

# TARGET SETTING FOR ISWM OF BAHIR DAR CITY /ETHIOPIA/



Forum for Environment

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**Forum for Environment**



**UNEP**

Division of Technology, Industry and Economics  
International Environmental  
Technology Centre

**in  
collaboration with**

**Bahir Dar  
City Administration**

**Dream Light Plc**



**Bahir Dar University**



**Bahir Dar  
Forum for Environment**



**ANRS Region Bureau of  
Environmental Protection, Land  
Administration and Use**

## Integrated Solid Waste Management (ISWM) based on 3R

### Target Setting for ISWM of Bahir Dar city /Ethiopia/



## VISION

**The City Administration envisions Bahir Dar city to be**

**A Clean and Healthy Bahir Dar which is Economically Dynamic and Globally Competitive Tourist Destination**

## Mission

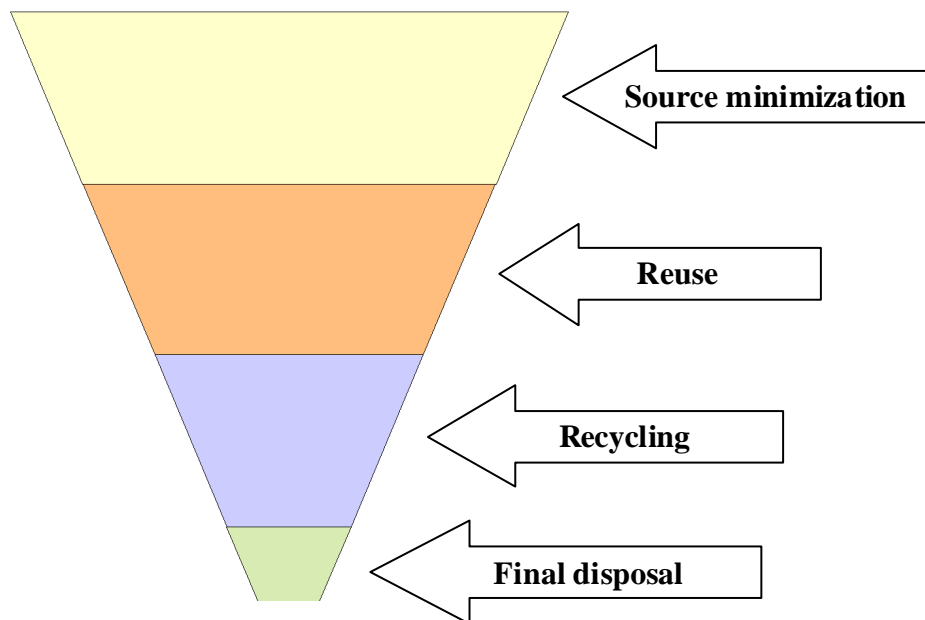
**Develop, implement and maintain effective, efficient, affordable, sustainable and accountable solid waste management system in order to ensure citizens' good health and maintain the ecological balance of the city and its surroundings through proactive, participatory, and socially responsible manners.**

## Principles

- Commitment to
  - Environment and Public Health Safety
  - Environmental Justice (equity)
  - Cost Effectiveness
  - Quality
  - Public Private Partnership
  - Innovation and appropriate technologies
  - Learning by doing
  - Resource Optimization
  - Sustainability

## 1. General ISWM objectives:

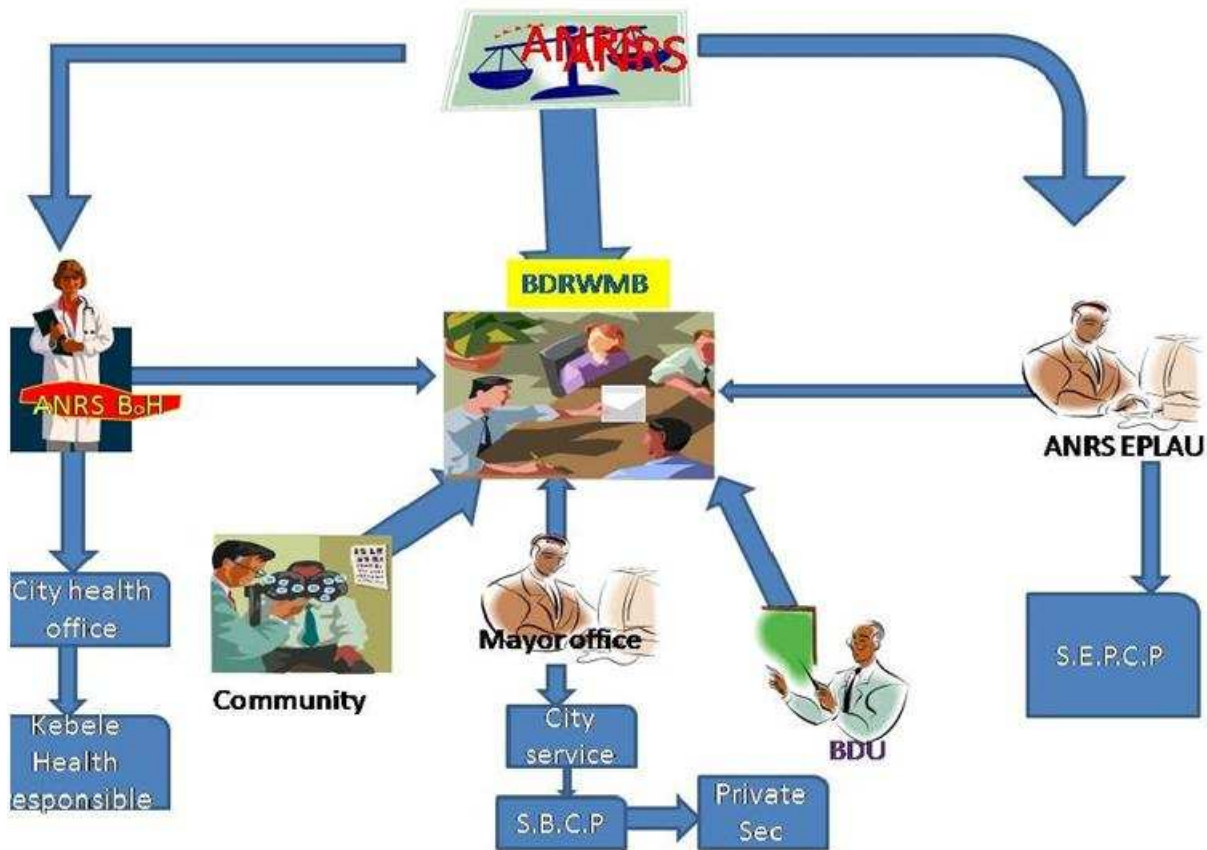
- ❖ To raise public awareness on ISWM based on 3R through information exchange, awareness raising campaigns/programs and demonstration projects;
- ❖ To reduce the quantity of solid waste to be disposed at landfill by effectively and efficiently implementing 3R principles;
- ❖ To Increase resource recovery rate by promoting suitable waste recovery, reuse and recycling techniques and technologies
- ❖ To strengthen the environmental pollution control measures by developing and enforcing appropriate regulations, directives, guidelines and monitoring tools
- ❖ To establish a cost effective integrated solid waste management system
- ❖ To develop and strengthen public-private partnership including community-based waste management process



## 2. Qualitative Targets

### 2.1 Short term targets (2011-2016)

- 2.1.1 Develop and promote public awareness and training programme and campaign on Integrated Solid Waste Management based on 3R principles
- 2.1.2 Develop an initial ISWM model on solid waste administration at city and community levels and construct a complete ISWM system after evaluating the effectiveness and efficiency of the initial model.
- 2.1.3 Develop and enforce regulations, directives and guidelines of integrated solid waste management, including support for local recycling centers and service providers, and strengthen public private partnership in the solid waste management efforts.
- 2.1.4 Establish waste management board for Bahir Dar city from all major stakeholders at city level which include research institutions (e.g. BDU), Mayor of the city, Environmental Protection Land Administration and Use Bureau(BOEPLUA), Health Bureau(BoH), Regional State Government and community Representative. The board controls and evaluates the overall solid waste management activities and plans for future activities.
- 2.1.5 Establish a waste inventory cells at community levels that collects all inventory data (waste data, quantification, composition, resource recovery rates, landfill rates, waste minimization rates, collection rates and other data), analyzes and reports to the board annually.
- 2.1.6 Arrange a funding mechanism for solid waste management especially focusing 3R principles and increase investment in solid waste management.



Re

*commended institutional rearrangements*

2.1.7 Develop a complete system for municipal solid waste management to achieve municipal solid waste minimization, resource recovery treatment and un-harmful disposal (3R)

- **RESOURCE RECOVERY:** Waste is sorted and processed for material recovery (Recycling and reuse where appropriate)
- **BIOLOGICAL TREATMENT:** Organic wastes (food and yard wastes) are composted and where feasible, biogas is extracted.
- **HAZARDOUS WASTES Management:** All hazardous and toxic wastes are segregated at source, treated and safely disposed

- TREATMENT: Incineration, if practiced, should be carried out in an environmentally sound manner.
  - DISPOSAL: Ensure that the landfill site is sanitary landfills
- 2.1.8 Construct standard sanitary landfill for the safe disposal or un-harmful disposal of the unrecovered wastes
- 2.1.9 Prepare markets for recovered or recycled materials through involving small scale industries, private or public sectors engaged in urban agriculture, city beautification, and local energy utilization
- 2.1.10 Promote household and community based composting and provide technical and financial supports.

## **2.2 Long Term Qualitative Targets (2016-2023)**

- 2.2.1** Construct a modern municipal solid waste treatment facility that considers the urban and rural areas together, the layout is reasonable and the resource is adequately utilized, realizing municipal solid waste minimization, resource recovery and un-harmful disposal of municipal solid waste;
- 2.2.2** Construct ecological industry zone with the aim of an ecological and modernized city, with tourist centers and harmonious development among economy, society and environment.



### 3 Quantitative Targets

#### 3.1 Short term quantitative targets for MSW (2011 - 2016)

##### 3.1.1 Increase source minimization to 5% and segregation to 30%

- ❖ Source minimization rate achieve 5%;

##### ***Actions to be taken (recommended)***

- Integration of waste prevention measures and introduction of cleaner production measures
- Awareness raising tools for waste minimization at source

- ❖ segregation at the source achieve 30%

##### ***Actions to be taken***

- Waste collection bags with different color (for organic and other wastes) are distributed with a reasonable price to residents and commercial centers which are ready to start at Source level segregation.
- Train generators about the importance of waste segregation
- Motivate generators who start segregation by reducing service fee to the service providers

Total waste disposed by the Dream Light company is recorded as follows:

- In the year 2009/2010 the total disposed waste was 22,355 tons/year  $\approx$  71 ton per day

This is the amount of waste transported to disposal site. Based on this information we developed some targets quantitatively.

##### ❖ **Baseline:**

**Total generated MSW in 2010  $\sim$  99 ton/day**

**Total to landfill in 2010 = 69 ton/day**

**Current Collection rate =72%**

**Recycling rate per day  $\sim$  2 ton  $\Rightarrow$   $\sim$  2%**

**Open burning and incineration I  $\sim$  1 ton $\Rightarrow$   $\sim$  1%**

**\*Waste generation (G) = Waste land filled (L) + incinerated (I) + recycled (R) + dumped (D)**

Baseline data for waste inventory indicated that above 74% of solid waste in Bahir Dar is organic and the residential waste constitutes above 55% and city waste projections for future indicates that when the population doubles in 2022 the waste generated will also be doubled.

Based on this information our general quantitative targets would be reducing the disposal rate to a reasonable amount and increasing the recovery rate also to an achievable amount.

### 3.1.2 Improve collection system

- ❖ Increase the door-to-door collection rate of MSW from the current 72% to 95%;

#### *Actions to be taken (recommended)*

- ❖ Set cost effective, area specific, material specific, time diversified collection system
- ❖ Set **4** appropriate transfer stations and ready for the secondary collection stations
- ❖ study and improve the collection service fee (charge) balancing the interest of service providers and generators
- ❖ Construct **700** standard dustbins in the main streets
- ❖ Awareness raising the community towards minimizing the throwing of food scraps and other types of wastes on the streets.
- ❖ Effective regulations and enforcements to avoid throwing of waste on the streets
- ❖ 100% of hazardous and toxic wastes collection

### 3.1.3 Improve Transportation, treatment, and disposal system

#### **Transportation**

- ❖ 100% Waste transportation from primary collection site and transfer stations to landfill
- ❖ Practice covering of waste while transportation

#### *Actions to be taken*

- ❖ change the existing 7 dump trucks to 9 (appropriate) standard closed and crushing trucks for the transportation of the waste to dumping site
- ❖ There will be 9 three wheel drive (rickshaw) waste collection vehicles which could transport the waste to the transfer stations where secondary segregation take place.

#### **Disposal**

- ❖ The un-harmful disposal rate achieves 65%;

- ❖ 100% of non-hazardous waste, including residual waste from treatment plants, is disposed in sanitary landfills (equipped with leachate and methane collection and treatment) and no waste is disposed of in illegal dumps or through illegal burning.

***Actions to be taken (recommended)***

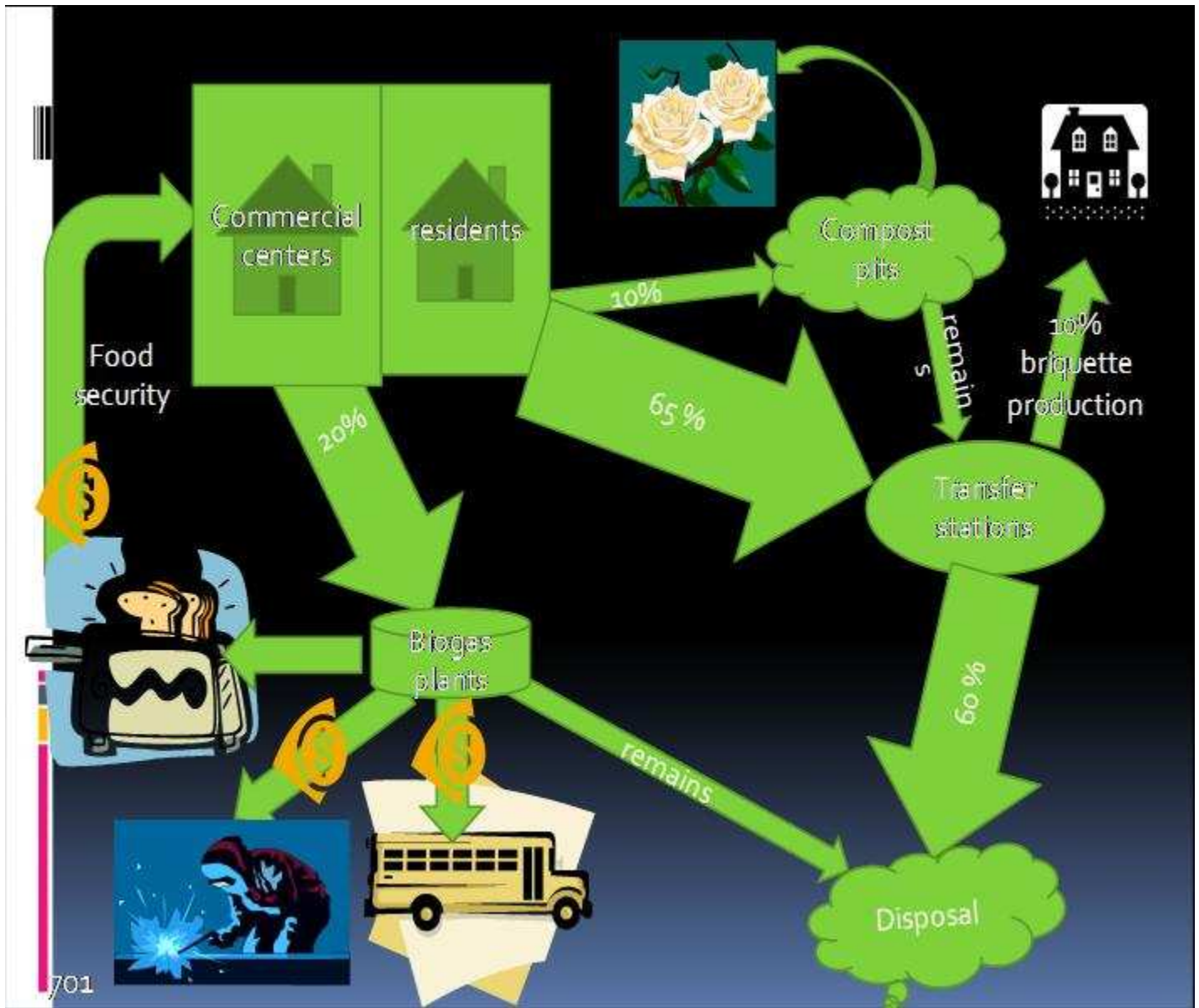
- ❖ Building (constructing) a standard sanitary landfill
- ❖ Introduction of policies, regulations and enforcements for un-harmful disposal charges

**Treatment and resource recovery**

- ❖ 50% of wastes at transfer stations are sorted for material recovery
- ❖ 30% of organic waste (food and yard wastes) is composted, and bio-gas recovered and briquette production
- ❖ 100% of incineration facilities are equipped with pollution control technologies as per standards

***Actions taken (recommended)***

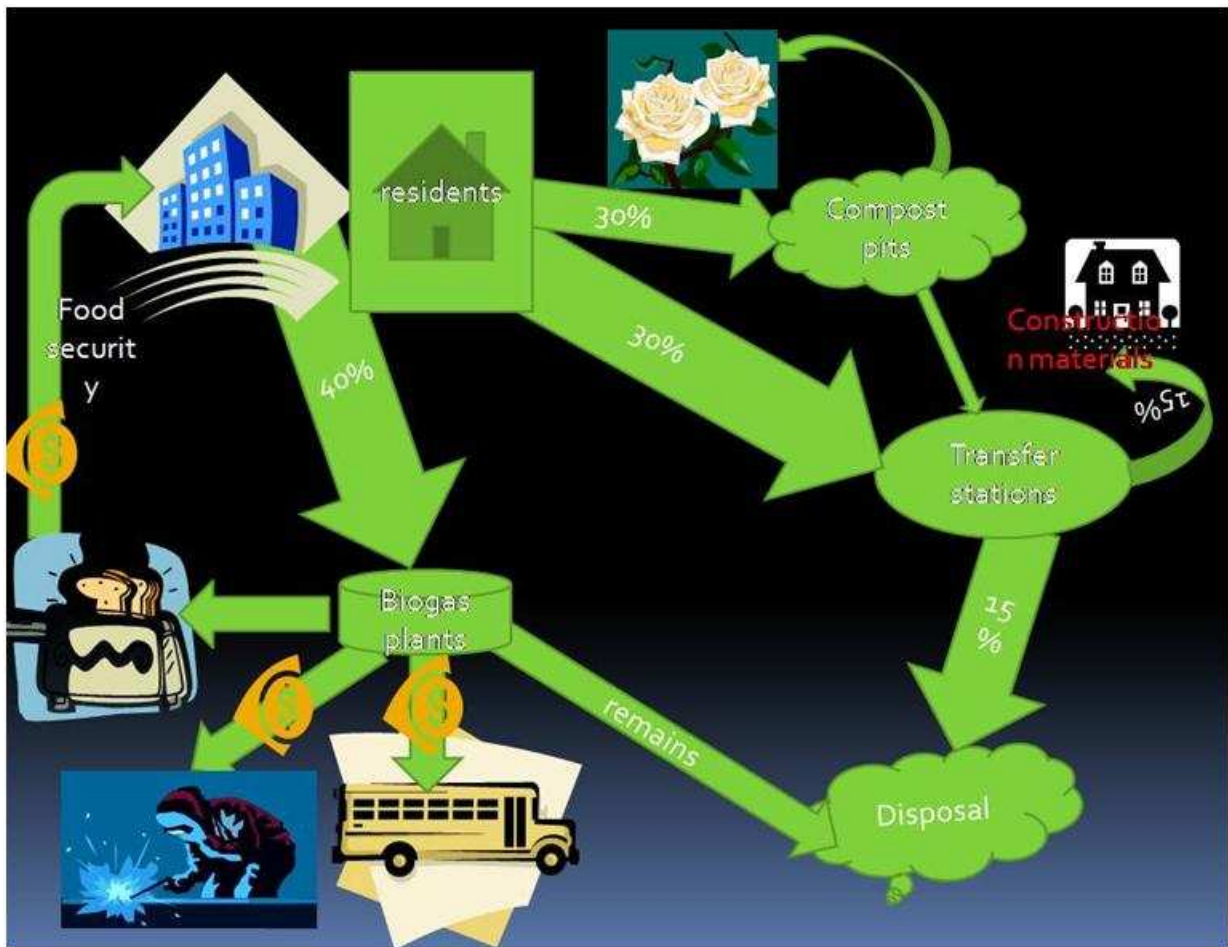
- ❖ Construct 6 community composting units to generate compost product
- ❖ Starting secondary sorting (segregation) in the transfer stations for material recovery and recycling
- ❖ Develop 2 biogas plants and 4 Briquette production plants,
- ❖ Trading recovered resources, Compost to urban agriculture and biogas to bakery, household supply and other industries, briquette to household consumption
- ❖ Build one common incinerator for the hazardous waste



### 3.2 Long term quantitative targets for MSW (2016-2023)

In the long term all targets set for the short term will be applicable but the difference is in number or percentage. The focus will be on upgrading the amount of materials recovered and reducing the amount of disposal rate to a very high amount

- ❖ Source segregation rate achieve 70%
- ❖ The collection rate of municipal solid waste will be 100%;
- ❖ The un-harmful disposal rate achieves 100%;
- ❖ Source reduction rate achieve 20%,
- ❖ Resource recovery rate achieve 80%;



#### 4. Targets for C&D waste

Baseline C&D waste inventory shows 12tons/day C&D waste is generated but almost 95% of C&D waste generated is consumed(reused) even it wasn't not treated as waste we hope this continues for the next 5 years and the focus will be on the remaining 5%

- ❖ C&D waste to assure 100% disposal rate for the remaining 5% unrecovered waste from the construction sector.

#### 5. Targets for Industrial waste, healthcare and hazardous waste

There are 7 industries in the city which didn't start treating their waste properly. In the waste inventory process no information were found about the type and amount of waste generated in industries.

There are one hospital and 38 clinics and 30 drug stores in the city which are currently giving health service to the citizens of Bahir Dar.

In the waste inventory it was also difficult to find waste data from the healthcare institutions. Then the ISWM plan developing work team decided to

- ❖ Prepare separate plan for Industrial, healthcare and other hazardous waste by 2011.

#### 6. Targets for special waste (short term-2011-2016)

Special wastes in Bahir Dar include died animals and night soil

##### 6.1 Targets for Died animals

- ❖ One special transportation track for died animals and proper treatment before disposal.

##### 6.2 Targets for Night soil

- ❖ Construction of 5 standard public toilets to slum areas of the city