

Domestic and Solid Waste Management in Zvishavane Town in Zimbabwe: A Case Study of Mandava Township

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Abstract

This study seeks to determine the forms of waste management in Zvishavane town council. Main objectives of the study were to determine the forms of waste in Mandava township; to establish the level of waste collection and disposal in Mandava township; to determine the status of Zvishavane town council dumpsite; and to determine challenges faced by Zvishavane town council in waste management. The study used a mixed approach employing elements of both quantitative and qualitative research designs. One hundred residents were sampled for the study. The study established that there is poor waste management in Zvishavane town council. Waste mostly generated in Mandava township is in the form of plastics, food waste, paper, biomass and metallic. Waste collection is very erratic, and sometimes residents would go for two or more weeks without waste collection by the responsible authority. This has consequently led residents to take alternative measures in order to manage domestic waste. These include burning, burying and illegal dumping. It was also established that Zvishavane town council is failing to provide refuse collection bins to residents. The study recommends residents and all stakeholders involvement and partnerships with the NGOs and the business community in the management of waste in the town council.

Key words: Domestic waste, solid waste, waste management, waste collection, waste disposal.

1. Introduction

According to Auginwarrba (1998) while solid waste management systems in developed countries are fairly advanced, the same cannot be said in the developing world. Developed countries have door to door waste collection. Yet solid waste is a growing problem which has not yet received the required attention in the developing world (Jonsson, 1997). This problem of waste is due to the increase in the amount of packaging in plastics. The accumulation of waste threatens health, damages the environment and is causing rapid deterioration in levels of sanitation and the general quality of urban life. The situation is exacerbated by the growing population together with poor or weak disposal systems.

Mandava Township, one of the oldest townships in Zvishavane is at the centre of this study. This township was given the name location because of its potential to give services to the public. Some of these services include the main bus terminus, beer hall, shops and very old houses built during the colonial era.

Mandava township is facing problems of sewage pipes blockages. Streets, open spaces and the market places are littered with solid waste (plastics, pampers, rotten vegetables and braids). Drainage systems are blocked resulting in flooding of roads. Clogging waters have become breeding areas for mosquitoes bringing in the problem of malaria. Residents are resorting to illegal dumping waste as well as night soiling due to serious water rationing in the township. The environment is polluted by smoke from other residents who resorted to burning waste in their backyards. It has been observed that over the past years, Mandava township has become polluted by solid waste and human excreta exposing people to a health hazard. It is against this background that this study was carried out.

This study sought to determine the forms of waste management in Zvishavane town council. The specific objectives are to:

- determine the forms of waste in Mandava township;
- establish the level of waste collection and disposal in Mandava township;
- establish the status of Zvishavane town council dumpsite;
- determine challenges faced by both Zvishavane town council and residents in waste management; and
- investigate the relationship between urban council act, Zvishavane town council's waste management policy and practice.

2. Conceptual and Theoretical Background

Waste management is the process by which products and by-products generated by business, households and industry are collected, stored, transported, treated, disposed off, recycled or reused in an effort to reduce their effect on human health sources.

In most developing countries there is rapid urbanization and increasing population leading to overcrowding. Waste generation increases with increasing population growth. Urban dwellers generally consume more resources than rural dwellers and so they generate large quantities of solid waste and sewage. The per capita waste generation is also directly related to the level of income with high income households generating more waste than low income households due to unavailability of waste collection services (Zake, 2007).

Studies in Africa (e.g. Zake, 2003) established that one to two thirds of the waste generated is not collected. As a result the uncollected waste, which is often also mixed with human and animal excreta, is dumped indiscriminately in the streets, wards and in drain contributing to flooding, breeding of insects and rodent vectors and the spread of diseases such as

cholera. The low waste collection levels have triggered widespread illegal open dumping and background incineration. This has created negative environmental impacts and increased the health risk of the residents. Open waste dumps are prime breeding sites for houseflies, mosquitoes and other vectors of communicable diseases such as fever, dysentery, diarrhea, cholera and malaria. Fumes from burning waste cause acute respiratory infections and the odours make the environment uninhabitable (Henry, et al, 2006). The leachate from the dumpsite pollutes underground water, which is an important alternative water source for the residents. Loose papers and plastics blown by wind result in an aesthetic intrusion of the surrounding environment. Dumpsites have become play grounds for young children. (Zurbruegg, 2003).

Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities or by private companies in the industry (Lewis, 2007). For example in Europe and other places around the world, a few communities use a proprietary collection system known as the Envac which conveys refuse via underground conduits using a vacuum system. Other vacuum based solutions include the Metro Taifun single line and ring line automatic waste collection system where the waste is automatically collected through relatively small diameter flexible pipes from waste collection points spread up to a distance of four kilometers from the waste collections stations (Nwra, 2013).

According to Gandy (2009) in San Francisco, the local government established its Mandatory Recycling and Compositing Ordinance in support of its goal of zero waste by 2020 requiring everyone in the city to keep recyclables and compostable out of the land fill. The three streams are collected with the Curbside, Fantastic 3 between system- blue for recyclables, green for compostable, and black for landfill – bound materials provided to residents and business and serviced by San Francisco's role refuse hauler Recology. The city's "Pay –As- you Throw" system charges customers by the volume of landfill – bound materials, which provides a financial incentive to separate recyclables and compostable from other discards. The city's department of the Environment's Zero waste programme has led the city to achieve 80% diversion, the highest diversion rate in North America (Ibid).

Solid waste management is a challenge for the cities authorities in developing countries mainly due to the increasing generation of waste, the burden posed on the municipal budget and the lack of understanding over a diversity of factors that affect the different stages of waste management and linkages necessary to enable the entire handling system functioning (Burntley, 2007). Increasing population levels, booming economy, rapid urbanisation and rise in community living standards have greatly accelerated the municipal solid waste generation rate in developing countries. Local authorities have the challenge of providing an effective and efficient system to the inhabitants. Usually these municipal authorities do not have the ability to tackle waste management issues mainly due to lack of organisation, financial resources, complexity and system multi dimensionality (Ibid).

According to Coffey and Coad (2010), management deficiencies are often observed in the municipalities. Local waste management authorities have a lack of organisational capacities (leadership) and professional knowledge. The information available is very scanty from the public domain. The extremely limited information is not complete or is scattered around various agencies concerned.

Solid waste management is often underfunded due to a combination of inadequate resources from municipal tax revenues, insufficient user fees and the mismanagement of funds (Coffey and Coad, 2010). Thus persistent lack of funds prevents capacity building and the improvement and expansion of waste management handling capacities (Henry, et al, 2006). As the price of land increases it becomes increasingly difficult for municipalities to site landfills close to urban areas, while transportation costs become a major constraint to constructing landfills at a distant location exacerbating the problem. Much needed resources are consumed by inefficiencies, frequently caused by inefficient institutional structures, organisational procedures and poor management capacities (Ibid). Structural problems often arise when revenue collection and investment decisions happen at the central government level while operation and maintenance occur at the local level. Capacity issues are also common. Henry, et al (2006) state that large dispenses often exist between the job requirements and the actual qualification of the staff at the managerial and operational levels. Overstaffed local authorities find it difficult to meet the large wage payments of poorly trained workers.

UNDP (2006) revealed that in Chitungwiza, Epworth and Mbare waste is being converted into marketable products. There are micro-enterprises providing low cost waste management services. Through community health and hygiene extension education and training waste handling has improved. This has contributed to improved health and hygiene standards. In fact, there is an effective working partnership between communities, local authorities and the private sector in waste management

According to UNDP (2006), the mobilisation of communities was done through the local authorities and existing community leadership structures. The identified people formed themselves into either community based organisations (CBOs). These are local service delivery groups of low capital intensive consisting of up to about 20 persons either registered or operating informally in an area. Proper leadership structures are put in place where gender equality is encouraged to ensure that women take up positions of leadership.

To ensure sustainability of the intervention before the ground activities could be done, a business perspective approach is used where the established CBOs and MEs are oriented to look at waste management as business venture and not just community service. There is community clean up in Zengeza 3 extension and Chitungwiza. In Epworth there is community based waste disposal where the community is using carts to transport waste to the dumping sites.

3. National Legal Framework for Waste Management

Policy is broadly defined as a plan of action outlining the aims and ideals of government, a political party or

business company (MET, 2004). The term in this case refers to a framework of guidelines put together in the form of a document in order to give guidance on how certain activities in waste management can best be addressed. In Zimbabwe there is a comprehensive legislative framework for dealing with waste management issues. There are several Acts of Parliament and regulations that deal directly or indirectly with environmental pollution in general and waste management in particular. Following are some of the legislations that deal with among other things waste management issues:

- the Environmental Management Act (2007): Chapter 20:27;
- the Urban Councils Act: Chapter 29:15; and
- the Water Act: Chapter 20:22.

The Environmental Management Act (EMA): Chapter 20:27 is the principal act that addresses environmental issues. The act provides for the sustainable management of natural resources, protection of the environment and the prevention of pollution and environmental degradation. It also provides for the preparation of the National Environmental Plan and other plans for the management and protection of the environment. All these provisions of the Environmental Management Act address the issue of waste management. EMA is therefore the supreme law governing the management of waste. Section 4 of the Environmental Management Act stipulates the environmental rights and principles of environmental management. Some of these address waste management issues as follows:

- every person shall have a right to clean environment that is not harmful to health;
- the right to protect the environment for the benefit of the present and future generations is everyone's responsibility as this will prevent pollution and environmental degradation;
- environmental management must place people and their needs at the forefront of its concern; and
- any person who causes pollution or environmental degradation shall meet the cost of remedying such pollution

The Urban Councils Act: Chapter 29:15 regulates activities taking place in centres designated as urban. Section 218 (b) of this Act makes provision for the councils to charge for removal of refuse where this service will have been provided. The monetary value of the charge is not mentioned in the Act, giving council the powers to set the monetary value of the charge for the services provided in refuse collection. In section 227 (1) provisions are made for the matters to which councils may make by laws and these are listed in the third schedule of the act as sewerage, sanitary fittings, effluent and refuse removal, cleansing of private sewers, streets and yard as well as crops, vegetation, rubbish and waste material. The Water Act; Chapter 20:24 addresses the issue of waste management in Section 68 (1) where it prohibits the discharge of any organic and inorganic matter into any surface or groundwater, either directly or indirectly so as to cause pollution of the water. The Act also ensures that whoever disposes of waste including local authorities should do so in a manner that does not cause pollution to surface and groundwater resources. Local authorities are required to construct and manage waste disposal sites so as to avoid causing pollution. The Act also requires polluters to pay the costs of cleaning up polluted water resources.

4. Local Authority By- laws on Waste Management.

Local authorities make by-laws to help them control and regulate activities taking place in their area of jurisdiction despite policies and Acts of Parliament dealing with waste management issues. The local authorities are empowered to make by-laws through section 227 (1) of the Urban Councils Act (Chapter 29:15). Generally, by-laws are formulated from existing national legislation and as such they complement the legislation from which they are derived. According to the Urban Council Act (Chapter 29:15) each local authority in Zimbabwe is required to have by-laws guiding the manner in which certain activities and functions are undertaken towards waste management. Statutory Instrument (477 of 1979) stipulates that the by-laws apply to:-

- the council area;
- the local government area, the administration control and management of which is vested on;
- only the council or its contractors have the responsibility for removing all domestic waste from premises;
- the council should supply a standard waste receptacle to residents;
- no person shall deposit or abandon any waste upon any vacant land, public places or premises other than waste disposal site.
- section 13(1) restricts access to waste materials once they are deposited at a waste disposal site; and
- no person shall be allowed to throw or deposit or place or cause or permit to flow, in or any street thorough fare, open space, vacant stand, ground sprout or water course, any filth, slops, water, waste liquid or yard flushing or any dirty, filthy or other offensive matter of any kind whatsoever (section 15).

Even though, the Urban Councils Act regulates the activities taking place in urban areas on waste management, it does not mention anything about key sustainable waste management practices such as the use of the three Rs (reduce, recycle and reuse). In addition to the above, the Urban Councils Act does not mention what the council will do with the waste that it collects and what is to be done in the event of failure by the council to fulfill its obligations. The Act again is silent on disposal of waste that is where and how the waste will be disposed and the requirements for establishing a disposal site

5. Methodology

This study was a case study. It used a mixed approach employing elements of both quantitative and qualitative research designs. The researchers used quantitative method for numerical data and qualitative method for continuous data. Through interviews and questionnaires respondents provided information which gave an insight as to whether waste management system in Zvishavane is effective or not.

With respect to the population and sample of the study, the Zimbabwe population census of 2012 put the population

of the Mandava township as 8000 people approximately. A sample of 210 people was used for this study (see Table 1).

Table 1: Sampled Research Subjects

| | Population | Questionnaire | Interview | Total Sample |
|--------------------------------|------------|---------------|-----------|--------------|
| Mandava High Density Residence | 200 | 94 | 1 | 95 |
| Zvishavane Council Employees | 10 | 4 | 1 | 5 |
| Total | 210 | 98 | 2 | 100 |

Source: Primary data

Response rate was 100% as the researchers made frequent follow-ups and replacement of questionnaires where they were said to have been lost.

6. Background of Respondents

Table 2: Sex Distribution of Respondents

| | Males | Females | Total |
|-----------------------------------|-------|---------|-------|
| Mandava Residents | 30 | 65 | 95 |
| Town Employees | 1 | 2 | 3 |
| Town Council managerial employees | 2 | - | 2 |
| Totals | 33 | 67 | 100 |
| Percentage % | 33 | 67 | 100 |

Source: Primary data

For the researchers to get detailed and more appropriate information, they sampled those people who had more years residing in Mandava township. Table 3 shows that 60% of the respondents have stayed in Mandava for 6- 15 years whilst the 40% constitute those who have 16 – 20 years as residents of Mandava township.

Table 3: Duration of stay in Mandava township

| Years | Number of people | Proportion |
|-------|------------------|------------|
| 0-5 | - | - |
| 6-10 | 25 | 25% |
| 11-15 | 35 | 35% |
| 16-20 | 40 | 40% |
| Total | 100 | 100% |

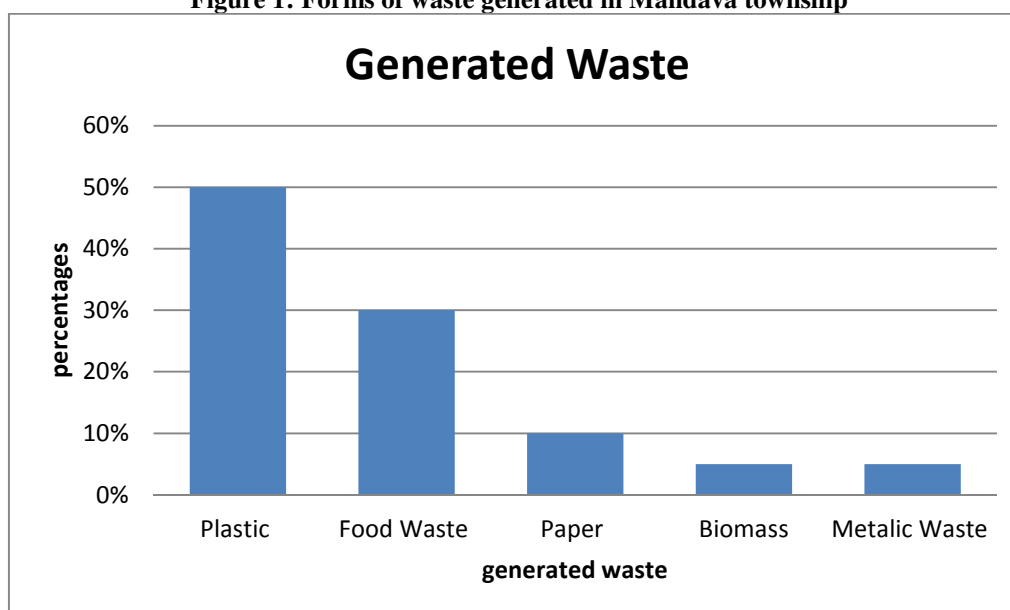
Source: Primary data

7. Findings and Discussion

7.1 Waste Generation

The study found that domestic waste in Mandava township is largely made up of food waste, plastics, pampers, old clothes and papers.

Figure 1: Forms of waste generated in Mandava township



(Source: Primary data)

Around Mandava bus terminus more waste is accumulated as a result of shops, vending and food outlets. Rotten

vegetables, fruits, refuse from roast maize cobs, plastics as a result of food packaging as well as braids from saloons by the bus terminus is evident. Figure 1 below shows the types of refuse generated in Mandava township.

In order for the residents to manage waste generated a container is needed at each household. This container is then emptied by the local authority on designated days. Table 4 shows the proportion of households using waste containers to store their waste before collection by the local authority.

Table 4: Possession of waste containers

| Responses | | | |
|------------|-----|----|-------|
| | Yes | No | Total |
| Frequency | 43 | 52 | 95 |
| Percentage | 45 | 55 | 100% |

Source: Primary data

Only forty five percent of the respondents had waste containers at their households. When waste is generated it is temporarily stored at the homes or work places before it is transported to the designated dumpsite by local authority. Table 5 shows the responses on the question on provision of household waste storage facilities.

Table 5. Provision of household waste storage facilities

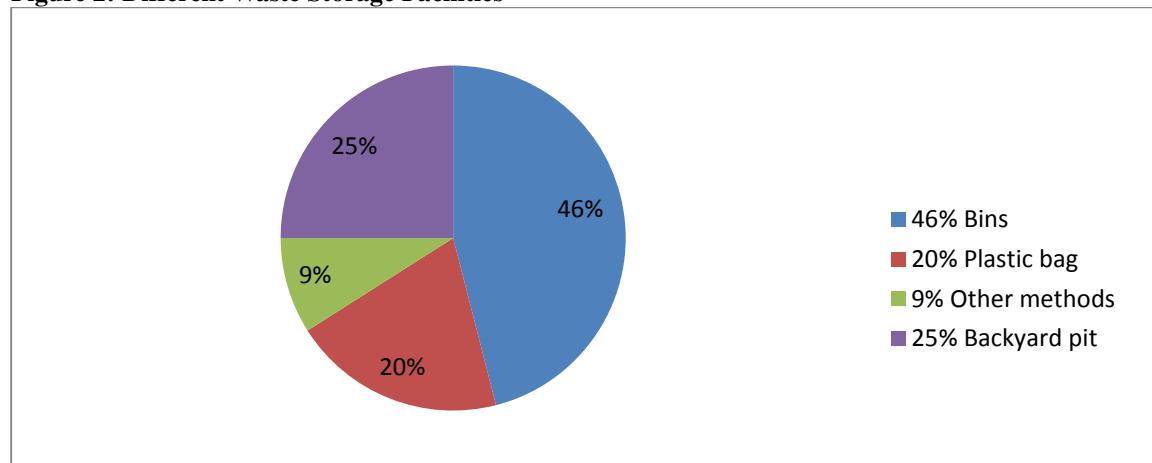
| Responses | | | |
|------------|------|--------------|-------|
| | Self | Town Council | Total |
| Frequency | 95 | - | 95 |
| Percentage | 100% | - | 100% |

Source Primary data

The interview with one local authority employee showed that the local council is failing to provide the refuse storage facilities at household levels due to high manufacturing costs of bins. Instead they only manage to provide refuse storage facilities at common public places like in the bus terminus and in other townships with defined pavements. This is in violation of section 79 (i) of the Urban Councils Act which says it is the mandate of the local authority to provide waste containers to the residents.

The storage of waste generated by households before collection and transportation to the dumpsite involved the use of various storage facilities or receptacles since the household improvise so as to manage the wastes. Figure 2 shows different waste collection facilities used by residents in Mandava township.

Figure 2: Different Waste Storage Facilities



(Source Primary data)

7.2 Refuse Collection and Disposal by Town Council

The interview with the local council representative revealed that the collection of solid domestic waste is the responsibility of their Environmental Health Department. Table 6 shows the waste collection frequency as scheduled in the Zvishavane Urban Council Waste Collection Schedule document.

Table 6: Zvishavane Refuse Collection Schedule

| Sector | Collection frequency |
|------------------|----------------------|
| Household | Twice a week |
| Industrial sites | Once a week |
| City centre | Daily |
| Market place | Daily |
| Hotels | Daily |
| Schools | Once a week |

(Source: Zvishavane Urban Council Waste Collection Schedule document)

Table 7 Frequency of Local Authority Waste Collection

| Collection times | %of respondents |
|------------------|-----------------|
| Not at all | 30% |
| Once a week | 50% |
| Twice a week | 10% |
| Erratic | 10% |

Source: Primary data

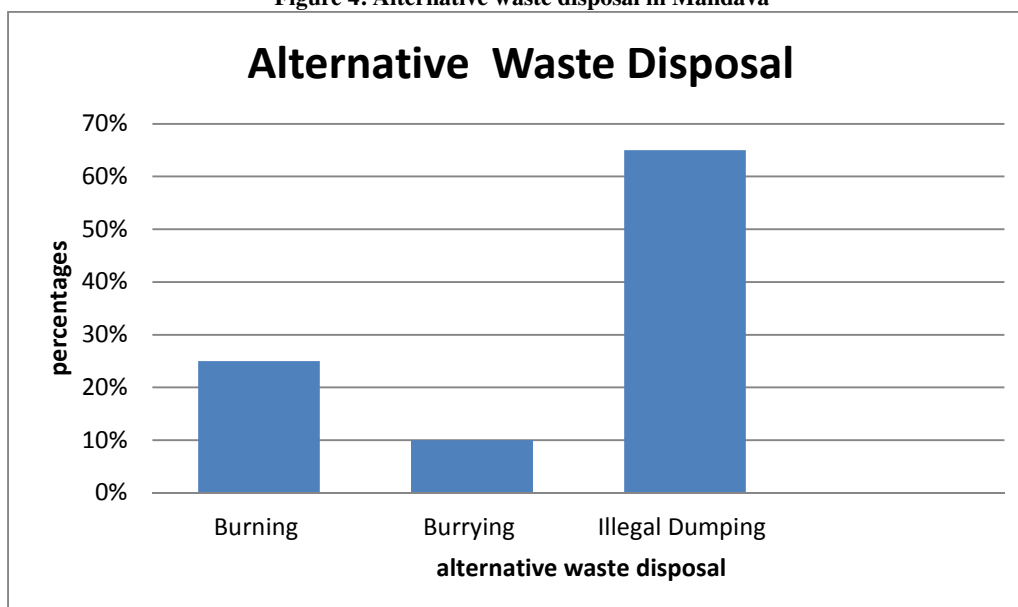


Figure 3: Dumping site in Mandava township (Photo taken by one of the researchers)

Waste collection is thus not consistent. An interview with one of Mandava business people showed that waste is collected once a week instead of daily as scheduled in the municipal collection frequency document. All business people around the bus terminus dump their waste at designated location where the local authority can collect it, but it takes long before being collected. Residents therefore feel uncomfortable because of the smell and appearance of waste at their premises.

Figure 4 shows the alternative storage and dumping practices done by residents if waste fails to get collected.

Figure 4: Alternative waste disposal in Mandava



Source: Primary data)

The interview with management representative showed that the local authority does not have enough equipment for efficient and effective service delivery. Only two tractors are operational to make sure refuse is collected and disposed at the rightful place. In addition the tractors are said to be small and outdated whilst waste is generated daily regardless of the prevailing challenges. Figure 5 shows the small and outdated tractor used for refuse collection in Zvishavane town.

Figure 5: Zvishavane town council tractor for waste collection



(Photo taken by one of the researchers)

Waste is collected and dumped at Madhenda dumpsite, the main dumping area for Zvishavane town council. The dumpsite is located approximately 3km in the western side of the town. The researchers visited the Madhenda dumpsite and observed that the method of disposal is simply open dumping. The area is not protected. Figure 6 shows Madhenda dumpsite in Zvishavane town.

Figure 6 Zvishavane town dumpsite



(Photo taken by one of the researchers)

7.3 Challenges of Waste Management in Zvishavane Town Council

The interview with the town council management representative revealed that there is a problem of inadequate machinery at Zvishavane town council for effective waste management. There are only too small and outdated tractors which are used to transport collected refuse to the dumpsite. Yet the town council needs four standard tractors for efficient and effective transportation of waste to the dumpsite. Also the town council does not have any tipper truck nor landfill compactors. There is only one dozer. The town council does not have funds to cater for materials such as refuse containers for residents. Their budget does not allow them to engage private companies to assist them in waste management. Management claimed that the refuse charge paid by residents is not enough to cater for the expenses needed for effective waste management.

10. Conclusions and Recommendations

This study established that:

- waste generated in Mandava township is in the form of plastics, food waste, paper, biomass and metallic waste;
- it is the responsibility of the Environmental Health Department within the Urban Council to collect waste from households and public places;
- collection of waste is inconsistent (sometimes once a week and sometimes not collected at all);
- Mandava residents use a number of alternative waste disposal strategies including burning, burying and illegal dumping of waste as a way to get rid of the uncollected waste by local council;
- illegal dumping of waste cause the street drainage blockages as waste get piled in the drainage pipes;

- municipal resources are inadequate to cater for effective and efficient service delivery;
- Zvishavane town council waste management practices fall short of the requirements of the Urban Council Act; and
- domestic waste management in Mandava township is very poor.

This study recommends an all stakeholders involvement in decision making concerning waste management in the town. This would mean partnerships with residents and their associations, non-governmental organisations (NGOs), community based organisations, central government, the business community and many others in the management of waste in the town council. A major recommendation that needs to be underscored is the imperative of improved funding to the local authority for effective performance in waste management. Finally, there is need for improved human resource capacity to cope with the enormous waste generated in the area.

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