

Organic Solid Waste Management and the Urban Poor in Dhaka City

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Abstract

Space within urban areas is differentially allocated among rich and the poor; existence for the poor becomes tenuous within conditions of environment degradation. Many migrants to the city are faced with uncertainties in their rural origins and opt for better opportunities in the city. However, in the city their activities are remunerated but meagre and without adequate provision for safety to health, in times of climate induced inundation. Urban management in this city is unsatisfactory but, theories conjecture an informality-organizing culture rather than lack of coordination and weak implementation. This paper contends that the problem will sustain, if addressed in a laissez faire manner. Management issues like garbage collection, freeing of effective space for remunerated economic activity, should be based on innovative approach which can minimize environment squalor. This paper delineates a management system for garbage disposal to free urban space to build a functionally viable city.

Keywords: Migration; Functional cities; Urban service; Garbage recycling; Waste management

who have been pushed out of rural areas due to climate change then become part of the scenario that is rapidly contributing to climate change. Urban environment degradation has particular negative effects

Introduction

- The space within urban areas is differentially allocated for the rich and the poor; the challenge to remain viable, especially for the poor, becomes highly fragile because of lack of adequate urban services.
- Cities like Dhaka must resolve important management issues that can make urban living more congenial. The targeted, but critical urban management issues like garbage collection, thereby freeing of effective space for remunerated economic space, should be based on innovative approach which can minimize economic and environment degradation.
- This paper delineates a management system for garbage disposal to free urban space to build a functionally viable city.

Vulnerability of the urban poor

- Urban environment degradation has particular negative effects upon the overall health of the population but with specific negative consequences for the abject poor, who survive in the city, clinging to the assurance of a livelihood strategy.
- Migrants are continuing to move to a life of poverty in the city. The problem is compounded by the living and working conditions in which these people exist.
- The greatest threats to health and livelihoods arise from the heaped garbage, lack of sanitation facilities and environment pollution that surround them.
- There is evidence that some slums have mushroomed, like TT Para Bustee, on accumulated garbage in the Kamalapur area.

Rational of the study

- The rapid growth of population, the mushrooming of poor settlements and unplanned urbanization have crucial implications for the efficiency and equity of urban services.
- Rapid population growth along with increase in per capita income as well as uncontrolled urbanization is severely degrading the urban environment.
- Due to environmental problems in urban areas of Bangladesh, waste management has become a matter of major concern.
- The present waste management situation in Bangladesh needs modernization and innovative approach for its proper management.

Objectives of the study

The objectives of the study was

- I. Urbanization in Bangladesh**
- II. Solid Waste Management Situation**
- III. Problems of Solid Waste Management in Urban Areas of Bangladesh**
- IV. As a solution: 3R Concept**
- V. Organic Waste Composting: Approach of Tyre Tube Biogas Plant and Approach Followed by Waste Concern**
- VI. How Solid Waste is Converted into Resource Through Public-Private-Community Partnerships (PPCP)**

Urbanization in Bangladesh

Population of Bangladesh is around 15.25 crore

Density -1015/sq.km

Year	Total Urban Population	Percent of Urban Population	Average Annual Growth Rate (%)
1951	1819773	4.33	1.69
1961	2640726	5.19	3.75
1974	6273602	8.78	6.62
1981	13535963	15.54	10.63
1991	20872204	20.15	5.43
2001	28808477	23.39	3.27
2010	41782489	28.10	2.85
2025*	78440000	40.00	-

Year	Urban Population Density/Sq.Km.	
	Dhaka Mega City	Dhaka City Corporation Area
1991	4795	15333
2004	8573	18055
2011	19,447	23,029

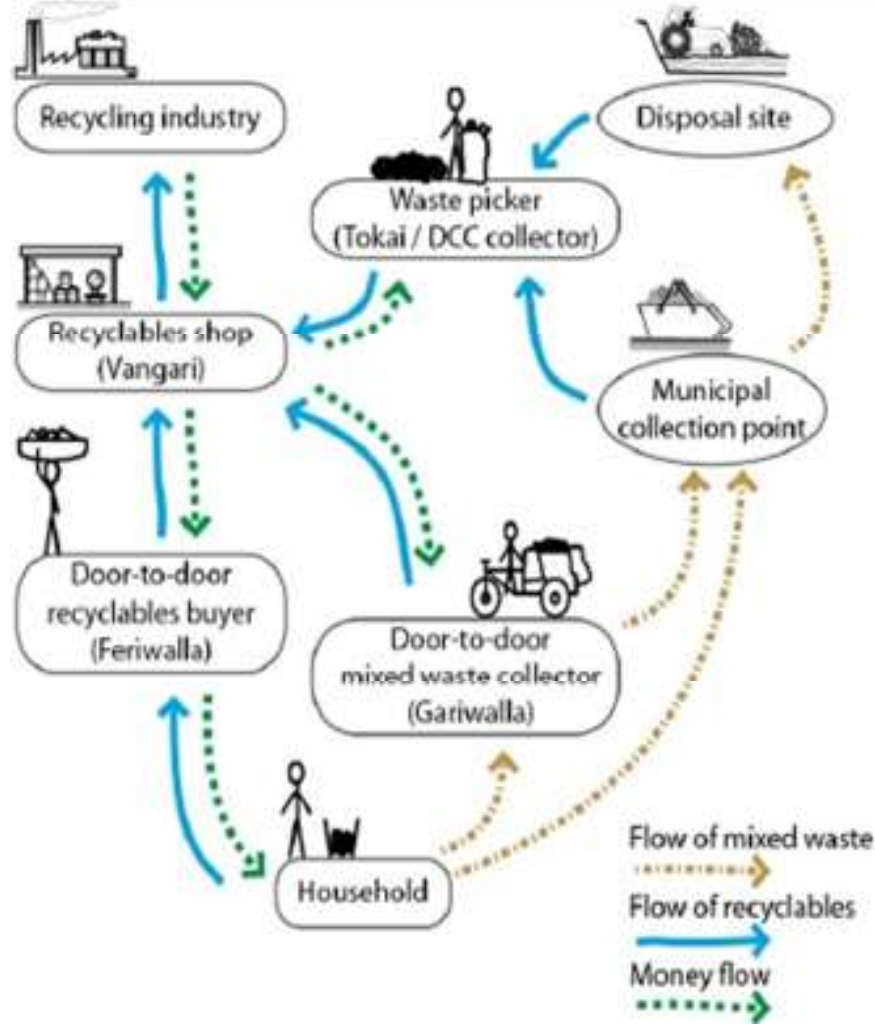


<http://www.tradingeconomics.com/bangladesh/population-in-largest-city-wb-data.html>

Issues regarding Urbanization

- High Population Growth
- High Population Density
- Unemployment
- Energy Crisis
- Environmental Pollution
- Waste management

Schematic overview of the waste management system for households in Dhaka



Dhaka City Corporation (DCC) holds the official responsibility for collection, transportation and final disposal of everyday solid waste generated within its service area.

Public-Private-Community-Partnership

Fig: Schematic overview of the waste management system for households in Dhaka.

Source:

http://www.academia.edu/2020674/Improving_the_informal_recycling_sector_through_segregation_of_waste_in_the_household__The_case_of_Dhaka_Bangladesh

Total Waste Generation in Urban Areas of Bangladesh in 2005

City/Town	*WGR (kg/cap/day)	No. of City/Town	Total Population (2005)	Population** (2005)	TWG*** (Ton/day)		TWG (Ton/day)
					Dry season	Wet season	
Dhaka	0.56	1	6,116,731	6,728,404	3,767.91	5,501.14	4,634.52
Chittagong	0.48	1	2,383,725	2,622,098	1,258.61	1,837.57	1,548.09
Rajshahi	0.3	1	425,798	468,378	140.51	205.15	172.83
Khulna	0.27	1	879,422	967,365	261.19	381.34	321.26
Barisal	0.25	1	397,281	437,009	109.25	159.51	134.38
Sylhet	0.3	1	351,724	386,896	116.07	169.46	142.76
Pourashavas	0.25	298	13,831,187	15,214,306	3,803.58	5,553.22	4,678.40
Other Urban Centers	0.15	218	8,379,647	9,217,612	1,382.64	2,018.66	1,700.65
Total	-	522	32,765,516	36,042,067	10,839.75	15,826.04	13,332.89

*WGR= Waste Generation Rate,** Including 10% increase for floating population,

***TWG= **Total Waste Generation, which increases 46% in wet season from dry season**

Source: 1 JICA (2004), 2 Chittagong City Corporation, 3 Field Survey, 4 Sinha (2000), 5 Field Survey, 6 Sylhet City Corporation, 7, 8 Field Survey

Average per capita urban waste generation rate is estimated as 0.41 kg/capita/day.

SOLID WASTE GENERATION SCENARIO OF DHAKA CITY

- Per Capita Waste Generation : 0.56 Kg/cap/day
- Total Waste Generation DCC Area : 3800 tonnes/day
- 70% - 80% of the solid waste is organic

URBAN WASTE GENERATION(Tons/ day) IN BANGLADESH

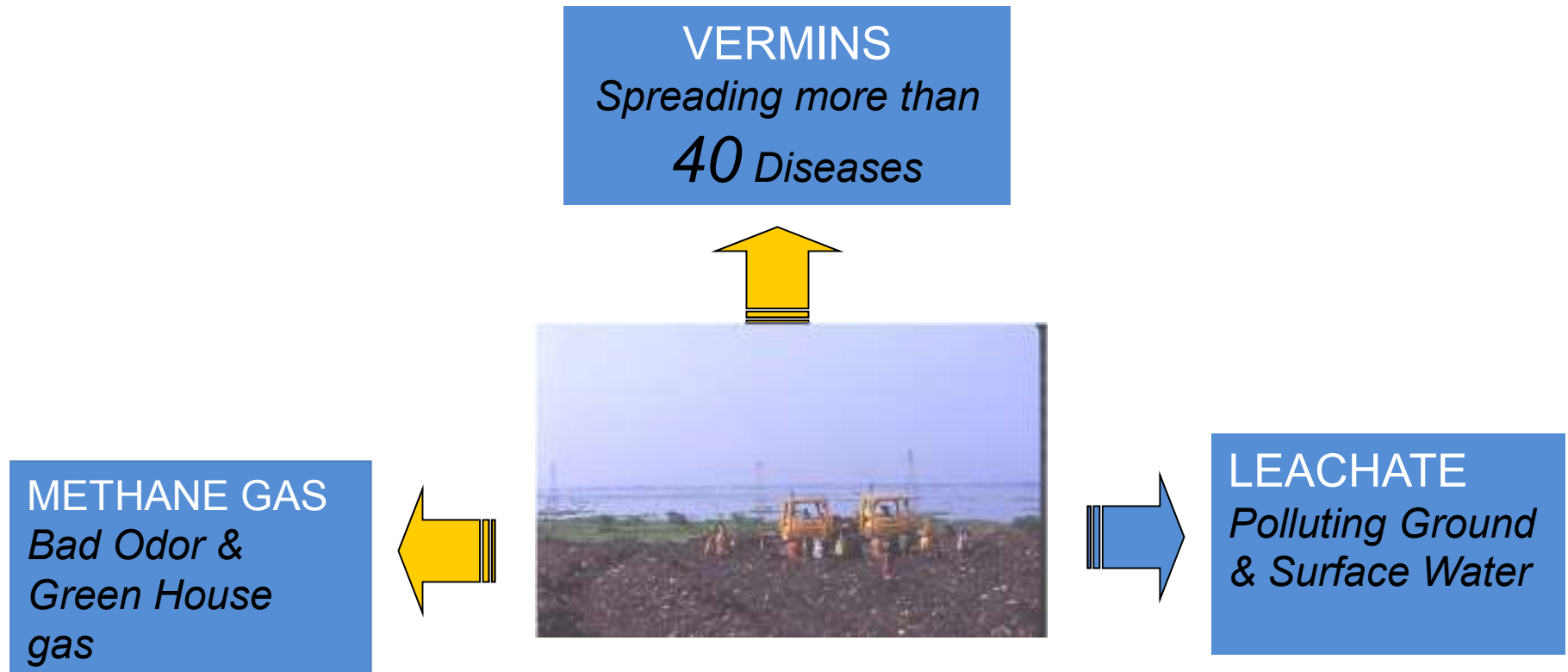
- 1991: 6493 tonnes/day
- 2005 :13,300 tonnes/day
- 2025: 47,064 tonnes/day (estimated)

Case Study

Two case studies(Agargaon and TT Para) are given below to illustrate the problems of the poor, due to garbage in the city:

- People are Allergic to mosquito bites and most of the time the children are ill.
- Flies are abundant due to the nearby garbage.
- They suffer from odor and excess of stagnant water.
- Their eyes become red when they go out, under the sun.
- They also experience aches in their eyes.

Negative Impacts of Unmanaged Waste



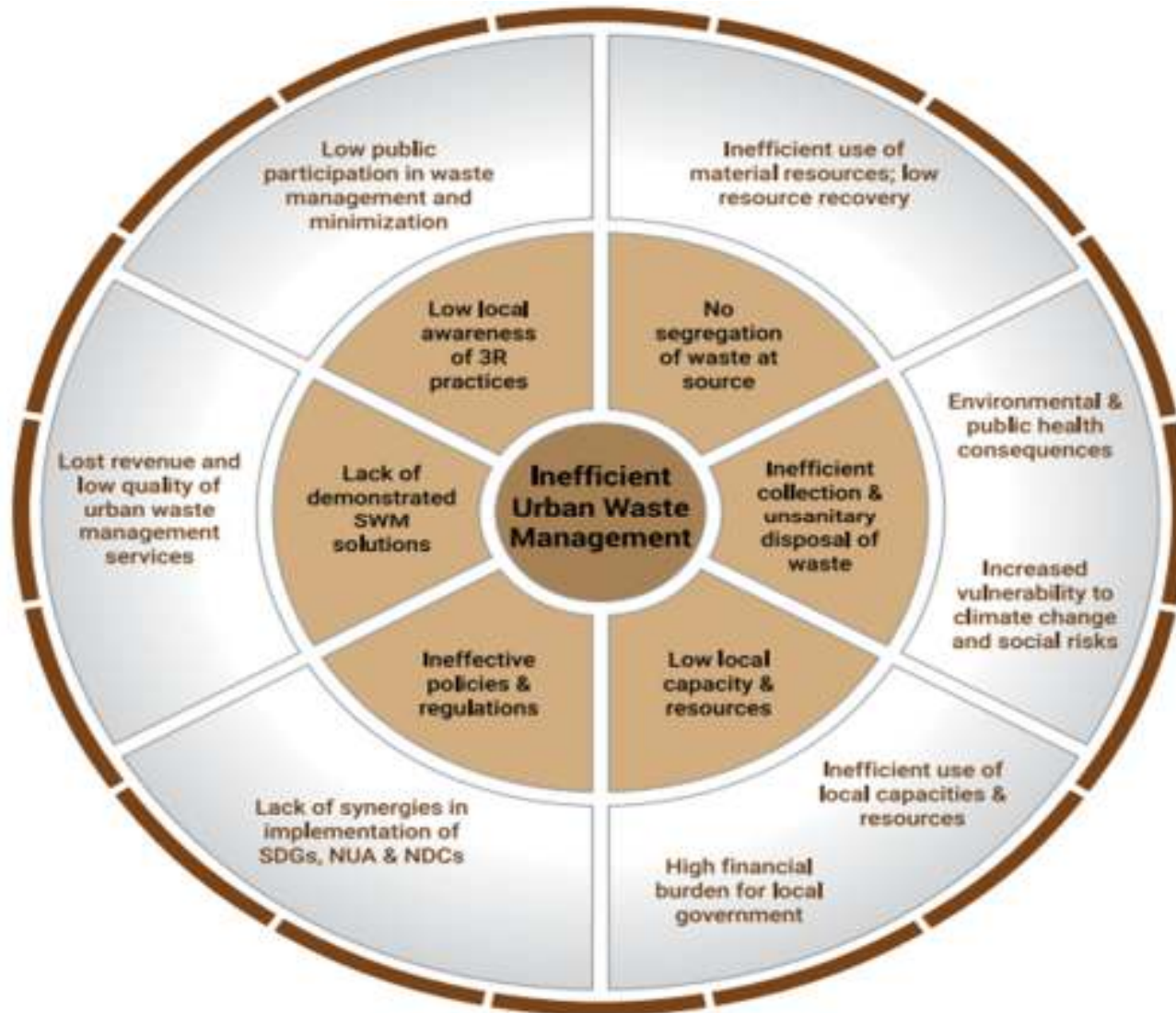
PROBLEMS OF SOLID WASTE MANAGEMENT IN URBAN AREAS

Solution:3Rs concept

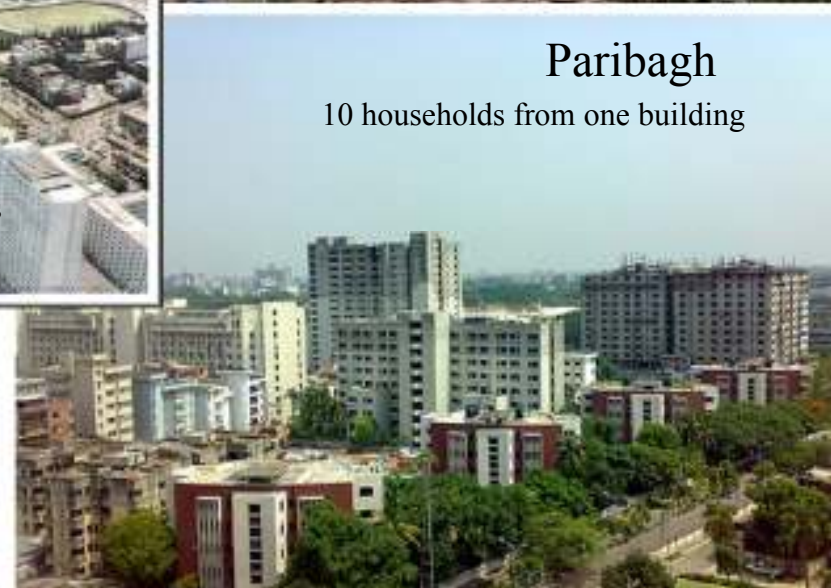
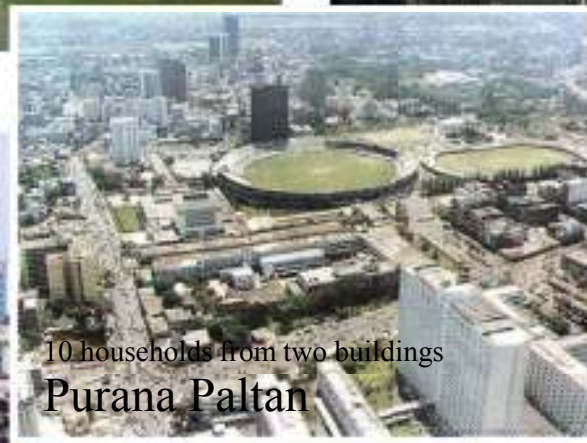
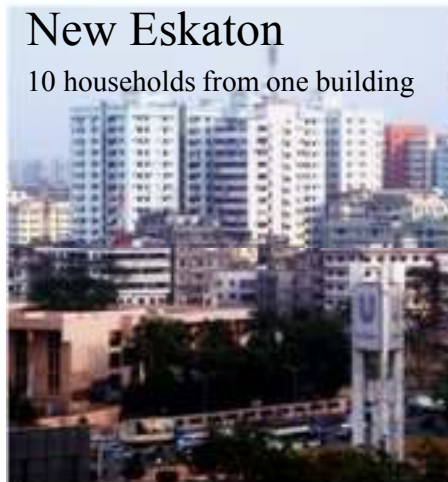


The figure shows the increasing trend for waste prevention and minimization policies as opposed to final disposal options (i.e. landfills). The pyramid also mirrors the “life cycle” of waste, from waste generation to disposal.

The Causes and Impacts of Inefficient urban waste management



Survey Conducted on Households attitude and behavior towards Waste



Source : Tanzina Azad (2004)

Result of the households survey

% households buy their daily commodities.

70% local shop

25% large supermarkets

5% other sources

- It is found that none of them grow their commodities in home.
- The average weekly discarded garbage by households is around 7 kg.

Households Garbage Composition

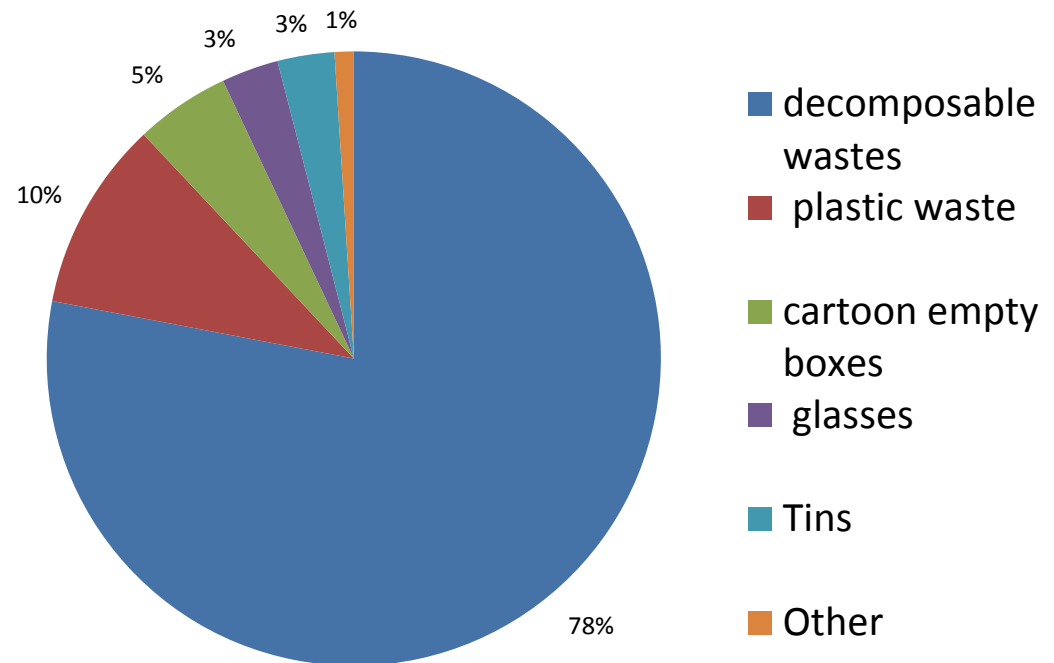
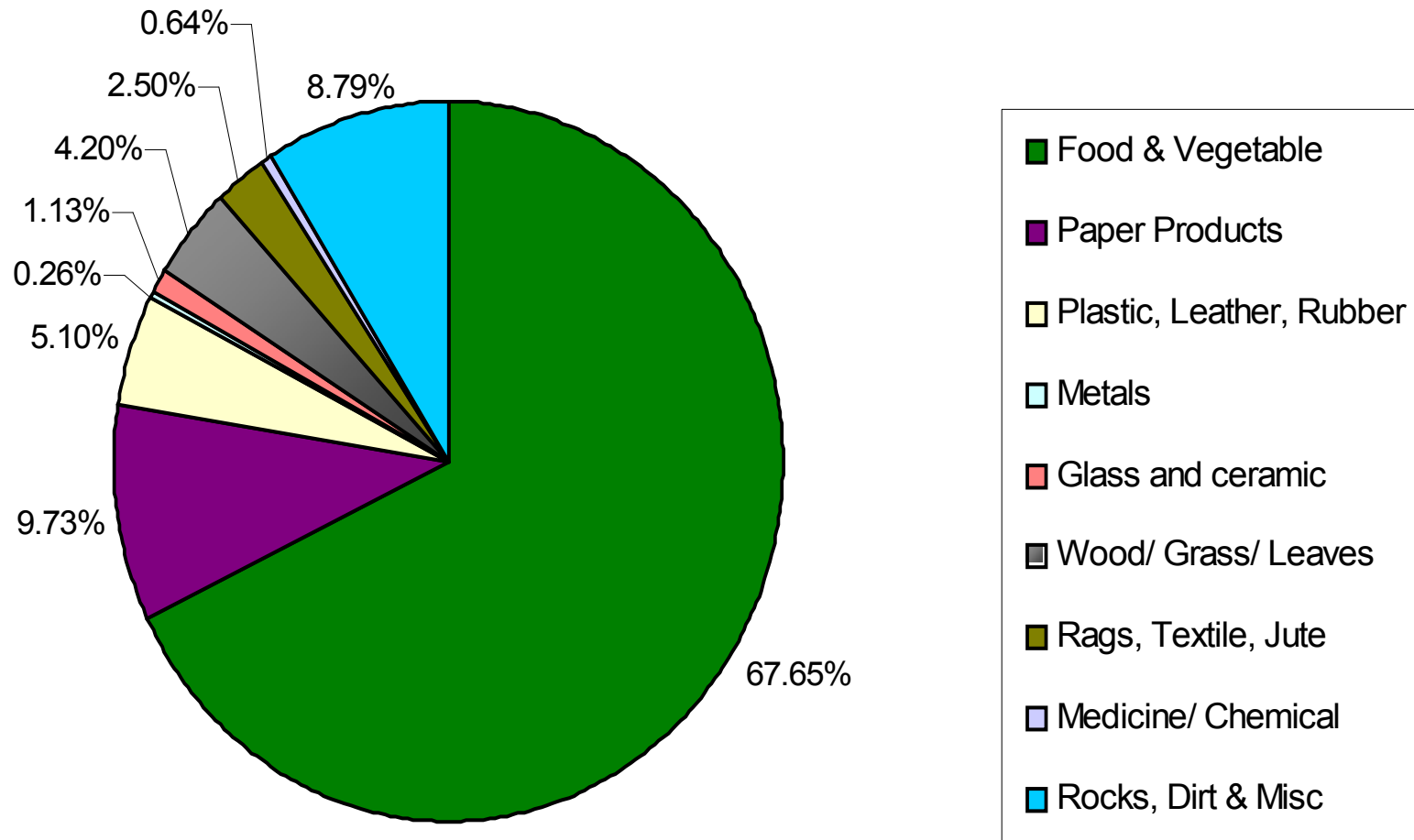


Fig 1: Average Physical Composition of Urban Solid Waste



RECYCLING INDUSTRIES IN DHAKA CITY



ALUMINIUM



PLASTIC



GLASS



PAPER



BONES



POLYTHENE

120,000 urban poor from the informal sector are involved in the recycling trade chain of Dhaka city

15% of the total generated waste in Dhaka (mainly inorganic) which amounts 475 tones/day are recycled daily.

Savings through Recycling (in 2005)

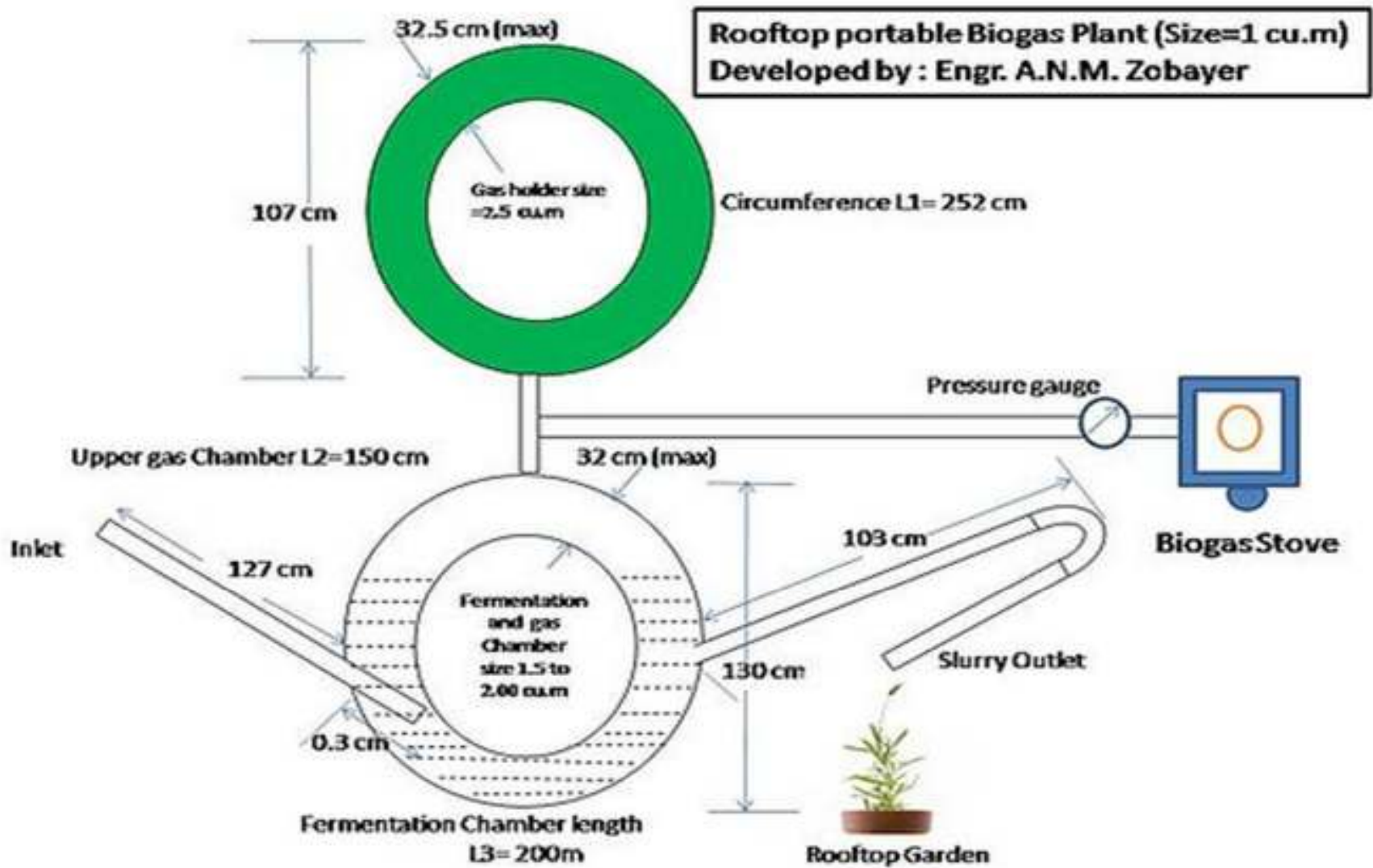
City/Town	TWG* (Ton/day)	No. of City/Town	% of Inorganic Waste Recycling**	Savings through recycling per year, (Tk. million)
Dhaka	4,634.52	1	15.00	170.00
Chittagong	1,548.09	1	12.45	28.96
Rajshahi	172.83	1	6.7	1.00
Khulna	321.26	1	6.00	6.94
Barisal	134.38	1	5.42	5.14
Sylhet	142.76	1	4.23	3.44
Pourashava	4,678.40	298	3.89	8,862.52
Other Urban	1,700.65	218	4.00	1,627.50
Center				
Total	13,332.89	522	-	10,705.5
				(15.29 million US \$)

Proposed solution at household's level
Zobayer's Tyre Tube Biogas Plant (inlet_side)



https://energypedia.info/index.php/Blog:News/Bangladesh_Rooftop_Biogas_Plant

Zobayer's Tyre Tube Biogas Plant



Specialty of Tyre Tube Biogas Plant

- Made out of recycled materials
- Total cost of the plant material was \$60-70
- Assembling time was only about thirty minutes (!).
- 2-3 kg (dry matter) kitchen and food waste feedstock produces about 1 m³ of biogas,
- Whereas 28 kg of cattle dung feedstock needed to produce the same quantity of gas.
- The capacity to hold 1.0 m³ gas
- Able to provide enough biogas to cook for 1.5 hours (in total) per day
- Produces best quality organic fertilizer.
- The empty biogas plant weights around 15 kg
- Can be transported easily.

Cooking with biogas



Proposed solution at urban level



ENVIRONMENTAL AND HEALTH
PROBLEMS IN URBAN AREAS
DUE TO UNMANAGED WASTE
40% of Waste Remains Uncollected

ADDRESSING TWO MAJOR PROBLEMS



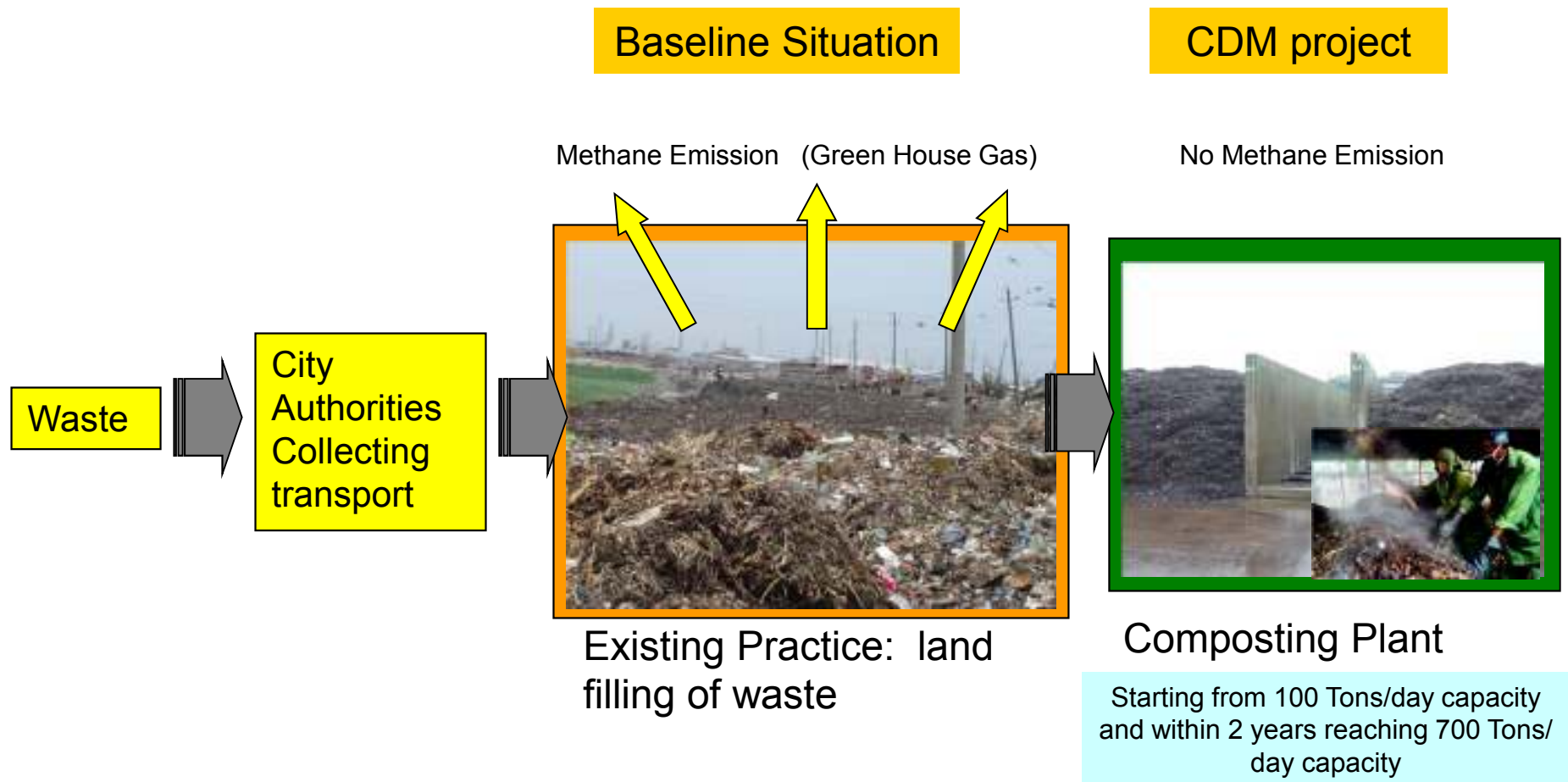
ORGANIC MATTER DEPLETION
IN THE SOIL OF RURAL AREAS
83% of the soil has less than 3.5% organic matter



WASTE CONCERN'S-WWR SOLUTION

- ☐ Converting Organic Waste Into Compost Using Decentralized Network of Compost Plants
- ☐ Use of Compost/Enriched Compost in Agriculture
- ☐ Use of carbon credit using CDM

Source : www.wasteconcern.org



The project is recycling organic vegetable waste and instead of disposing in landfill, it is converted into compost.

Waste Concern is involved in the design, implementation and now monitoring of the project

World's First Carbon Trading Based Composting Project From Organic Waste of Dhaka City



Opening Ceremony on November 25, 2009

Project based carbon trading (CER/VER) between industrialized and developing countries

Dutch Company WWR and Banks, FMO and Triodos

Industrialized country



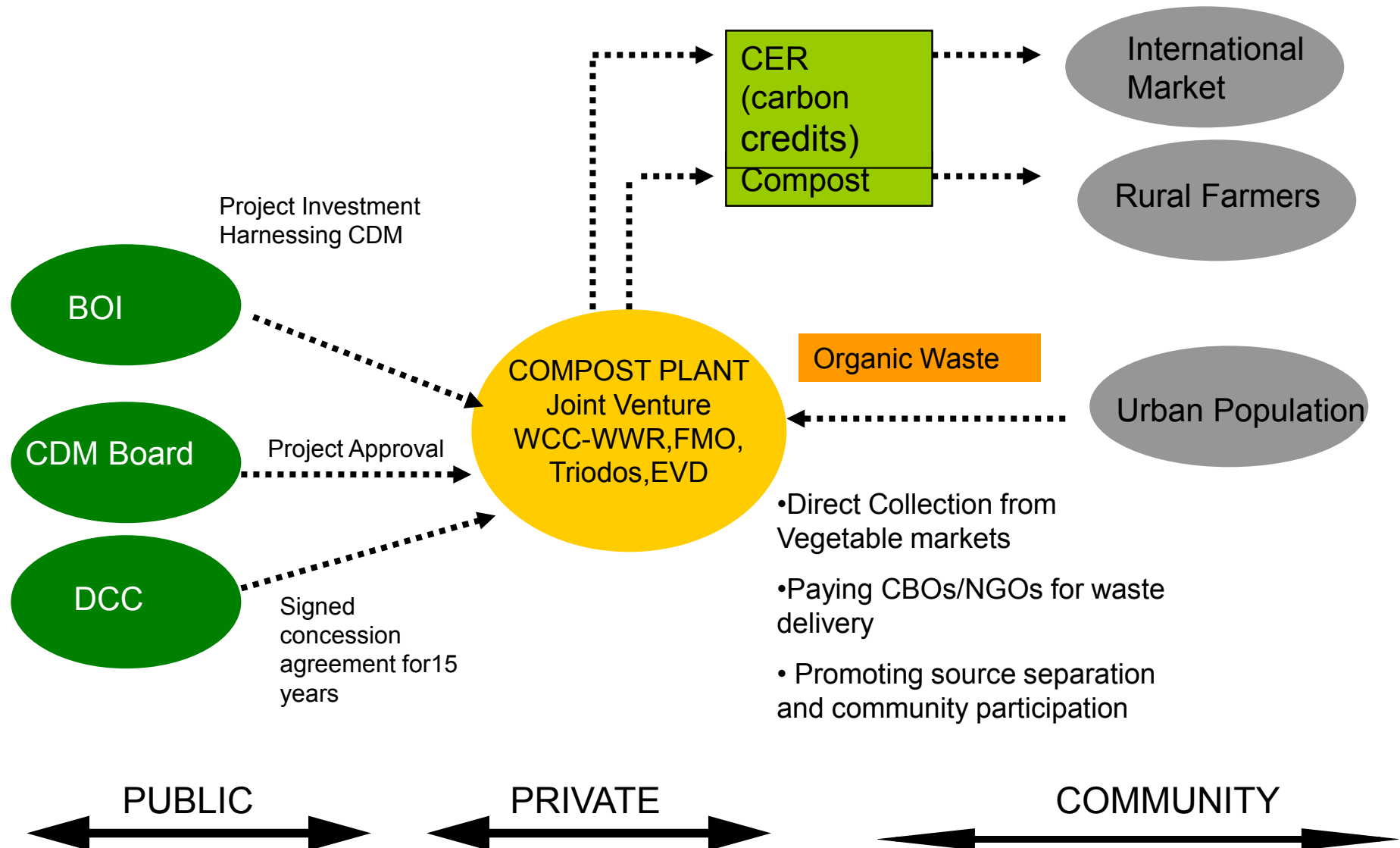
Emission reduction credits (CER)

CDM investment \$\$

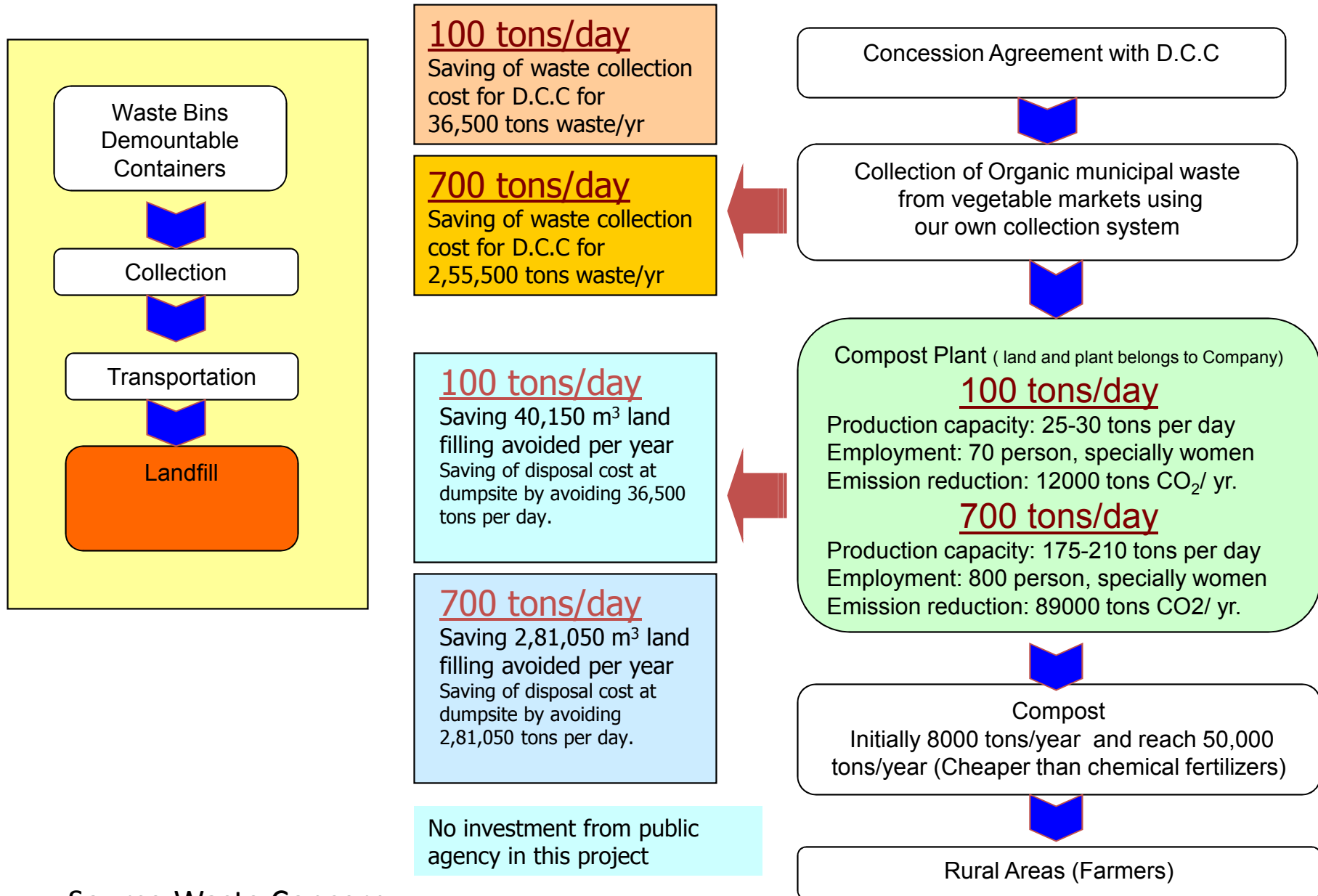


Project Reducing GHG emissions in Dhaka

PARTNERSHIP APPROACH UNDER CDM PROJECT



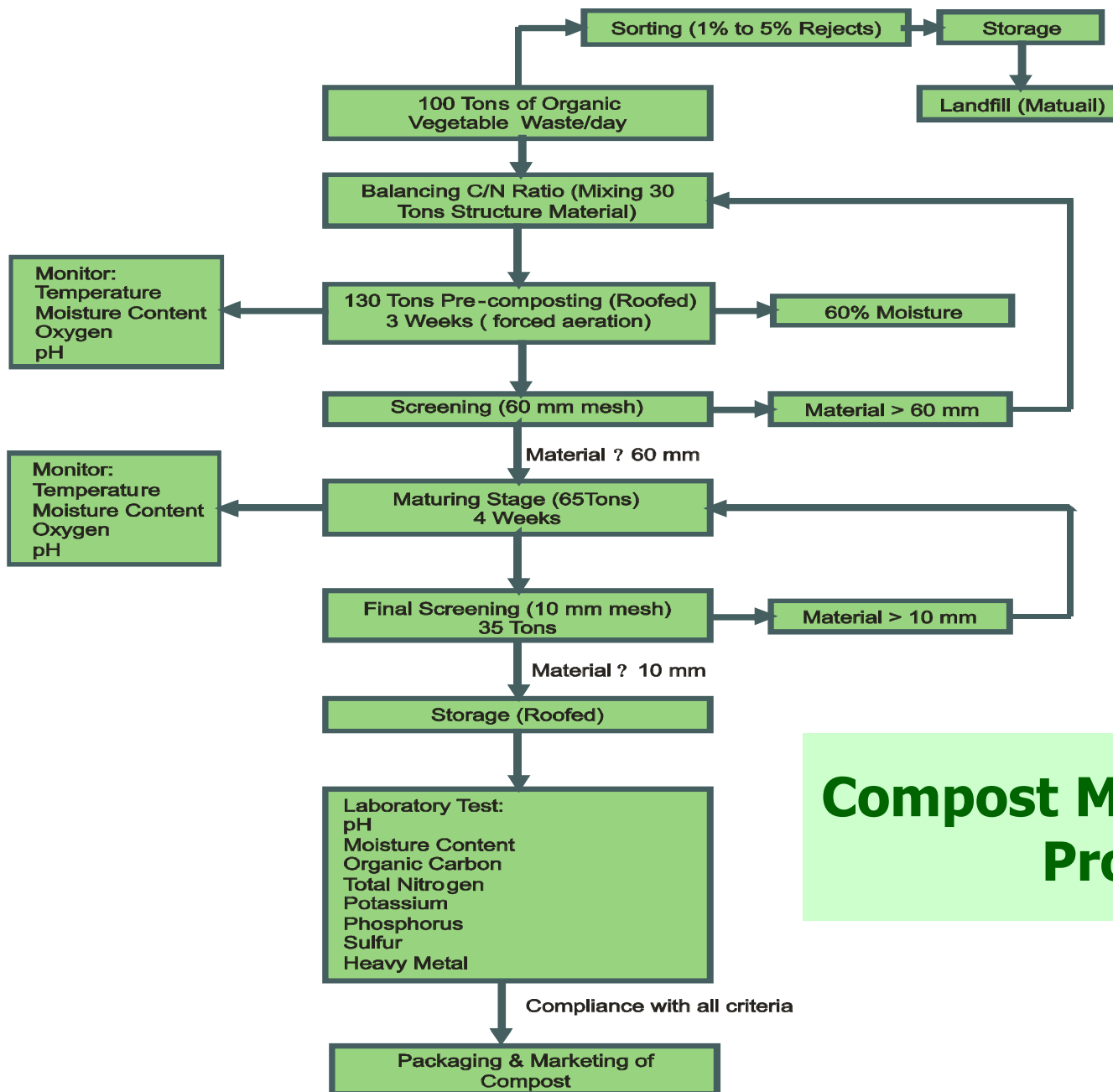
Calculation of savings: waste as a resource



Source:Waste Concern

Milestones of the Project

- Managing Waste from the DCC area = 700 tons/day by 2010;
- Production of Compost = 50,000 tons/year;
- Reduction of Green House Gas = 89,000 tons of CO₂e/ year;
- Job Creation for the Urban Poor = 800 nos.;
- Project Cost = 12 million Euro.



Compost Manufacturing Process



From August To November, 2008: Field Trial of Compost Produced by WWR Bio on Rice

Results:

- ✓ Reduces Use Of Chemical Fertilizer By 25% - 50%
- ✓ Increase Yield up to 30%

Pro-Poor Elements of the Project



Input

- Collection
(Organic Waste From Markets)

- Saving
DCC cost

Pro-poor element

- 700 tons/ day
of waste collection
Starting from 100
tons/day
- Job Creation
400 new jobs



Process

- Aerobic Composting

- Saving
Landfill Area

Pro-poor element

- Creating 800 new jobs
- Focusing on Waste Pickers
- Health Insurance
- Daycare Center
- Free Meal



Output

- Compost (50,000 tons/year)
- Carbon Credits
(89,000 ton Co₂e)
- Producing
environment friendly
product

Pro-poor element

- Cheaper
- Less Irrigation
- Soil Quality Improved
- Higher Yield
- Leads to higher income

Way Forward

- *53 (fifty three) permissions/clearance required for this project before implementation. We need to simplify this lengthy process/barrier.*
- *We need to enhance the capacity of the staffs and officials of public and private sector about CDM projects.*
- One stop approval process for CDM projects should be introduced (CDM/BOI/Bangladesh Bank/Line Ministry) to encourage CDM investment.
- There are many investors keen to invest in projects which has both mitigation and adaptation benefits.

Conclusion and Policy Recommendations

- For DCC, strategies for efficient solid waste management are to carry out institutional strengthening, capacity building and gradual private sector participation in solid waste management.
- In particular, promotion of community-based programs and local initiatives with NGO support are important and the formulation of laws and regulations.
- Examples from Surabaya could be useful to DCC which is based on community managed collection. Such experiences in managing solid waste issues would be of good reference to DCC.
- Similarly, other cities can learn valuable insights from Dhaka's successful and replicable composting program.
- The model of decentralized community-based composting by Waste Concern has demonstrated enough evidence that an effective partnership arrangement can be developed between the public sector, the community, and the private sector.
- In a multistoried building of DCC, rooftop tube-type biogas plant can help to improve the waste management, produce biogas and organic fertilizer which could be used in rooftop gardening.

Clean your city, live green



http://en.wikipedia.org/wiki/File:Dhaka_skyline1.jpg

THANK YOU