

3R from Developing Countries' Perspectives and its co-benefits



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**Preparatory Meeting
for the Inaugural Meeting of the Regional 3R
Forum in Asia**
*Tokyo, Japan
June 29 and 30, 2009*



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Waste Situation in **Developing Countries**

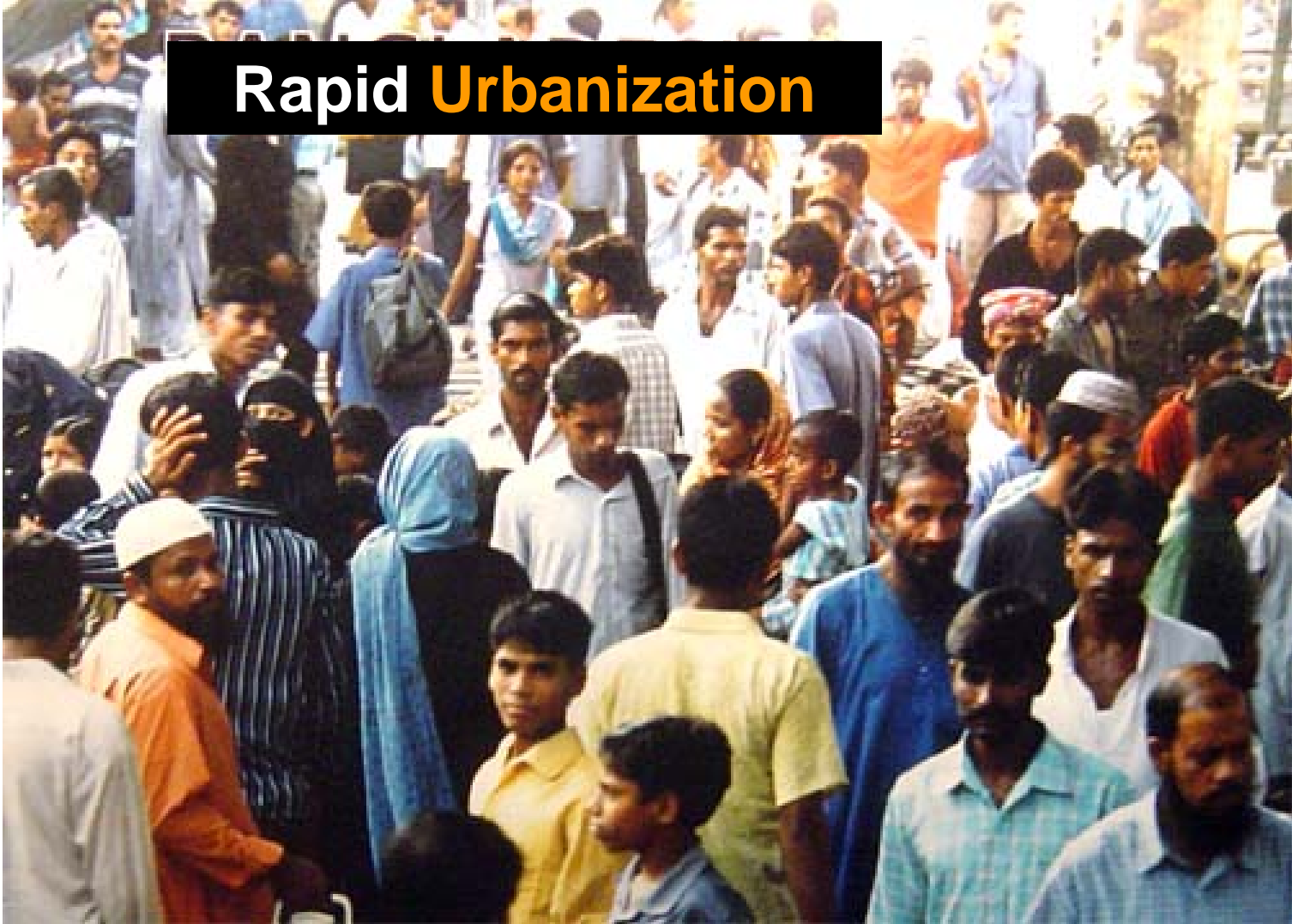


Human activities create waste, which can pose risks to the environment and to public health, if not managed properly....

The developing countries as a whole is experiencing rapid urbanization, increasing population, industrialization and changing lifestyle and consumption patterns are resulting in the generation of increasing amounts new types of wastes in waste stream.

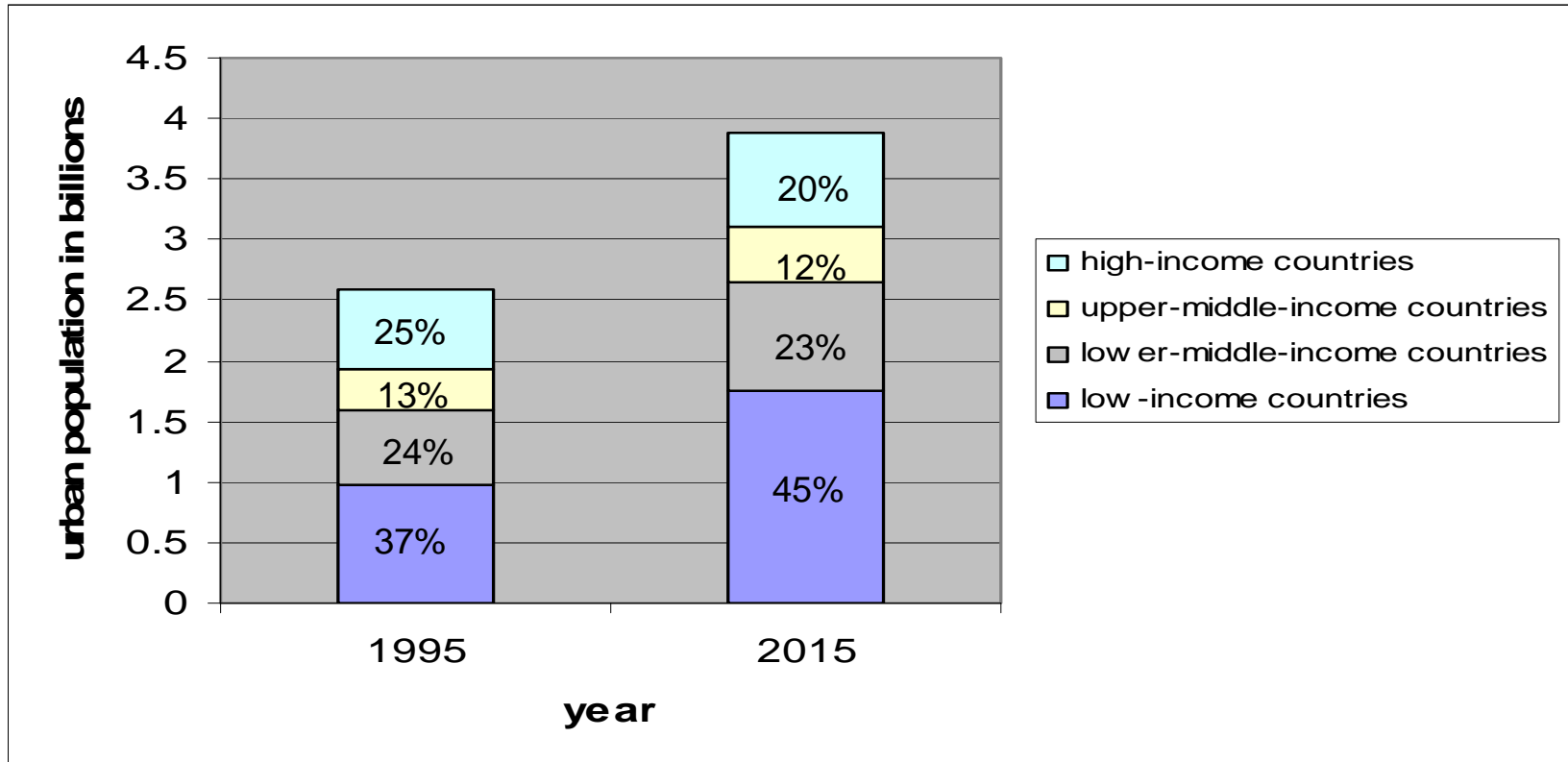
Waste management is mainly focused with end-of-pipe solution which is based on collection, transportation and disposal, where importance of 3R is missing.

Rapid Urbanization



Rapid Urbanization is taking place specially in low-income countries

Global urban population categorized by different economies



Global urban population categorized by of different economies (Schertenleib, 1992). Economics are divided according to 1996 GNP per capita: low income < 785 US\$; low middle income 786-3115 US\$; upper middle income 3116-9635 US\$, and income > 9636 US\$

In 1992, 41% of the world population lived in urban areas
In 2015, 60% of the world population will be living in urban areas and 68% of this urban population will living in the cities of low-income and lower middle income countries (schertenleib, 1992)

Relationship with Waste Generation Rate with Economic Growth

Waste generations rates of some Asian Countries, sorted by ascending Gross National Income (GNI)

Country	GNI	Waste generations (kg/capita day)	Reference
Nepal	240	0.2-0.5	(UNEP, 2001)
Cambodia	260	1.0	(Yem, 2001)
Lao PDR	290	0.7	(Hoorweg, 1999)
Bangladesh	370	0.5	(Hoorweg, 1999)
Vietnam	390	0.55	(Hoorweg, 1999)
Pakistan	440	0.6-0.8	(World Wildlife Fund, 2001)
India	450	0.3 -0.6	(Ahmed, 2000; Akolkar, 2001)
Indonesia	570	0.8- 1.0	(Mukawi, 2001)
China	840	0.8	(Hoorweg, 1999)
Sri Lanka	850	0.2-0.9	(Jayatilake, 2001; Hoorweg, 1999)
Philippines	1040	0.3 -0.7	(World Bank, 2001)
Thailand	2000	1.1	(Hoorweg, 1999)

GNI 2000 per capita in \$, based on Atlas Method, see <http://www.worldbank.org/data/databytopic/class.htm>

There is a link between growth in wealth and increase in waste — the more affluent a society becomes, the more waste it generates.

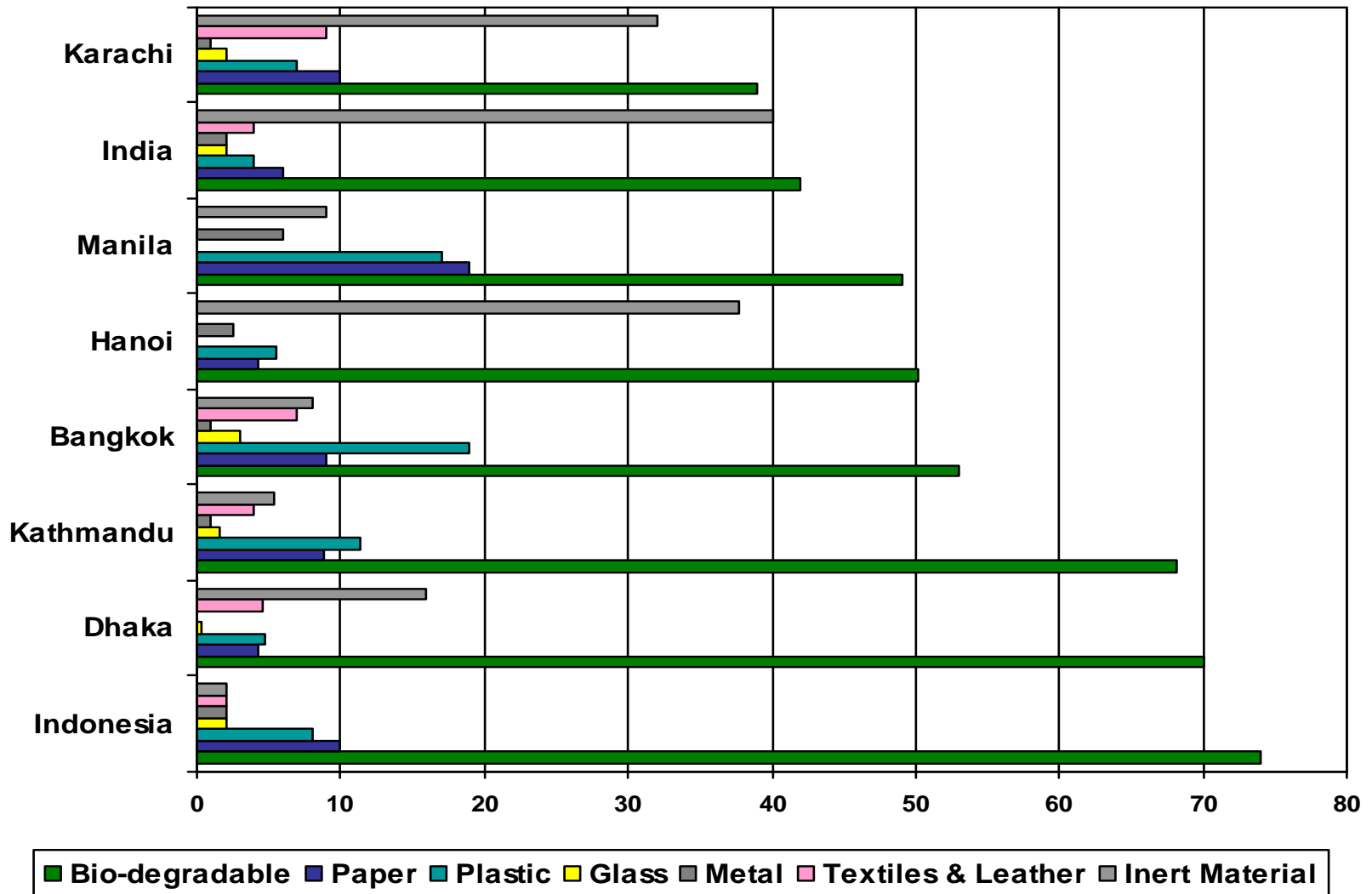
GENERATION OF WASTE IS RAPIDLY INCREASING

Bangladesh Example

Year	Urban Population	Total Urban Waste Generation (Ton/day)	Per Capita Waste Generation Rate in urban areas Kg/cap/day	Per Capita GDP
1991	20.8 million	6493	0.31*	US \$ 220
2005	32.76 million	13,330	0.41**	US \$ 482****
2025	78.44 million	47,000	0.60***	>US \$ 1000

* World Bank, 1998, *** Waste Concern, 2005, ** UMP, 1999, **** GOB, 2006

Typical Average Physical Composition of Waste in Urban Areas



Source: Zurbrugg, 2002

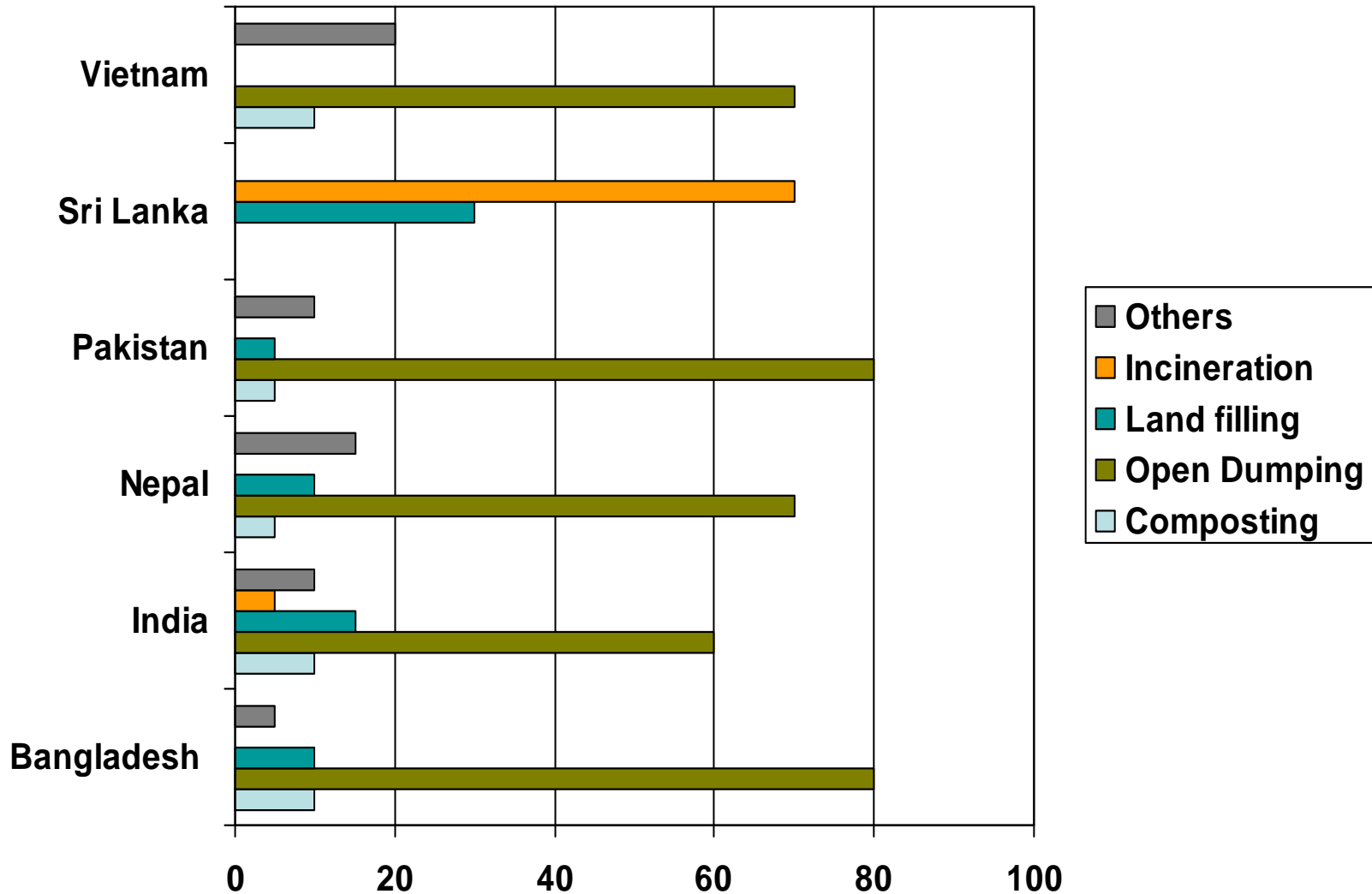
Waste Characteristic of Dhaka, Bangladesh

High organic matter >>(more than 70%)

High moisture content >>(more than 50%)

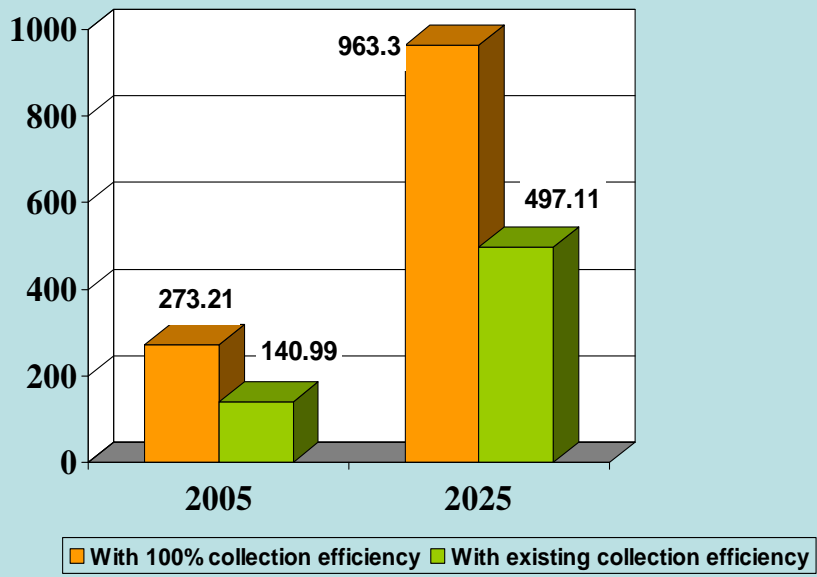
Low calorific value >>(less than 1000 Kcal/Kg)

Solid Waste Disposal Methods Practiced in Some Asian Countries



PRESENT PRACTICE

- *In developing countries municipal solid waste management costs consume **20%-50%** of municipal revenues*
- *In developing countries collection service level remain low with only **50%-70%** of resident receiving service.*
- *Land is scarce and expensive for many cities for land filling*



Projection of Future Landfill Requirement for Bangladesh Acre Per Year (4 m deep landfill area)



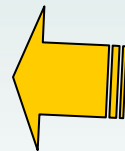
PROBLEMS FROM PRESENT PRACTICE

Solid Waste Management is based on end-of-pipe solution which is only focused on collection, transportation and final disposal...

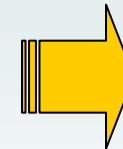
VERMINS
*Spreading more than
40 Diseases*



METHANE GAS
*Bad Odor &
Green House
gas*



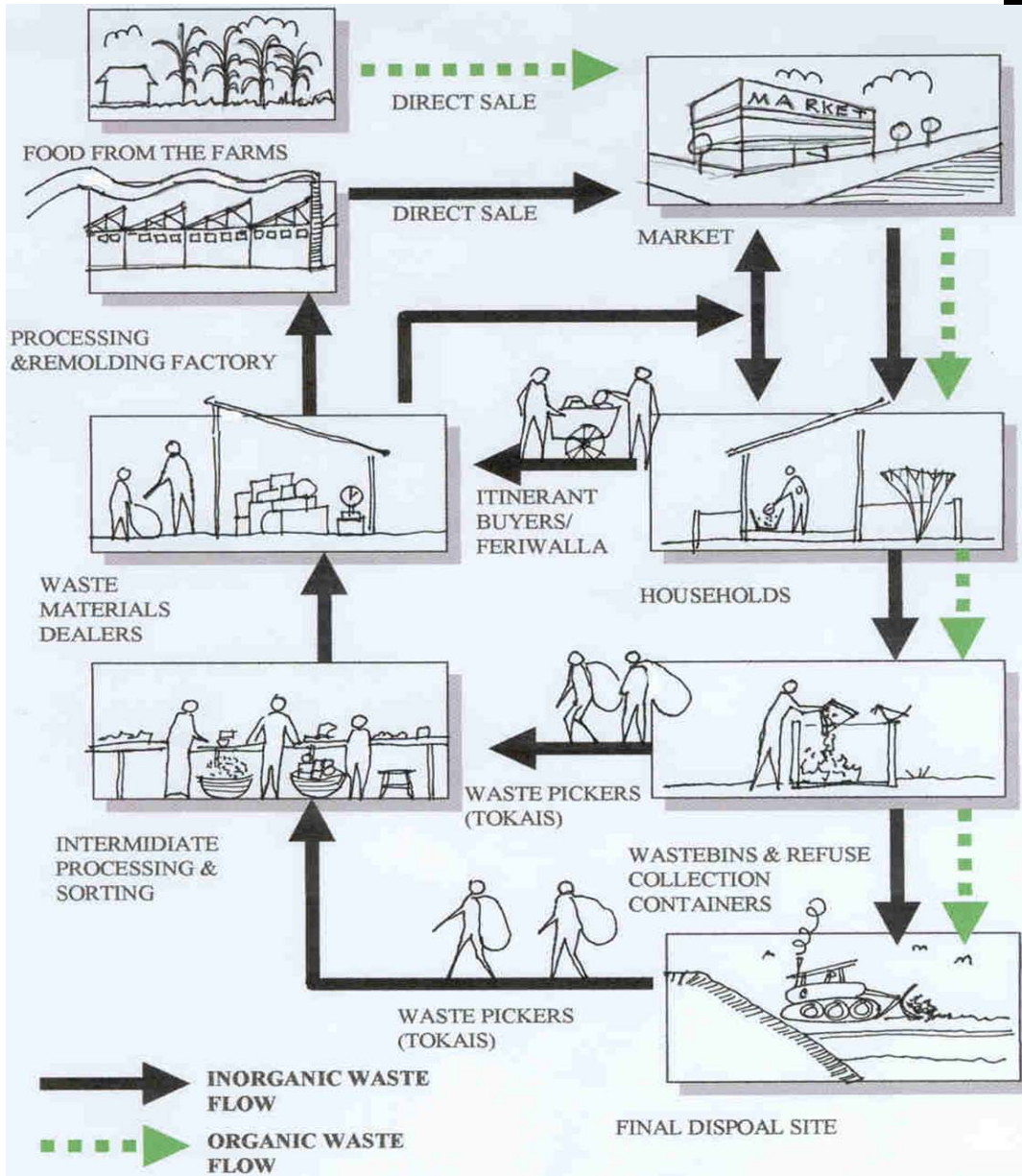
LEACHATE
*Polluting
Ground
& Surface Water*



Open dumping practiced in most of the cities and towns, which is the cheapest and easiest solution for them...

Waste Recycling by Informal Sector

PRESENT 3R PRACTICE



Itinerant Buyers/ Feriwalla



Waste Pickers in the Collection Points



Waste Pickers in the Dumpsite

Informal sector playing a vital role in resource recovery and recycling of waste for their survival....

INFORMAL SECTOR INVOLVED IN RECYCLING INDUSTRIES



ALUMINIUM



PLASTIC



GLASS



PAPER



BONES



POLYTHENE

- In developing countries the informal sector plays a major role in recovering secondary materials.
- The world bank estimates that about 2% of the population in developing countries are scavengers whose livelihood consists in collection, selling recyclables materials.
- According to Waste Concern study in 2005, the proportion of inorganic wastes recycled by informal sector in the urban cities/towns range between 3.89% -15 %, and approximately 15.29million USD\$ is being saved in Bangladesh through such recycling activities annually.

New Types of Waste Emerging in the Waste Stream



Rapidly changing consumption patterns are generating significantly increasing proportions of toxic chemicals in industrial waste, hazardous hospital waste, large quantities of electronic waste is a growing concern for developing countries



Industrial Waste

Untreated liquid and solid waste directly discharged in the water bodies, thus polluting the environment. Disposal of sludge from ETPs also becoming a major problem.



Ship Breaking Waste

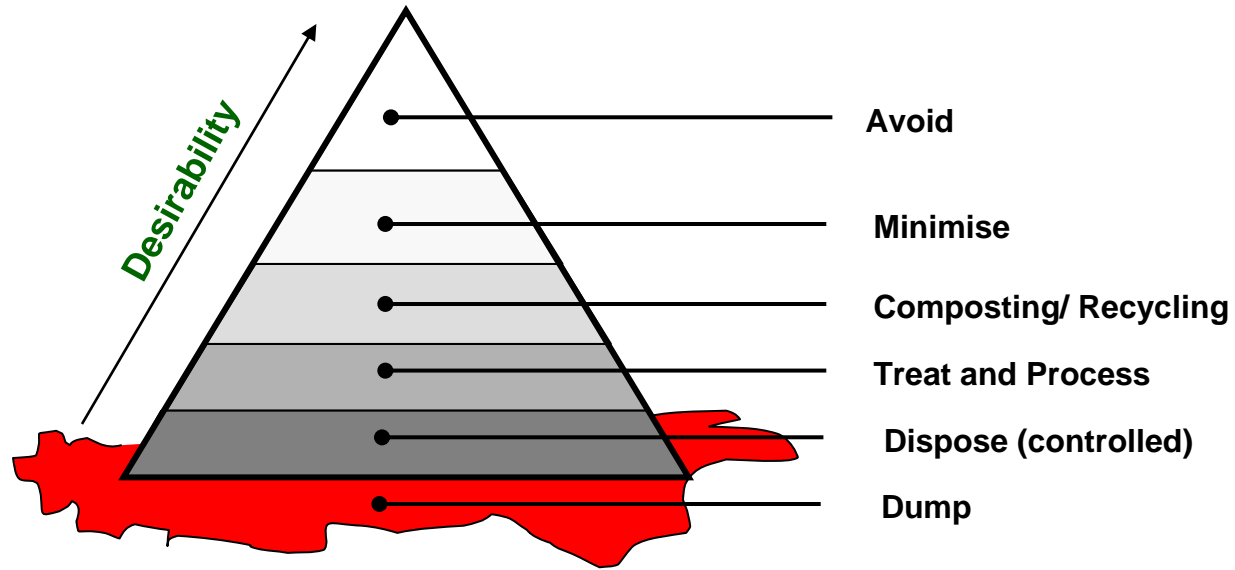
- ❑ Extracted 1.2 million tons of scrap iron in 2004
- ❑ 20000-30000 workers (skilled, semi-skilled and unskilled)
- ❑ Active Yards: Out of 32 Yards, 26 Yards were active in April 2005.

Source: UNDP & ILO:2005

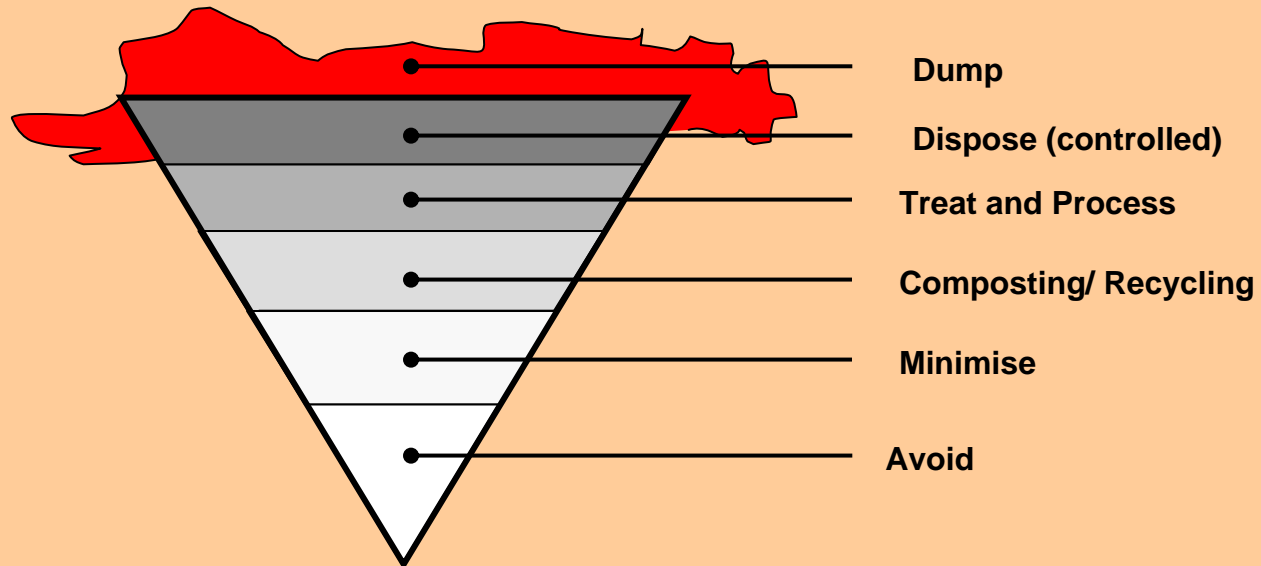
Problems Faced by Informal Sector

- Lack of awareness of environmental health issue,
- Lack of waste treatment and disposal facilities.
- Absence of technological know how,
- Lack of finance
- Lack of appropriate legislative support.

Strategy for **Improvement (3R)**



The Waste Management Hierarchy



The Waste Management Hierarchy (Present Situation)

Examples of 3R practice:
Dhaka experience CDM

Examples of 3R practice: **Dhaka experience CDM**

World's First Compost Plant Based on Carbon Trading Initiated by Waste Concern in Dhaka



700 Tons/day Capacity Compost Plant at Dhaka of Waste Concern



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

Dutch Company WWR and Banks, FMO and Triodos

CDM investment \$\$

Industrialized



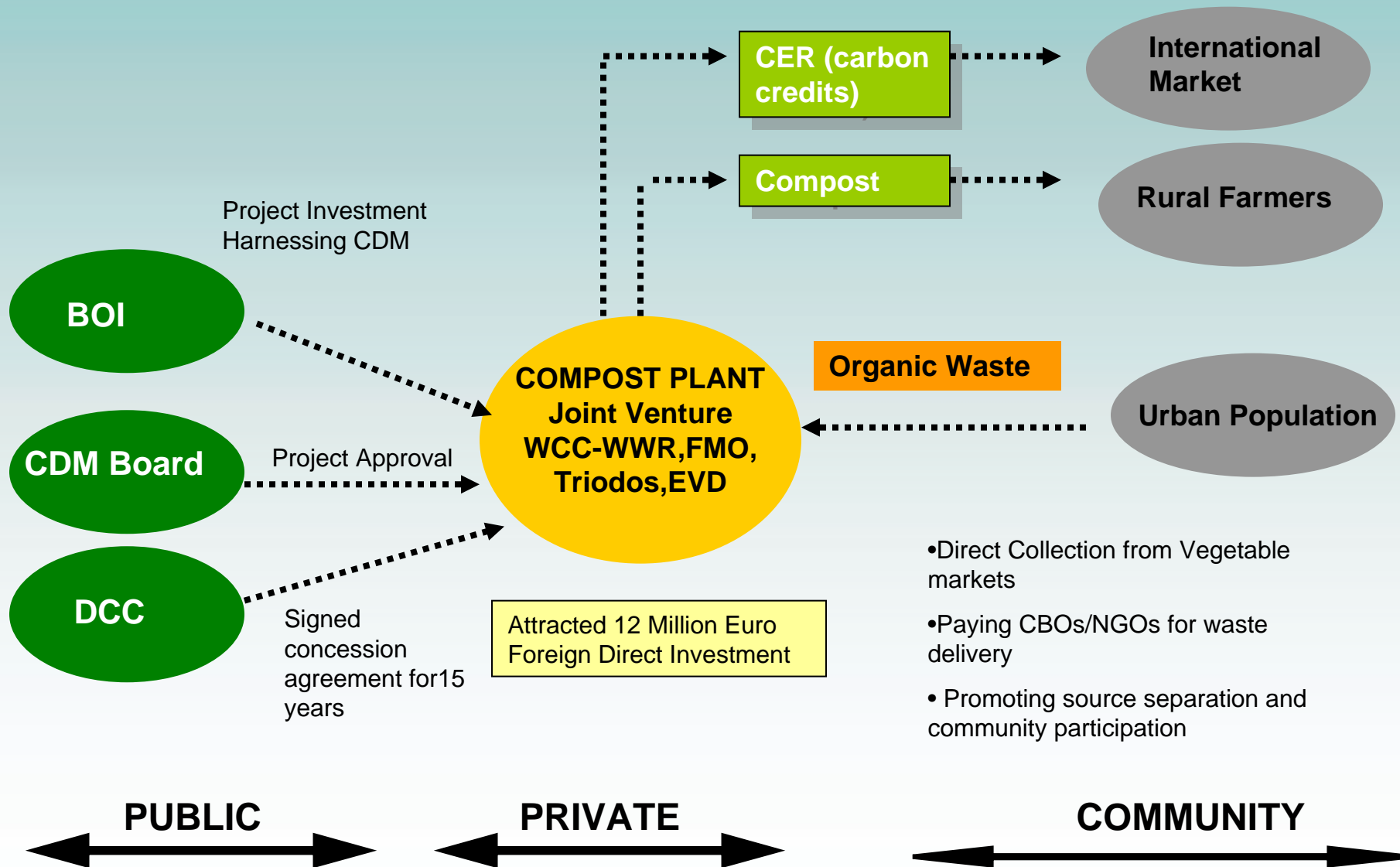
Emission reduction credits (CER)



Project Reducing GHG emissions in Dhaka

Examples of 3R practice: 700 ton/day Compost Plant in Dhaka

Using Public- Private and Community Partnerships Model



Examples of 3R practice: Dhaka experience CDM



CDM – Executive Board

UNFCCC/CCNUCC



AM0025 / Version 0
Sectoral Scope 1
EB 2

NOTE: The following project activities are required to make the PDD publicly available as per the guidance in paragraph 29 of the report of twenty seventh meeting of the Board:

1. those that use mechanical process to produce refuse-derived fuel (RDF) from waste and its use for energy generation.

Revision to the approved baseline methodology AM0025

“Avoided emissions from organic waste through alternative waste treatment processes”

Source

This baseline methodology is based on the proposed methodologies submitted for the project “Organic waste composting at the Matuail landfill site Dhaka, Bangladesh,” whose baseline study, monitoring and verification plan and project design document were prepared by World Wide Recycling B.V. and Waste Concern. It has been revised to include elements from the methodology for the “PT Navigat



Obtained UNFCCC
approval on Sept 2005

Before-After: Waste Collection System



Present Collection Practice



Improved Covered Collection by WWR

Parameters to be Monitored **During Implementation**



Weighing of Waste Input

Process Quality Control



Forced Aeration by Blowers to Provide Oxygen in the Compost Pile



Process Quality Control



Regular Oxygen Monitoring



Parameters to be Monitored During Implementation



Temperature Control



8 3 2000

Working Condition



Informal sector working in unsafe working condition



Informal sector working in safe working condition

Comparative Analytical Results of Fertilizer Samples

Name of Product : Waste Concern Jaiba Sar Company:

উপাদান	অনুমোদিত মান	Analytical Results			Guaranteed analysis
		BARI	BINA	SRDI	
Physical					
Colour	Dark grey to black		Very dark greyish brown	Dark brown	
Physical condition	Non-granular form		Soft body, Granular in size	Non granular	
Odour	Absence of foul odour		Not smell	Odour less	
Moisture	Max. 15%	16.3	17.1	15.5	
Chemical					
pH	6.0 – 8.5	8.3	8.0	8.4	
Organic Carbon	10 – 25%	23.8	20.20	24.9	
Total Nitrogen (N)	0.5 – 4.0%	2.01	1.90	1.95	
C : N	Max. 20:1	11.8:1	10.63	12.8	
Phosphorus (P)	0.5 – 1.5%	1.7	2.2	1.25	
Potassium (K)	1.0 – 3.0%	2.68	2.52	2.60	
Sulphur (S)	0.1 - 0.5%	0.30	0.09	0.35	
Zinc (Zn)	Max. 0.1%	0.04	*	0.03	
Copper (Cu)	Max. 0.05%	0.009		0.008	
Arsenic (As)	Max. 20 ppm	19.3	*	*	
Chromium (Cr.)	Max. 50 ppm	*	*	20.2	
Cadmium (Cd)	Max. 5 ppm	3.81	*	2.28	
Lead (Pb)	Max. 30 ppm	27.4	*	26.0	
Mercury (Mg)	Max. 0.1 ppm	*	*	*	
Nickel (Ni)	Max. 30 ppm	16.85	*	26.1	
Inert material	Max. 1%	*			

*Not analysed

**Complies with GoB
Compost Standards of
2008**



Quality Control Laboratory

FIELD TRIAL ON COMPOST

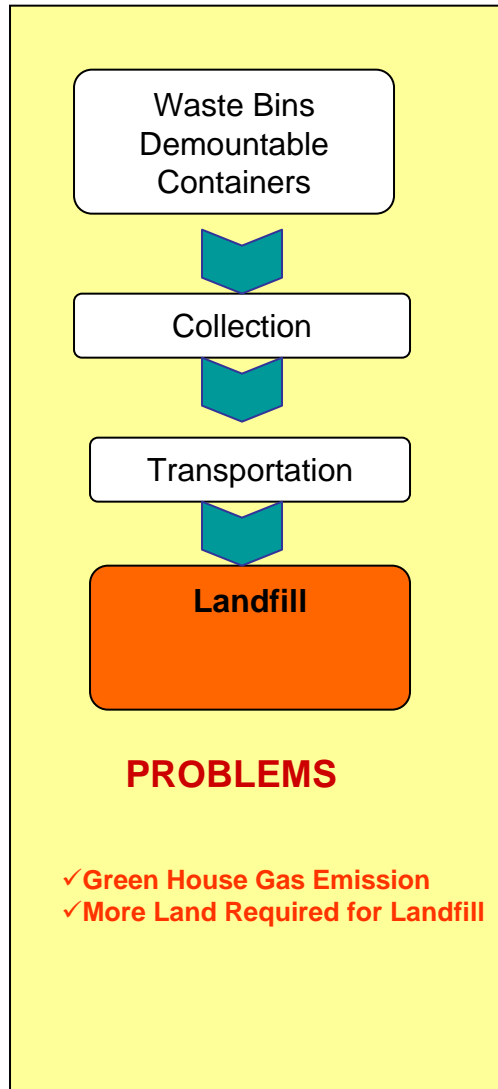


FIELD TRIAL OF COMPOST PRODUCED BY WWR
ON RICE FROM AUGUST TO NOVEMBER, 2008



FIELD TRIAL OF COMPOST PRODUCED BY WWR
ON RICE FROM AUGUST TO NOVEMBER, 2008
Reduces the use of chemical fertilizer 25-30
increased yield 30%

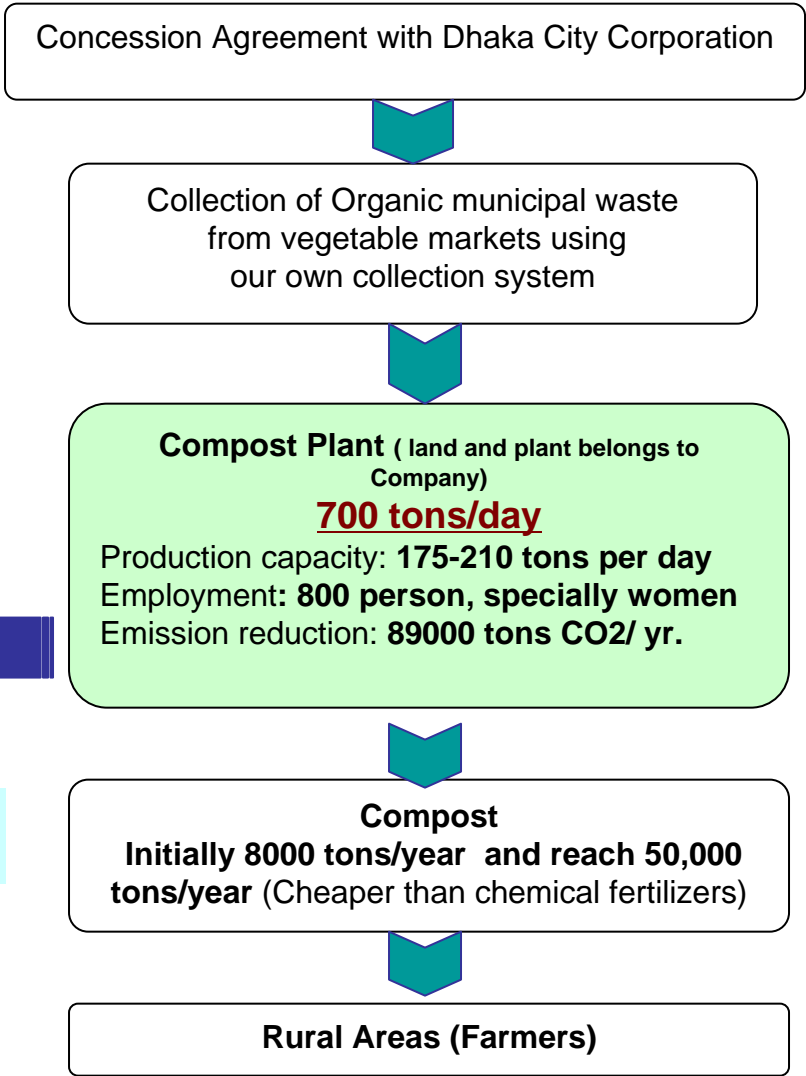
How the CDM project is implemented in Dhaka Using 3R Principle



700 tons/day
Saving of waste collection cost for D.C.C for **2,55,500 tons waste/yr**

700 tons/day
Saving **2,81,050 m3 land filling avoided per year**
Saving of disposal cost at dumpsite by avoiding **2,81,050 tons per day.**

No investment from public agency in this project



How 3R Can Help the Poor



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

Potential of Scaling-up Waste Sector CDM Projects Using Programmatic Approach

15,000 tons/ day

Total urban waste generation in Bangladesh is estimated

70% of this waste is organic

10,500 tons/ day

If 30% of this waste is recycled

3,150 tons/ day

This type of project will have both mitigation and adaptation co-benefits.

402,000 tons CO₂e/Yr.
Emission reduction potential



236,250 tons/Yr.
Organic Manure



3600 nos.
new Jobs for the poor



Mitigation-Adaptation Loop

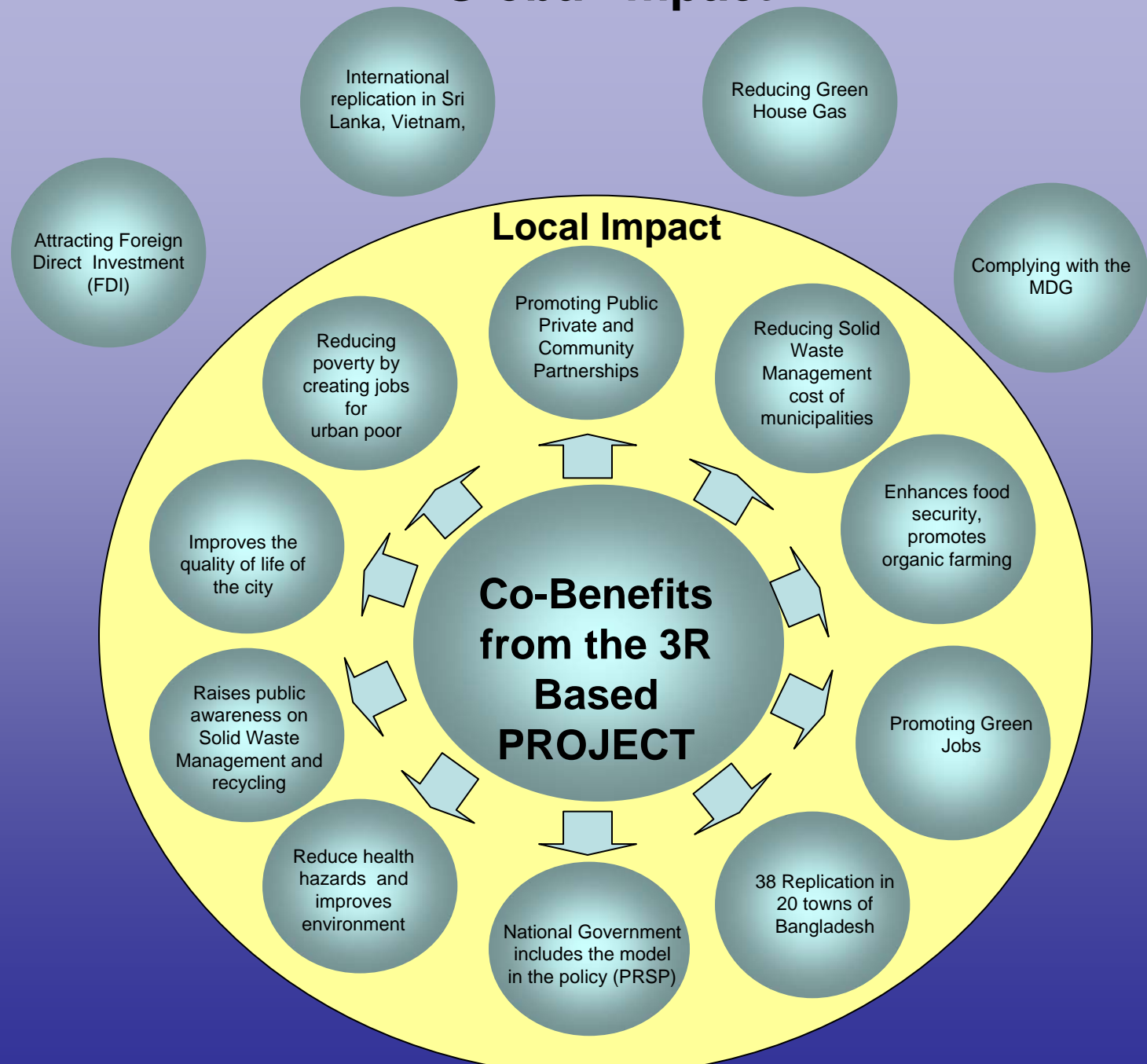
Mitigation



Adaptation



Global Impact



Way Forward

- ✓ Developing countries will positively gain from 3R initiative
- ✓ Clear-cut policy package, incentives, guidelines needs to be promoted for 3R in most of the developing countries.
- ✓ Appropriate Technology are expensive, which should be subsidized by rich developed countries (for example technology transfer in CDM projects).
- ✓ Easy financial support should be promoted by bank/ financial organizations and incentives should be extended to 3R projects.
- ✓ Capacity building training programs and research on 3R required for both public and private sector
- ✓ Role of Media needs be promoted to inform people and raise mass awareness on 3R.
- ✓ Public-Private-Community Partnership needs to be promoted to bring in investment in 3R projects.
- ✓ Informal sector should to be given special attention in 3R initiatives.

Thank You