized/organized, in 3 years

133. The more people are involved in the following, the more economic solid waste collection is to become.

Activities		Responsible
Col.21	In other communities, assess traditional disposal practices for possible application	MT + Municipality + waste producers
Col.22	Carry out surveys on waste characterization type, volume, location, weight per capita,	MT + Municipality + waste producers
Col.23	Design + do cost estimates for alternative collection modes	MT + Municipality
Col.24	Select most efficient and most economic collection mode for the prevailing conditions	MT + Municipality
Col.25	Redesign most economic collection routes accordingly	MT + Municipality
Col.26	Assess collector vehicles + redesign accordingly if required	MT + Municipality
Col.27	Order additional most appropriate economic equipment accordingly, if required	MT + Municipality
Col.28	Design maintenance procedures and select maintenance equipment accordingly	MT + Municipality
Col.29	Do test runs on new program and adjust	MT + Municipality
Col.30	Develop + install monitoring procedures for waste collection with public participation	MT + Municipality + waste producers
Col.31	Develop annual work plan	MT + Municipality
Col.32	Include program for dof removal if required	MT + Municipality

Solid waste disposal

134. The Environmental Codes of Best Practice for Solid Waste Management are providing detailed guidelines for selecting the location of landfill sites under the challenging environmental conditions of Bhutan. They pay special attention to the impact such a site may have on local communities and that they are to be involved in planning. The ECOPSW advice on the design of a sanitary landfill, its operation and maintenance and what has to be done when the landfill is full. They also refer to other forms of disposal such as incineration, composting and recycling. The

Environmental Codes of Best Practice for Hazardous Waste Management are addressing the challenge of hazardous waste disposal.

135. It is recognized that among the above disposal techniques the ultimate disposal for residual solid waste is the sanitary landfill.

136. **A sanitary landfill is a site where solid wastes are placed on or in the ground at a careful selected location by means of engineering techniques that minimize pollution of air, water and soil, and other risks to man and animals. Aesthetic considerations are also taken into account.**

137. Most designs include expensive and carefully constructed impermeable layers, which prevent leachate moving downwards into the ground, and drainage systems to bring the leachate to a treatment plant or a storage tank. However, if the tank is not emptied before it overflows, or if the treatment plant is not working, the leachate control system actually makes the pollution worse than from an open dump, because all the leachate is concentrated in one place, giving natural purification systems very little chance of reducing the pollution impact.

138. To gain control over gas produced by the landfill and turn it into energy, requires a well done design and careful construction of the landfill and regular proper maintenance.

Output

Present disposal techniques assessed against waste reduction potential + costs, within 6 months

139. This assessment is to refer to the new landfill site.

Activities		**Responsible**
Dis.1	Assess waste disposal to sanitary landfill + waste separation at landfill, identify pros + cons	MT + SWSS
Dis.2	Assess pros + cons of composting	MT + SWSS
Dis.3	Assess pros + cons of waste Incineration	MT + SWSS

Output

Thimphu waste disposal reorganized, within 1 year

140. The following comparison is to be made by referring to the new landfill site and a new incinerator at the hospital.

Activities		Responsible
Dis.4	Assess Thimphu landfill disposal against findings	MT + SWSS
Dis.5	Redesign + order equipment if required	MT + SWSS + DUDES
Dis.6	Redesign operation + maintenance procedures if required	MT + SWSS
Dis.7	Assess Serbithang compost plant performance against findings	MT + SWSS + customers
Dis.8	Redesign + order equipment if required	MT + SWSS
Dis.6	Redesign operation + maintenance procedures if required	MT+ SWSS
Dis.7	Assess Thimphu disposal through incineration against findings	MT+ SWSS
Dis.8	Redesign + order equipment if required	MT+ SWSS
Dis.9	Redesign operation + maintenance procedures if required	MT+ SWSS
Dis.10	Develop + install environmental impact monitoring procedures and required mitigation with public participation	MT + SWSS + neighbors
Dis.11	Develop annual work plan	MT+ SWSS
Dis.12	Prepare + carry out regulatory reforms for the country for enforcing compliance to the newly developed approach (incentives, regulations, laws).	MT + legal consultant

Output

Waste disposal in other towns reorganized/organized, over 3 years

141. As the collection methods, disposal methods for more rural communities are to be adjusted to prevailing conditions.

Activities		Responsible
Dis.13	Assess disposal operation against earlier findings	MT+ local team
Dis.14	Select most appropriate and financially sustainable disposal techniques with public participation	MT + local team + waste producers
Dis.15	Redesign + order equipment if required	MT + local team
Dis.16	Redesign operation + maintenance procedures if required	MT + local team

Dis.17	Develop + install environmental impact monitoring procedures with public participation	MT + local team + waste producers
Dis.18	Develop annual work plan	MT + local team

Hazardous waste

142. Some waste materials need special care because their properties make them more hazardous or problematic than general wastes. Used oil can be refined for reuse or burned in properly equipped furnaces. Slaughterhouse wastes should be buried in special trenches at suitable sites. Car tires should be reused as much as possible, 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.

143. 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 so 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.

144. Among hazardous wastes, healthcare wastes are like the top of the iceberg. They normally get preferential treatment, whereas other hazardous wastes may not be attended to at all. **Healthcare wastes are generated as a result of activities related to the practice of medicine including veterinary medicine and dentistry. Some of the healthcare wastes coming from any particular hospital or institution are similar in nature to domestic solid wastes, and may be called "general hazardous wastes". The remaining wastes pose serious health hazards because of their physical, chemical or biological nature, and so are known as "hazardous healthcare wastes" or "healthcare risk wastes".**

145. Healthcare wastes have attracted considerable attention because of the emotional impact of seeing body parts amidst solid waste, and because of the increasing concern about AIDS and hepatitis. In many cases the most dangerous items in healthcare wastes are needles from syringes and drips, because the needles shield the viruses from chemical disinfectants and a harsh external environment, and the sharp point allows easy access for the viruses into the blood stream of anyone who is pricked by the needle.

146. Many attempts to improve healthcare waste management rely solely on the provision of incinerators or other treatment technologies. Such a strategy has several weaknesses in that
    - often the hospitals and healthcare facilities are not able to afford the operating costs of their incinerator or other treatment technologies, and so the equipment is left unused or not repaired when it breaks down
    - Many of the risks occur before the waste gets to the stage of removal or treatment, and so the risks are not reduced by the provision of treatment equipment
    - The real need is often to provide better methods of storage and to train the staff to adopt safer working practices.

147. By now it is clear that all this is rather cost intensive. Therefore, in order to protect public health and the environment, special attention has to be given and special funds be made available, in order to fully integrate hazardous waste control into the ISWM system.

148. With the principle that **the producer pays for the removal of hazardous wastes** the following outputs and activities are proposed:

Output

Hazardous wastes identified for immediate action, within 1 year

149. For the following, the Hazardous Waste Consultant of the MT is to take the lead.

	Activities	**Responsible**
Haz.1	Identify all hazardous wastes generated and present removal practices (update inventory)	MT + SWSS + volunteers + HWC
Haz.2	Identify most dangerous substances and their impact which need to be substituted + negotiate with producers	MT + SWSS + volunteers + HWC + MoTI
Haz.3	Identify priority hazardous wastes + develop proper removal/transport, treatment + storage procedures and make cost estimates	MT + Thimphu Team + HWC
Haz.4	Train all staff accordingly	MT + SWSS + HWC
Haz.5	Negotiate with the respective producers on reducing production of such wastes and paying for removal, treatment + storage	MT + SWSS+ HWC + MoTI
Haz.6	Order treatment equipment and establish hazardous waste facilities if required (central depository for e-waste)	MT + SWSS + HWC
Haz.7	Identify hazardous wastes the handling of which has to be subsidized	MT + SWSS

Haz.8	Identify sources for subsidy	MT + SWSS
Haz.9	Develop enforcement procedures for hazardous wastes + framework of incentives/taxes for e-waste	MT+ SWSS + DUDES + legal consultant
Haz.10	Develop + carry out impact monitoring of hazardous wastes and of compliance with enforcement procedures.	MT + SWSS + legal consultant + HWC + volunteers

Output

Long term strategy developed for the rest + future hazardous wastes, within two years

150. Other waste producer groups can be made responsible for monitoring.

Activities		Responsible
Haz.11	List remaining and future hazardous wastes	MT + SWSS + HWC
Haz.12	Develop proper removal, treatment + storage procedures and make cost estimates	MT + SWSS + HWC
Haz.13	Negotiate with the respective producers on reducing production of such wastes and paying for removal, treatment + storage	MT + SWSS
Haz.14	Order treatment equipment and design hazardous waste facilities if required	MT + SWSS + HWC
Haz.15	Secure funds for equipment + construction of facilities	MT + SWSS
Haz.16	Train all staff accordingly	MT + SWSS + HWC
Haz.17	Identify hazardous wastes the handling of which has to be subsidized	MT + SWSS
Haz.18	Identify sources for subsidy	MT + SWSS + DUDES
Haz.19	Identify potential groups of hazardous waste producers for awareness campaign	MT + SWS + HWC
Haz.20	Prepare and carry out awareness campaign	MT + ICOS + volunteers
Haz.21	Develop + carry out impact monitoring of the rest of hazardous wastes and of compliance with enforcement procedures.	MT+ SWSS + DUDES + legal consultant + HWC

Composting

151. Composting is an excellent method of recycling biodegradable waste and conserving existing landfill space. Compost as such increases organic matter content in the soil, improves soil structure, texture and aeration which increases the soil's water-holding capacity, especially important for

sandy soils. It loosens clay soils and stimulates healthy root development in plants. Compost is a soil conditioner, not a fertilizer.

152. When plants or part of plants die, fall to the ground and decay, they are slowly dismantled by small organisms living in the soil. Eventually, these plant parts become humus and disappear in the ground. This humus keeps the soil light and fluffy. Humus is the goal for composting and its quality defines much of the financial success of a compost plant where Mother Nature's process is speeded up. The second aspect of composting which is very basic for marketing is the amount of small hard materials left in the compost which cannot be broken down by microorganisms. If there is too much of hard materials in the compost farmers will not buy it again. Thirdly, if compost is sold only partly decomposed - finished compost is dark brown, crumbly and earthy-smelling – and added to the soil, the micro-organisms will continue to do the work of decomposing, but will use soil nitrogen for their own growth. This then reduces the amount of nitrogen available to the plants the growth of which the purchased compost was to enhance.

153. Many large and small composting schemes have failed because composting is regarded as a disposal process, and not a production process. Lack of attention to marketing and to the quality of the product may lead to the accumulation of unsold compost.

154. Production of compost can range from passive –allowing the materials to sit and rot on their own over a long period of time- to highly managed. Passive composting can be done by just letting a pile sitting there over a long period of time. It involves the least amount of time and energy of the compost producer. This also can be done in a 3-sided enclosure made of fencing, wire or concrete blocks, which keeps the pile neater and less unsightly. This method would serve the purpose of reducing biodegradable waste going to the landfill. If people want to use their compost regularly, more work is required. With the best management, compost can be ready in 3-4 weeks.

Output

Marketing of public compost production improved, within 1 year

155. An opportunity for public/private partnership.

Activities		Responsible
Com.1	Assess compost operation against earlier findings	MT+ SWSS
Com.2	Redesign + order equipment, if required	MT + SWSS
Com.3	Redesign operation + maintenance procedures, if required	MT + SWSS
Com.4	Assess marketing strategy and redesign, if required	MT + SWSS + customers
Com.5	Establish outlets for marketing compost	MT + SWSS
Com.6	Ensure compost standards by regular quality monitoring	MT + SWSS + customers
Com.7	Develop + do promotion for the compost produced.	MT + SWSS + customers

Output

Home composting promoted, within 1 year

156. This is to be part of the community mobilization campaign.

Activities		Responsible
Com.9	Identify composting practices in different climatic regions of the country	MT + SWSS + private composters
Com.10	Develop model composting for private household in different climates of the country	MT + SWSS + private composters
Com.11	Develop + carry out composting promotion + provide hands-on training on composting	MT + SWSS + NGO + private composters
Com.12	Develop + carry out progress monitoring	MT+SWSS+ private composters

Output

Biogas production promoted, within 1 year

157. 145. This is an option for a PPP-venture.

Activities		Responsible
Com.13	Visit successful biogas production in neighboring countries	MT + TCC
Com.14	Brief potential biogas producers on benefits of biogas	MT + TCC + potential users
Com.15	Provide support if requested	MT + TCC + potential users
Com.16	Develop and do progress monitoring	MT + TCC + potential users

Recycling

158. Resource recovery of material that someone has regarded as waste may come in different forms:

- REUSE – being used for the same purpose again such as refilling a soft drink bottle

- RECYCLING – processing material so that it can be used again as the
  - same material such as waste paper turned into pulp and then into new paper again, or broken bottles as basis for making new bottles
  - converting materials into something different such as making padding for clothing and sleeping bags from plastic bottles

- ENERGY RECOVERY such as using the gas from landfills as fuel for electricity generation.

159. Key factors that affect the potential for resource recovery are the cost of the separated materials, their purity, quantity and location. The cost of storage and transportation is then the decisive point for making the marketing of recycled items profitable or not.

160. Recycling ventures **seldom become profitable if introduced from above**. Most successful recycling is done by private entrepreneurs. Individuals who intend to make a living from recycling need to have a good business sense and a clear understanding which materials can be sold where and for how much. With this expertise they can provide the basis for waste separation at household level, also for the scavenger and the school recycling committee to only collect those materials, which the waste trader may buy from them after he has confirmed the prices he will pay. The waste trader may decide to process some of the collected items himself such as compacting paper for easier transport or cleaning and shredding plastic bottles, in order to get a better price in return.

161. However, recycling ventures **need support from above** in the form of guiding/motivating waste producers towards mandatory separation of recyclable materials.

Output

Conditions for recycling of marketable waste materials improved, within one year

162. Support by the government to successful recycling ventures is not a lost investment, since it will reduce the waste volume going to the landfill.

Activities		Responsible
Rec.1	Identify + assess present recycling practices in the country	MT + SWSS + waste traders + MoTI
Rec.2	Identify those recycled materials which have/may have a market	MT + SWSS + waste traders + scavengers
Rec.3	Assist with publicity on recycling potential	MT + SWSS + ICOS
Rec.4	Assist with the formation of recycling bodies such as in schools and local government offices	MT + ICOS + MoE
Rec.5	Develop guidelines for the support of waste scavengers (healthcare, access to waste, etc.)	MT + SWWS + NGO
Rec.6	Develop and do monitoring on recycling impact.	MT + SWWS + waste traders + scavengers

Output

Procedures developed for use/disposal of other waste materials which can reduce the waste volume going to the landfill, within 1 year

163. Restrictions on or additional fees for the removal of bulky items may have the side effect of encouraging uncontrolled dumping.

Activities		Responsible
Rec.7	Identify and assess the potential of other waste materials for reducing the waste volume	MT + SWSS + waste producers
Rec.8	Develop procedures for handling such materials, especially of construction waste, bio-degradable + agricultural items, packaging coming across the border	MT + SWSS + waste producers + waste traders
Rec.9	Compare pros and cons of subsidies + additional fees for the identified items	MT + SWWS
Rec.10	Develop + carry out impact monitoring of the items selected.	MT + SWSS + waste producers
Rec.11	Support with regulatory framework, system of motivation + penalties, waste management act.	LC + SWSS + DUDES

Public/private partnership

164. In many countries there is a great interest in the participation of private companies in solid waste management. Sometimes this is driven by the failure of municipal systems to provide adequate services, and sometimes by pressure from national governments and international agencies. There is the experience that a local government body that has not been able to provide a satisfactory solid waste management service on its own will not be able to engage a private enterprise to provide services in a satisfactory way.

165. Such arrangements with private companies have not all been successful. As a result some opposition to private sector involvement is now in evidence.

(A) PPP WITH LARGER COMPANIES

166. Most partnerships in this field were limited to solid waste collection. There are three basic types of arrangements for such partnerships:

- a contract on which the service provider is paid by the local government
- franchise, for which the local government grants a monopoly for providing a service for a specified time in a specified area, and the service provider is responsible for collecting a fee from the waste producers
- open competition, where qualified service providers can contract with any waste producer for the collection of their waste, and there is ongoing competition for business between the service providers.

167. In such relationships there is the danger that local government may dominate the service provider. If the service provider is in a weak position, he may feel very insecure, not knowing how long the agreement will last, and he may feel that he has no rights, only obligations. He may also have very limited access to municipal decision-makers for discussion of problematic issues.

168. It is also possible that the private sector partner dominates the local government For example, when there is a large and multinational contractor working with a local government authority which has little experience of working with the private sector. In such cases the local government may pay more than was anticipated or receive an inferior service.

169. An important factor for the success of private sector participation is the ability of the client or grantor – usually a municipal administration – to write and enforce an effective contract. Many municipalities do not know what it has been costing them to provide a service, so they cannot judge if bids from the private sector are reasonable. The contract document must be well written to describe in quantitative terms what services are required and to specify penalties and other sanctions that will be applied in case of shortcomings. Monitoring and enforcement should be detailed. It is also important that the rights of both parties are upheld by the courts.

(B) PPP WITH SMALLER ENTERPRISES

170. As an alternative to large companies that can provide most or all of the solid waste services in a city, micro-enterprises or small enterprises can be involved. They often use simple equipment and labor-intensive methods, and therefore can collect waste in places where the conventional trucks of large companies cannot enter.

171. However, when we look at the tasks in starting and running an enterprise, the **need for external support** for small companies becomes clear, since a wide range of **skills** is required by this enterprise for: **data collection, preparing proposals, negotiating with authorities, arranging financial support, capacity building of staff, selection and procurement of equipment, planning, raising community awareness, management of personnel, salaries, accounts and financial management, fee collection, dealing with defaulters, monitoring and reporting, evaluation and improving shortcomings.**

172. Support has been provided to such ventures by international agencies, NGOs and influential local citizens. It comes in the form of training courses, provision of equipment, advice or as in The Billy Hatting model of South Africa in form of an expert as contract partner. The expert arranges finance and the provision of equipment, provides training and practical guidance, and acts as mentor and advisor. This type of support is most intense during the first five-year contract period and is only feasible when there is sufficient funding to pay the fees of the expert and the expert has the necessary skills and experience, so that his advice meets the needs. The goal should be to strengthen the enterprise so that it learns to perform all tasks.

173. Three key components of successful arrangements with any size of company are **competition, transparency and accountability.**

(C) PPP WITH LOW-INCOME GROUPS

174. On the lower end of the wide range of different PPPs in solid waste management there is a popular approach in low income areas or slums where collection services are not provided due to difficult access or low fee paying capacity of the residents. In such cases residents have taken action in cleaning their own neighborhoods and taking the waste to locations from where the waste can be collected more easily. Out of such volunteer operations partnerships with the municipality services have developed in many places rather successfully.

(D) PPP ON WASTE REDUCTION

175. There also are non-commercial small-scale examples linking waste reduction to public/private partnerships, mostly supported by NGOs and volunteer work. Most initiatives involve the separation and sale of common household materials and result in “win-win” situations where householders make some extra cash, waste traders get their raw materials, employment is generated and the waste volume going to the landfill is reduced.

Output

SWSS prepared for public/private partnership in solid waste management, within 6 months

176. This May be considered as part of the training activities.

	Activities	**Responsible**
PPP.1	Obtain assessment/reports of PPP such as “The Guidance Pack on Private Sector Participation in Municipal Solid Waste Management”, by Sandra Cointreau, CWG-SKAT	MT + SWSS
PPP.2	Obtain a variety of contract formats	MT + SWSS
PPP.3	Ensure close coordination/cooperation with the PPPUE Project of RSPN	SWSS
PPP.4	Visit successfully operating PPPs in solid waste management in neighboring countries	MT + SWSS + RSPN
PPP.5	Decide on further action in this field.	SWSS + DUDES

Tariff system

177. Designing the tariff system always comes last, when most of the costs are known. Assuming the initial costs for establishing or improving an existing solid waste management system have been covered either by the government or a grant, there is a need to look at the **costs of operation, maintenance and replacement**, which the municipality has to bear in the long run. This includes the costs of offices and manpower with healthcare, insurance, uniforms, and care of scavengers, costs of vehicle- and equipment operation, maintenance, repair and replacement, costs of operation and maintenance of the disposal facilities and of motivation materials and campaigns.

178. There may be no income from the landfill except if there was an existing and successfully operating public/private partnership. If there are no private and recognized waste collection operators, there will be no income from this side. To charge fees from individuals taking their waste to the landfill, may scare them away and they may dump their waste somewhere else.

179. The possible income from large scale composting may be neglected at this stage, since it is not sure how consumers may react in the long run to the quality of compost and its price.

180. And there may be no income from recycling, since this should go to e.g. “school recycling committees” and waste traders, in order to keep them going. The benefit from recycling to the ISWM system may be recognized in the reduction of waste and removal of non-compostable materials.

181. The ideal situation is when the fees for waste removal cover the entire cost of operation. Now we are back to the waste producers and their importance. The general principle should be that the **waste producers pay** for the removal of their waste at cost price. Different groups of waste producers may have different potential to pay fees for waste removal such as:
- private households (low-, medium and high income)
- commercial enterprises (business, hotels, restaurants)
- public offices (government, schools, hospitals)
- industries

Early information to the waste producers on fee structure and costs will be crucial for their willingness to pay fees.

Output

Cost of operation, maintenance and replacement of the entire ISWM system calculated, within 6 months

182. The decision to exclude cost of replacement of equipment from the cost estimates lies with SWSS.

Activities		Responsible
TAR.1	Calculate cost of premises, offices + staff	MT + SWSS
TAR.2	Calculate cost of vehicle operation, maintenance + (replacement)	MT + SWSS
TAR.3	Calculate cost of operation, maintenance + (replacement of other equipment)	MT + SWSS
TAR.4	Calculate cost of operation + maintenance of landfill site	MT + SWSS
TAR.5	Calculate cost of operation + maintenance of compost plant	MT + SWSS
TAR.6	Calculate cost of operation + maintenance + (replacement of incinerators)	MT + SWSS
TAR.7	Calculate cost of production of motivation materials (videos, leaflets, posters, etc.)	MT + SWSS
TAR.8	Calculate cost of motivation campaigns.	MT + SWSS

Output

Potential for payment of fees of different waste producer groups assessed, within 6 months

183. It may be useful to gradually increase the monthly fee to a rate which will cover the full operation and maintenance costs.

Activities		Responsible
TAR.9	Identify number of private households with low, medium, high income, their waste type + volume	MT + SWSS
TAR.10	Meet with private households + assess their willingness to pay	MT + SWSS
TAR.11	Identify number + type of businesses, their waste type + volume	MT + SWSS

TAR.12	Meet with representatives + assess their willingness to pay	MT + SWSS
TAR.13	Identify number + type of service providers (public offices, schools, hospitals), waste type + volume	MT + SWSS
TAR.14	Meet with representatives + assess their willingness to pay	MT + SWSS
TAR.15	Identify number + type of industries + their waste type + volume	MT + SWSS
TAR.16	Meet with representatives + assess their willingness to pay	MT + SWSS
TAR.17	Identify and estimate subsidy needs of specific waste producers	MT + SWSS
TAR.18	Estimate total income, compare with costs + decide on fees for each waste producer group.	MT + SWSS

Output

Different modes of fee collection designed + tested, within 6 months

184. An example for public participation from Bangla Desh:

"The Waste Management Committee is also responsible for setting the monthly service fee which varies depending on household income and prevailing socio-economic conditions. The intention is to gradually increase the monthly fee to a rate which will cover the full operation and maintenance costs," Khulna City Corporation

Activities		**Responsible**
TAR.19	Identify existing modes of fee collection in other sectors in the country + assess their potential	MT+ SWSS + MoF
TAR.20	Identify modes of fee collection for waste removal in other countries	MT + SWSS
TAR.21	Select one or more modes of fee collection for different groups	MT + SWSS
TAR.22	Make test runs of fee collection + adjust.	MT + SWSS
TAR.23	Develop + start monitoring of fee collection	MT + SWSS

3.3 Project development

185. The above Action Plan for strategy implementation requires funds which are to be secured through a project proposal. The MoWHS received the mandate for developing such proposal. Funds are required for:
- covering the costs of the Community Mobilization Program including contracts of motivation agencies, media use, material production, and incentives for volunteers
- covering all costs for the Mobile Team over a period of three years
- covering the costs for training and visits of efficient schemes in neighboring countries
- construction of facilities and equipment to be purchased

186. Due to the urgency of improving ISWM operations all over the country, the costs for new facilities and new equipment are to be taken over by this project, whereas operation and maintenance costs of all ISWM systems assisted by the Mobile Team are to come from the respective municipality.

187. When making cost estimates, the costs of motivation programs can be deducted from earlier such programs; the expenses for the Mobile Team can be estimated as well as for training and visits to other countries. However, the costs of construction of new ISWM facilities and of equipment to be ordered will only be known after the Mobile Team has assessed the situation and made proposals. The funds for new facilities and new equipment therefore need to be made available in a lump sum to be detailed later.

Annex 1

Contributors and Thanks

Annex 1

Contributors and Thanks

188. The Royal Government of Bhutan recognized that growth in urban areas, population and infrastructure development are fast becoming major emerging issues for the environment and natural resources of Bhutan (NEC, SOE 2004). As a very high ranking risk to the environment and public health pollution through waste has become a major challenge.

189. The National Environment Commission has taken the lead to request assistance from UNEP for formulating a National Strategy on Integrated Solid Waste Management.

190. Consultations for the preparation of this document have taken place from 9 – 18 June 2006.

191. The Deputy Minister Dasho Nado Rinchen of NEC extended a warm welcome to the UNEP consultant on arrival and gave valuable advise on the content of this document. From his staff, Mr. Ugen Tenzin, Head, Policy and Planning Division; Mr. Karma Rapten, Programme Officer, Head, Research and Monitoring, and Dr. David Annandale, Senior Technical Advisor, gave their full support. Mr. Tandin Dorji, In-charge of the Information, Communication and Outreach Section of NEC made useful comments and various proposals and agreed that ICOS initially would be in-charge of coordinating the Community Mobilization Program.

192. The Ministry of Works and Human Settlement has been mandated with coordinating and supervising the development of the National Strategy and Action Plan on Integrated Solid Waste Management.

193. His Excellency, Lyonpo Kinzang Dorji, Honerable Minister, MoWHS, guided the preparation of this document with very clear views on what should be done. He stressed the need for fully involving the people and making them responsible for a cleaner environment.

194. Mr. Tsering Dorji, the Secretary MoWHS; Mr. Rinchen Dorji, the Director of Urban Development and Engineering Services (DUDES) and Mr. David Annandale, Advisor NEC contributed with their professional expertise.

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196. Mr. Hemraj Chhetri, In-charge of the Solid Waste and Sanitation Section of TCC and Mr. Ganesh Gurung, Staff Overseer of Solid Waste Management provided valuable information on their operations.

197. Many useful inputs have been provided by the participants of the workshop held on 15th June 2006 at MoWHS which was chaired by His Excellency, Lyonpo Kinzang Dorji, Honerable Minister, MoWHS.

198. Special thanks go to Mr. Dungkar Drukpa, Planning Officer, and Ms Sonam Desel, Environment Assessment Officer, both of the Policy and Planning Division of MOWHS. Despite their normal work load, they gave much of their time, professional support and personal warmth to make the UNEP consultant feel welcomed.

199. **LIST OF PARTICIPANTS OF THE WORKSHOP ON SOLID WASTE MANAGEMENT STRATEGY FOR BHUTAN**

MoWHS, 15TH JUNE 2006

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Annex 2

Waste Problems in Bhutan

Annex 2

Problems with Waste in Bhutan

200. Many of the intentions of volunteers to help control pollution are not achieved due to the lack of facilities; this refers to individuals and schools as well as industries

201. ILLEGAL DUMPING - in some urban areas waste is disposed of either in rivers and streams, valleys or low lying areas

202. OPEN WASTE LITTERING biggest problem in towns, unsightly surroundings, choked drains, polluted water ways, open garbage dumps become breeding ground for rats, flies and other disease vectors, all this may affect tourism

203. 190. Some open defecation still occurs when day visitors from villages come to weekend markets to sell their products

204. 191. LACK OF CIVIC RESPONSIBILITY of urban residents

205. 192. MUNICIPALITIES are unable to deliver services effectively, overflowing containers, etc.

206. 193. Scavenging by dogs scattering the waste

207. 194. DISPOSAL SITES not properly engineered – more dump sites than sanitary landfills (no lining of the base, no leachate control, no monitoring, waste not compacted)

208. 195. Thimphu landfill capacity exceeded years ago

209. 196. In DISTRICT CENTRES waste is collected and dumped in collection pits and burnt when the pits are full, air pollution

210. 197. NO SEPARATION of biodegradable or hazardous substances

211. 198. Industrial waste may become a threat to the environment

212. Population increase

213. One of the greatest problems is the limited financial capacity of the municipalities

214. Some towns are UNABLE TO DELIVER SERVICES, shortage of skilled professionals - professionals often promoted into managerial posts without having experience

215. Poor coordination and interest by stakeholder agencies (departments of local government, administration, finance, legal planning, operations, Dzongkhags, municipalities, NEC, MoWHS, Ministry of Home Affairs and City Corporation)

216. Present operation not financially sustainable

217. No public participation in the planning process (in selection of disposal site and siting of communal bins)

218. Monitoring of environmental impact by landfill sites not mandatory

219. Any light sleeping tourist in a central hotel of Thimphu will easily record the times waking up by loud barking of packs of dogs passing through and returning again. The rumour goes that hotels in Thimphu reverted to providing ear plugs to their guests on arrival. It is said that about 200 dogs are kept in a dog shelter and fed by food remainders from local hotels. Another 400 dogs are said to live at the Thimphu landfill whereas the dogs in Thimphu proper cannot be counted

220. Enforcement of rules and laws is very weak.

Annex 3

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Annex 3

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