



WASTEWATER TREATMENT AND RECYLING PROJECT POWERED BY EARTHWORMS WARD 4, BEITBRIDGE TOWN COUNCIL

INTRODUCTION

- Beitbridge Municipality is located in the southernmost part of Zimbabwe and shares a boundary with South Africa
- Due to its strategic location the population is increasing at an astromical pace. The population of Beitbridge has been doubling every decade during the last two intercensal periods. In 2012, the population was 42307 being the biggest urban population in Matateleland South Province, being double the population of the provincial capital, Gwanda
- With an urban population of about 80 000 in the province, more that half of the province's urban population therefore resides in Beitbridge. The population of Beitbridge is currently estimated be in excess of 60 000
- The population growth rate has outpaced the capacity for service delivery by the Municipality
- The Municipality continues to search for innovative means to provide services to the ever-increasing population. Two important areas of innovation include the Mayor's half marathon that is against litter and the sewer and recycling project that is powered by earthworms
- The earthworm project, which is a subject of this presentation was pioneered by Dr. Ephereim Whingiri, CEO and founder of the Zim Earthworms. Through the project the 9 houses to an earthworm sewer system. The houses could not be connected because they are located below the trunk sewer line

1. <u>STARTING POINT</u>:

- What was the main challenge, issue, problem to be addressed by the practice?
- Problem of sewer networks in Beitbridge, serving mainly high density suburbs burst at manholes when clogged due to various factors
- As a result of the burst, sewage overflows into streets even some homes exposing the sewage to children playing in the area to otherwise preventable sanitation and hygiene related illnesses
- Air is also polluted by unpleasant sewage odour in the environment
- Permanent sewage smell due to manhole burst
- discharging of raw sewage into ponds results in sludge build up
- Generally sewage smell from the ponds pollute the surrounding environment
- Urban areas are swelling with many new settlements; making intense demands for services, Public toilets become dysfunctional when no water is supplied
- Project started around 2018 to provide sewerage network to 9 houses
- 9 houses had no sewerage net work since the early 2000 posing the above challenges
- Increase of open defecation, health hazards
 - Who was mainly affected by the challenge, issue, problem and will be addressed by the practice?
 - Mainly women and children and all stakeholders staying in and around the area
 - Was an eyesore for travelers as it is around a busy rank
 - Were different roles and needs of women and men and vulnerable people relevant for the challenge?
 - Yes all were relevant to the challenge
 - Women and children mainly using the bush to reieve themselves
 - Sewer generally affects everybody

- 2. Institutional Setting:
 - What were the frame conditions for the practice that will be presented? (e.g. policy, legal regulation, instrument, reform approach, demand by people according to gender roles etc.)
 - The Local authority has a policy and procedures to deal with sewer problems
 - Chapter 9 of 1977 Model Building Bye laws
 - Part IX of the Environmental Management Act (20:27)
 - Part XII of the Urban Councils Act (29:15)
 - Which actors/ stakeholders were involved?
 - Mainly house owners, Environmental Management authority(EMA), the Institute of Water and Snitation development, the Municipality of Beit Bridge and a private developer, Zim Eathworms

3. <u>APPROACH</u>:

- Zim Earthworm Farms was engaged to developed a **biotech system** based on the principle that the problem must be solved at its source before it builds up leading to clogging and bursting of manholes
- Systems works there is no sewer network, the biotech systems are connected to a **Common Trunk Pipe** carrying only partially treated wastewater to a **Communal Treatment and Recycling Plant**
- At this Plant wastewater is further treated to a quality suitable for reuse in flushing toilets and irrigating gardens
- All solid waste flushed in the toilet, from the kitchen or bathroom, at the house passes through a biotech system which processes biodegradables into an organic fertilizer called vermicompost using earthworms and bacteria.
- Non degradables, sand etc are trapped by a structure and periodically removed. What is allowed to leave the house or source of waste is partially treated water
- A *Vermi Sewage Cure*, an earthworm extract packed with enzymes and bacteria is applied in the toilet and bathroom making most biodegradables soluble, odour and pathogen free
- Only partially treated water without sludge is discharged into the pond
- The decongester discharges into the sewer network only partially treated water
- The load of sand and other clogging waste is reduced as more **decongesters** are constructed along the network.
- Each source of wastewater is analyzed in order to establish the source with highest clogging materials.
- As more **decongesters** are constructed along the sewer network, less solids will remain in the sewer system.
- Some partially treated wastewater can be diverted to a **Communal Wastewater Treatment and Recycling Plant**
- The construction of the Communal Wastewater Treatment Plant will be started at the top or where the sewer network begins. More Communal Wastewater Treatment& Recycling Plants shall be installed along the sewer network as the sewage continues to be cleaned(for a cluster of houses)
- The resulting treated water will be returned as recycled water to homes to flush toilets. In this case water for flushing toilets will always be available. Excess water can be made available for greening the town and also for fire brigade services
 - How have you considered the participation rights of specific sections of the population in the planning and decision-making process? Here above all participation right of handicapped people, children, as well as the equal of women
 - Stakeholders meetings were called and all property owners invited to participate
 - The user were part of the whole process and they understand how to use it. They were encouraged to grow supplementary worms

- 4. <u>Outputs</u>:
 - Which were the concrete tangible results, outcomes and/or impacts of the good practice? Including benefits and/or negative effects for women and men and/or vulnerable people in the city
- With time the incidents of water borne diseases and sewage smell will be under control and the environment will be saved.
- Where sewage has been discharged into dams and rivers only partially treated water is discharged.
- Fewer chemicals for water treatment shall be required. Desludging of ponds may not be necessary.
- Huge savings on cost to local authorities, savings on foreign currency used, and a cleaner environment will result. The life span of your sewer network is lengthened.
- Boreholes/ wells will not be contaminated.
- Excess water from Communal Treatment Plants will be available for reuse in flushing toilets, greening urban areas and also be available for fire brigade services.
- The water and sanitation woes in new settlements will be drastically reduced. Recovered dignity amongst the users since they no longer use the bush.

– How do they ensure sustainability of the practice?

Ensure ownership of the project by house owners

House owners understand the processes and ensure smooth running, reports on the functioning of the plant.

The municipality monitors the functioning of the project all the time.

In the event of any problem Zim Earthworm Farmers will be available to provide the required service.

5. <u>LESSONS LEARNT</u>:

- What are the main lessons learnt in the course of implementation of the good practice?
- The earthworm project is biological method that preforms better and is cleaner than septic tanks and soak away systems and can be used to service a big number of residential areas through a communal system. The same can therefore be replicated to other areas.
- Solar power is required as a cheaper source of pumping
- Enthusiasm on the take up and ownership by the house owners
- Support from Municipality of Beit Bridge and EMA
- Are there any open questions that need to be dealt with?
- The need to ensure the house owners pay for the continued use of the service
- Need for improvement so that the process is wholly biological and involves little or no mechanical methods.
- What are the lessons learnt in relation to gender concerns?
- Participation by houseowners and acceptance of the project particularly women, disabled as well as school children.

6. <u>TRANSFER</u>:

- What are the necessary preconditions to transfer this practice to another place?
- Not much precondition, just the need to mobilize the public
- Type of earthworms that will thrive in certain new circumstances
- In circumstances, where electricity from the grid is expensive other sources of energy need to be explored
- What would be the first steps to take?
- Sensitization of the public and all stakeholders
- What is important to take care of regarding different gender roles?
- All groups in society contribute to production of waste hence the need to participate

Figure 1: LOCATION OF BEITBRIDGE IN ZIMBABWE





Figure 3: THE PROJECT AREA

Figure 2: WARDS IN BEITBRIDGE: PROJECT IS LOCATED IN WARD 4



Figure 4: The Communal Wastewater Treatment & Recycling Plant (in Beitbridge) : The 5000 litre Tank with a UV lamp holds treated water for reuse.



