
Decentralized Approach to Waste Management and Composting for Climate/co-benefits: Case of Bangladesh

Plenary Session 2: Best Practice, Innovative Approaches and Public-Private-Partnership (PPP) in Waste Management

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International Consultative Meeting on Expanding Waste Management Service in Developing Countries

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web: www.wasteconcern.org



Presentation Outline

1. **Waste Challenge in Bangladesh?**
2. **Different Scale of Waste Concern's Composting Model**
3. **CDM Opportunity**
4. **Challenges Faced**
5. **Large Scale Compost Plant at Bulta, Narayanganj**
6. **Growth Over Time**
7. **Recent Impact of 3Rs Initiative**
8. **Way Forward**

Waste Challenge in Bangladesh?

GENERATION OF WASTE IS RAPIDLY INCREASING

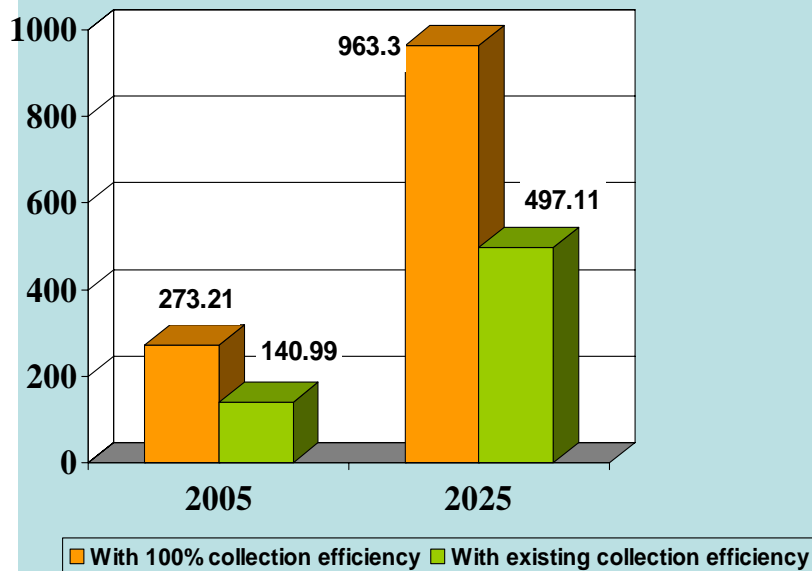
Bangladesh Example

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

Waste Challenge in Bangladesh?

- Waste management is mainly **focused with end-of-pipe solution** which is based on collection, transportation and Disposal
- Collection service level remain low with only **50%-70%** of resident receiving service.
- **Major Portion (>70% organic) is organic** and waste is not segregated at source.
- **Land is scarce and expensive in Bangladesh**



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



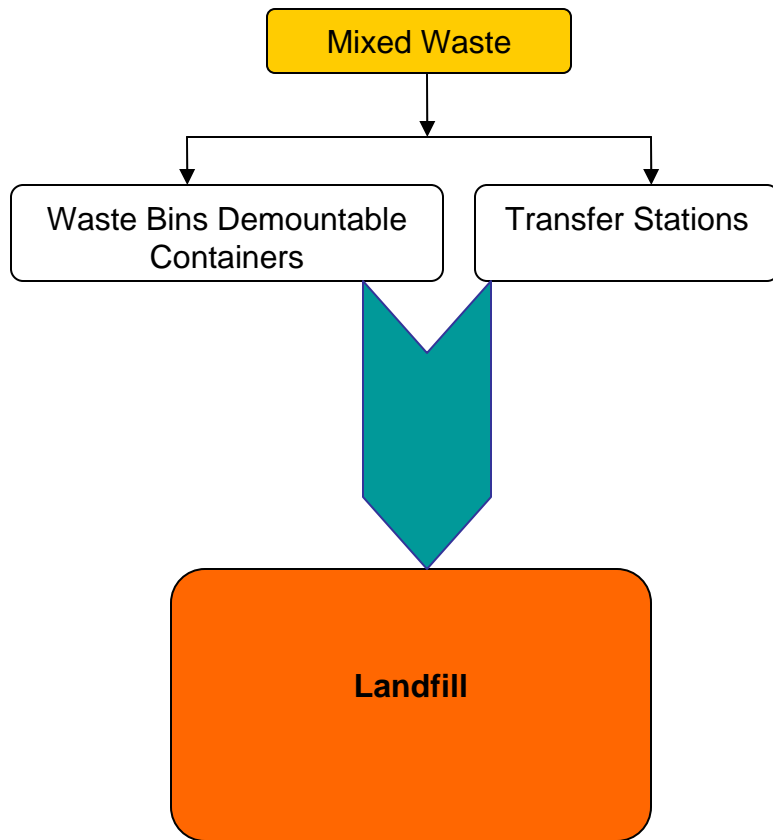
New Types of Waste Emerging in the Waste Stream



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 Bangladesh

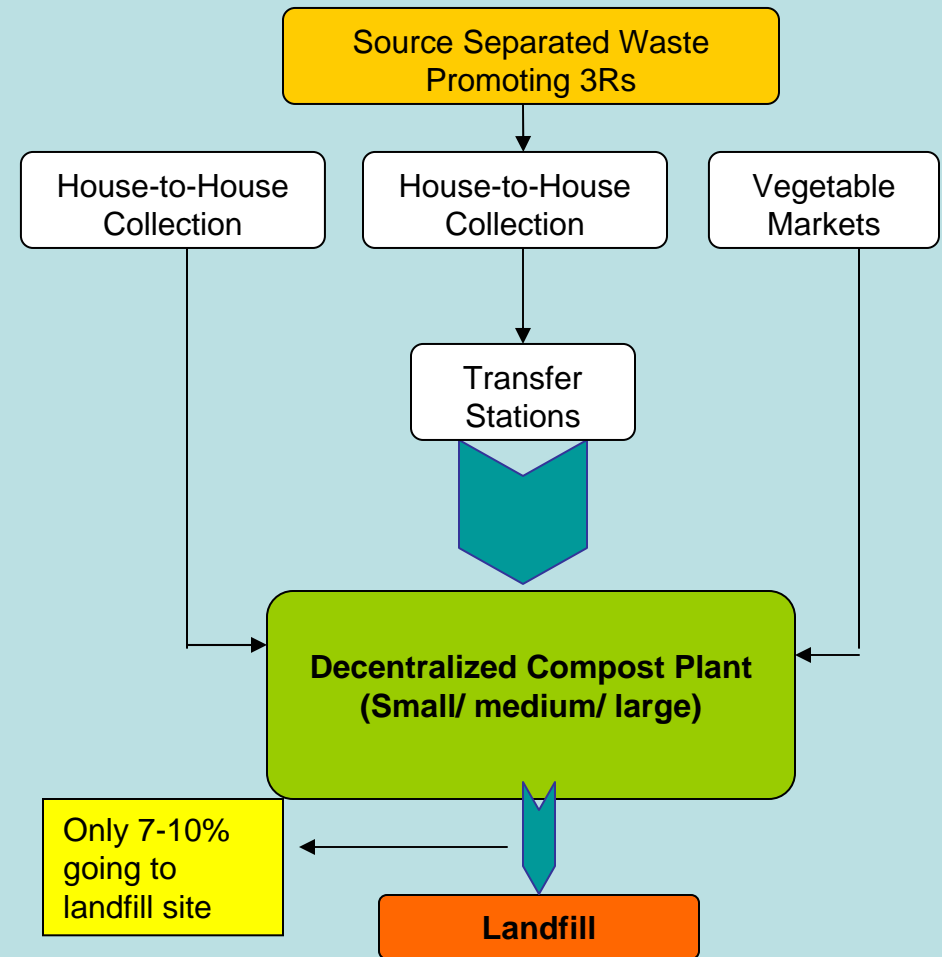
Approach of Waste Concern

Present Situation



PROBLEMS

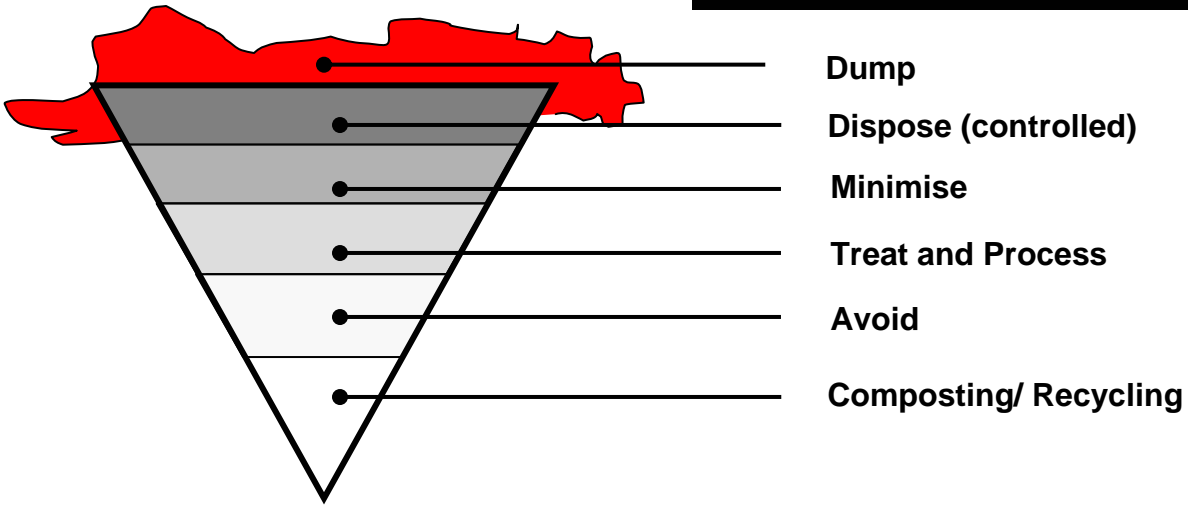
- ✓Water Pollution
- ✓Spread of Disease Vectors
- ✓Green House Gas Emission
- ✓Odor Pollution
- ✓More Land Required for Landfill



OPORTUNITIES

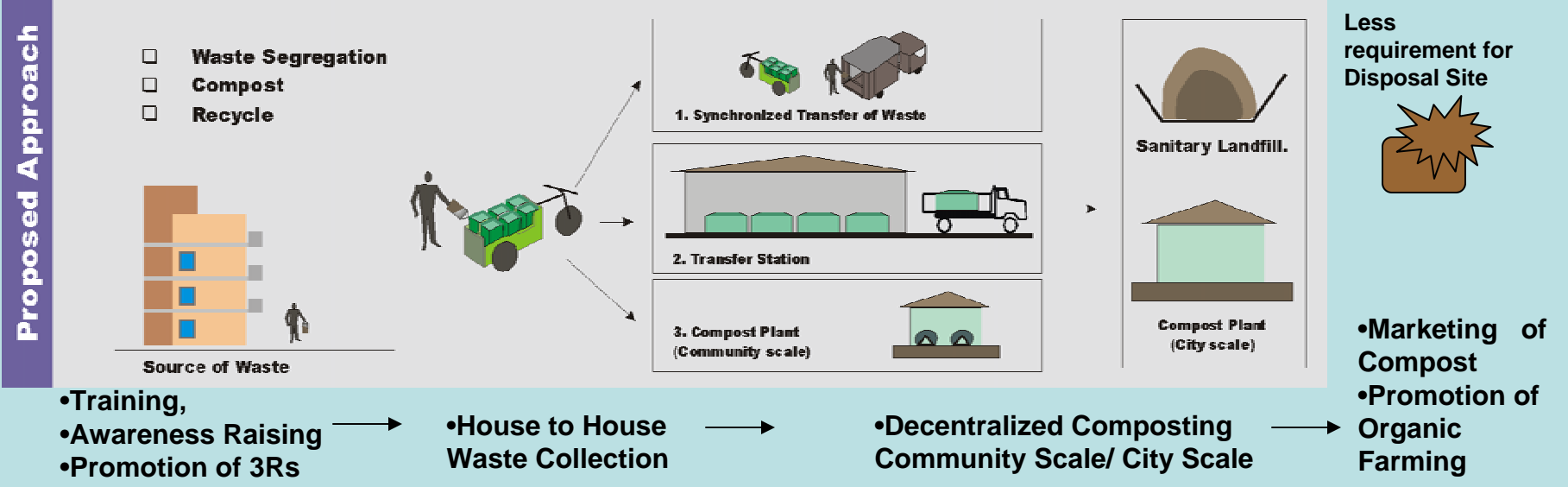
- ✓Producing Compost and Improving Recycling
- ✓Reducing Green House Gas & Harnessing Carbon Trading
- ✓Reducing Cost of SWM
- ✓Creating Jobs for the Poor
- ✓Improving Health and Environment
- ✓Improving Soil Condition

Waste Concern's Approach

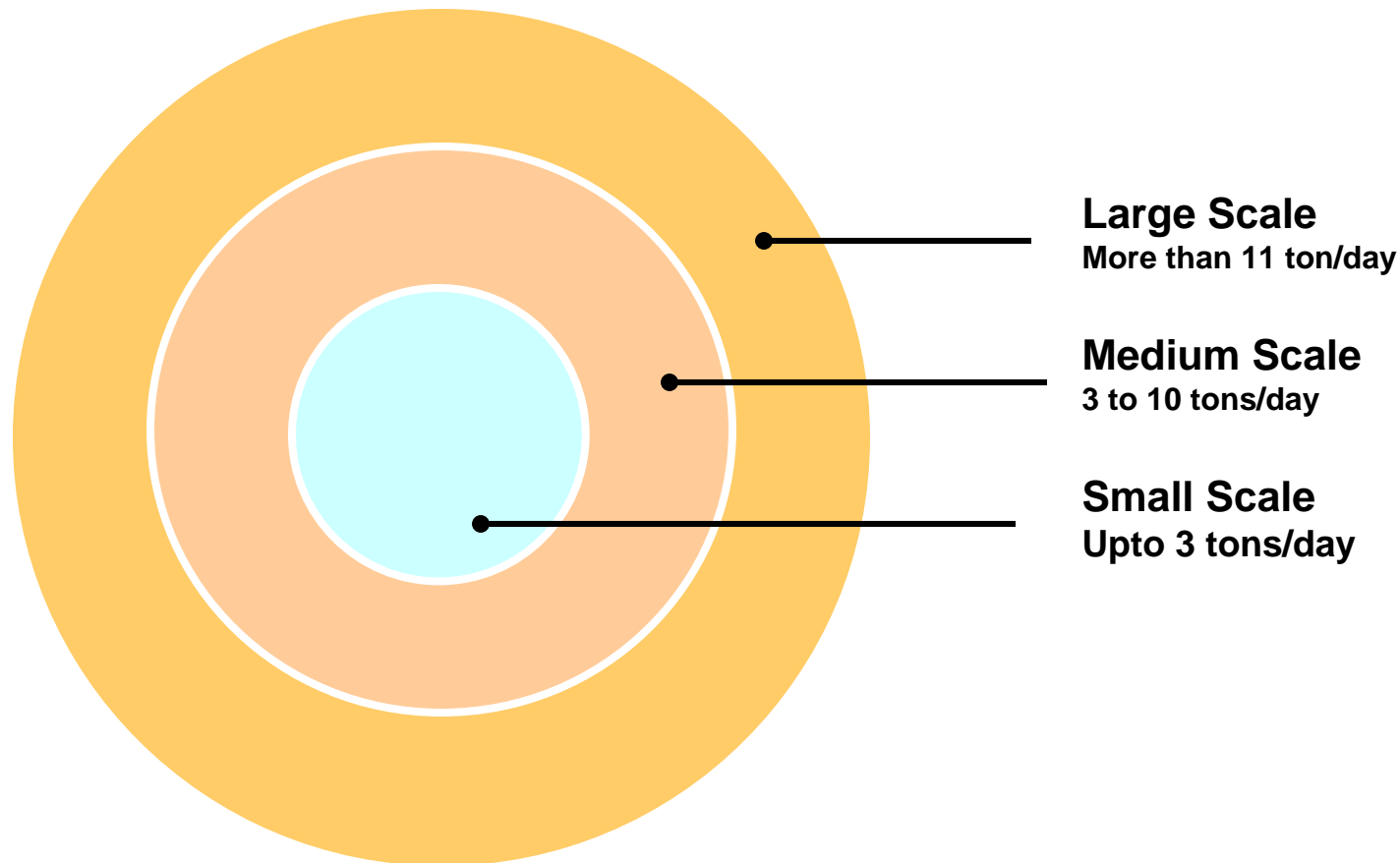


The Waste Management Hierarchy (Present Situation)

Approach of Waste Concern Based on 3R Principle



Different Scale of Waste Concern's Composting Model



The flexibility of Waste Concern's composting model is such that it can be adapted to any situation both in urban and rural areas. Moreover, it can be implemented in slum areas. It can be implemented on a small scale, medium scale, or large scale. The small scale model allows for 3 tons of organic waste to be processed daily, while the medium scale model permits processing 3 to 10 tons of organic waste per day. More than 11 tons of organic waste can be processed daily using the large scale model.

Besides reducing green house gas emissions, each of these models also generate valuable carbon credits on the international market.

Compost Plants for Urban & Rural Areas (Small Scale)



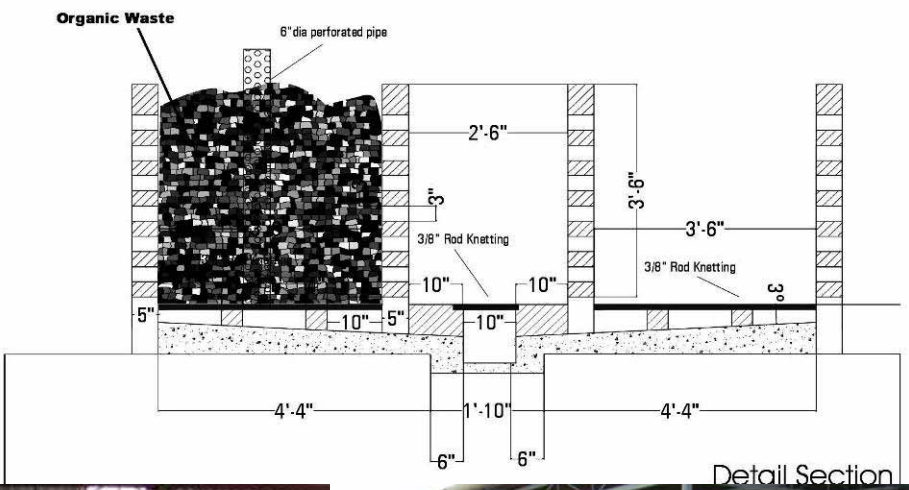
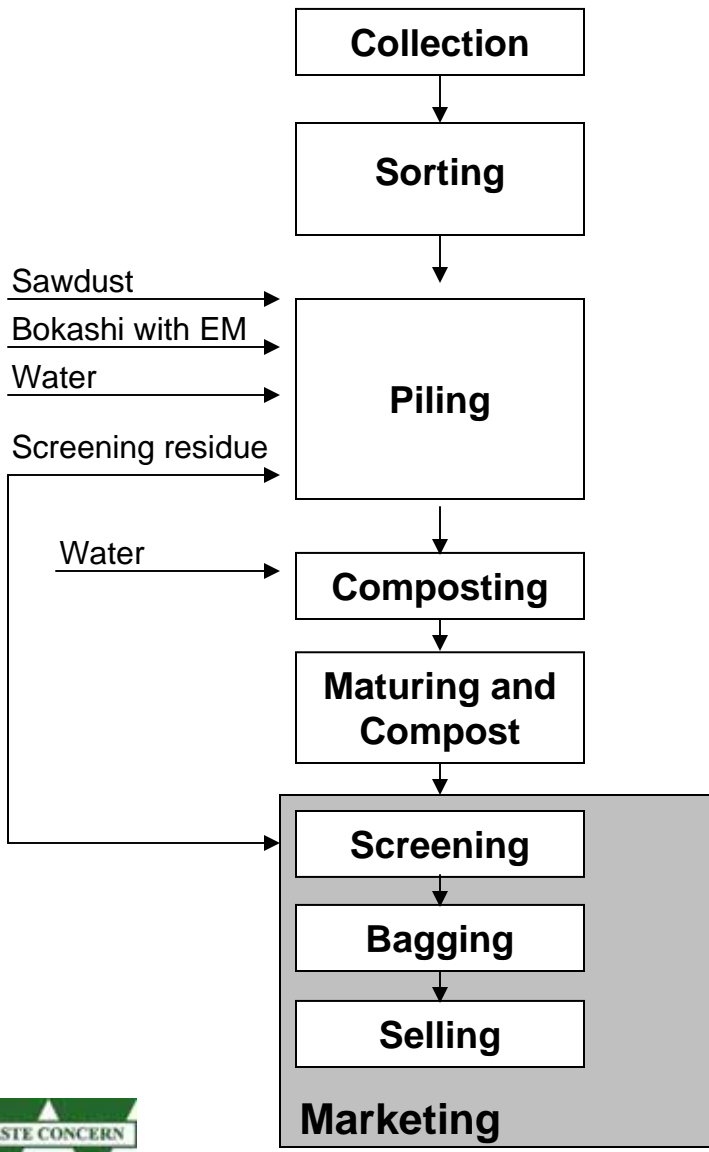
Box Type Composting System in Rural Areas



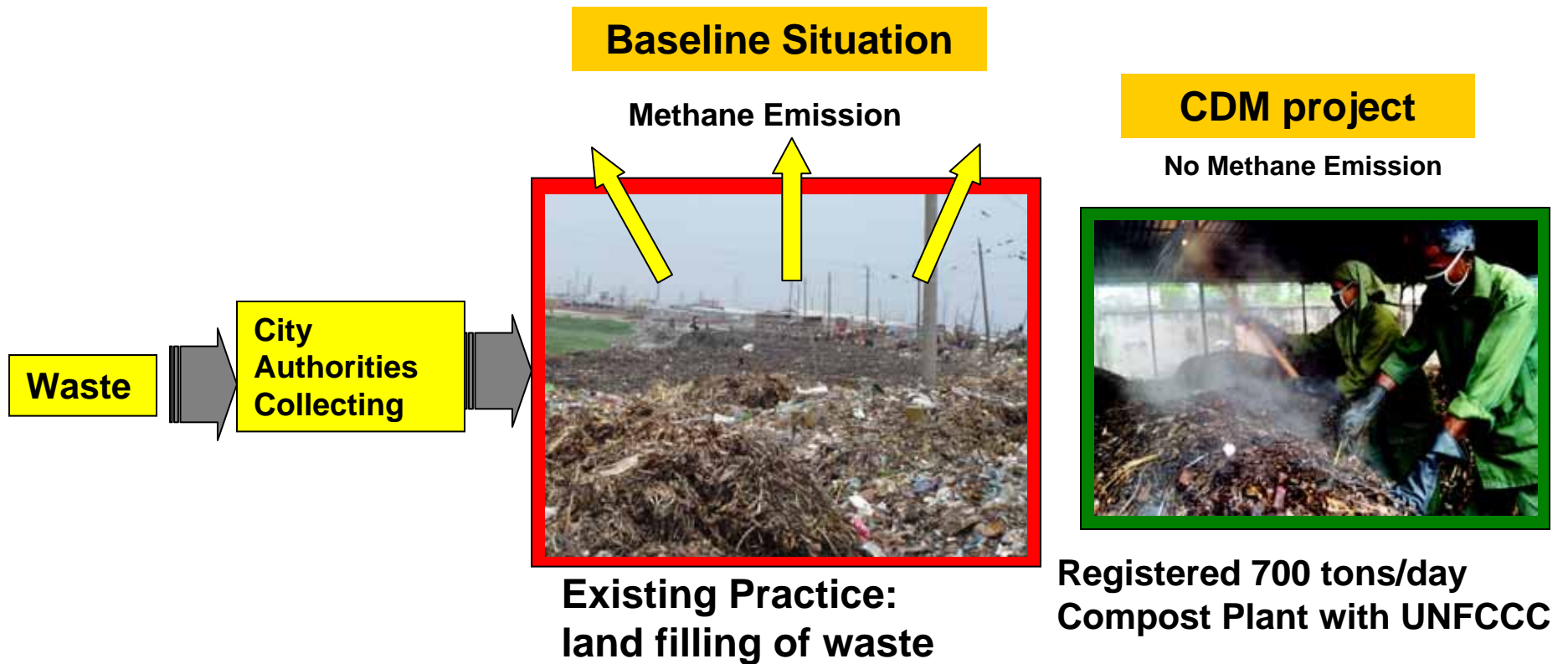
Barrel Type Composting System



Box Method Composting for Small Towns (Small & Medium Scale)



Decentralized Approach of Composting **Using Carbon Credits**



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

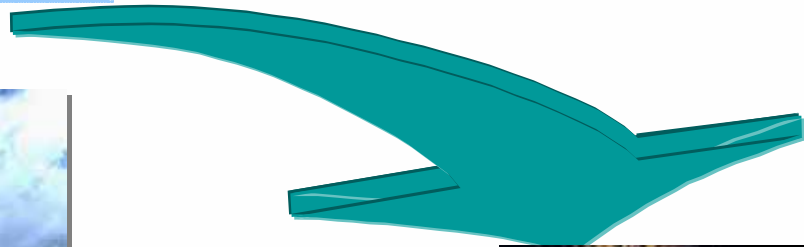


Project based carbon trading (CER/VER) between industrialized and developing countries

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: Dhaka experience CDM



UNFCCC/CCNUCC



CDM – Executive Board

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 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

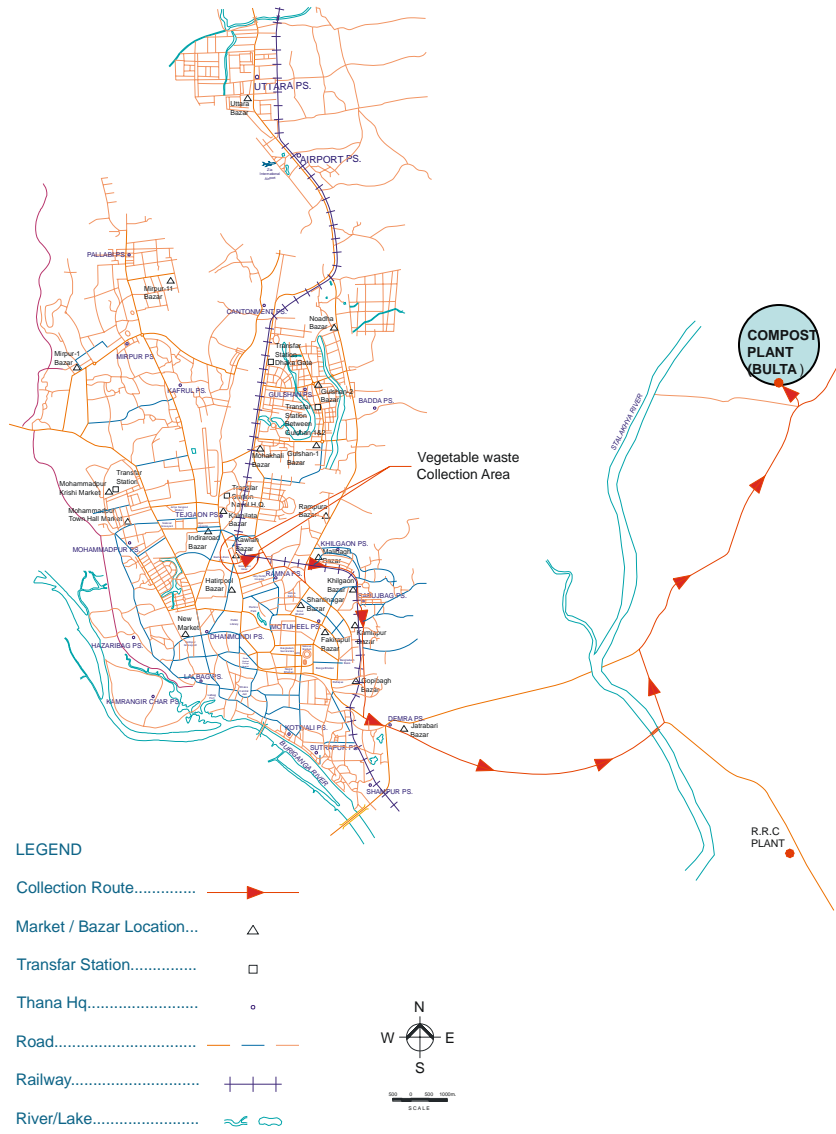
Large Scale Compost Plant at Bulta, Narayanganj



**130 Tons/day Capacity Compost Plant (first phase)
at Dhaka of Waste Concern established in November 2008**

Large Scale Compost Plant Located in Bulta, Narayanganj

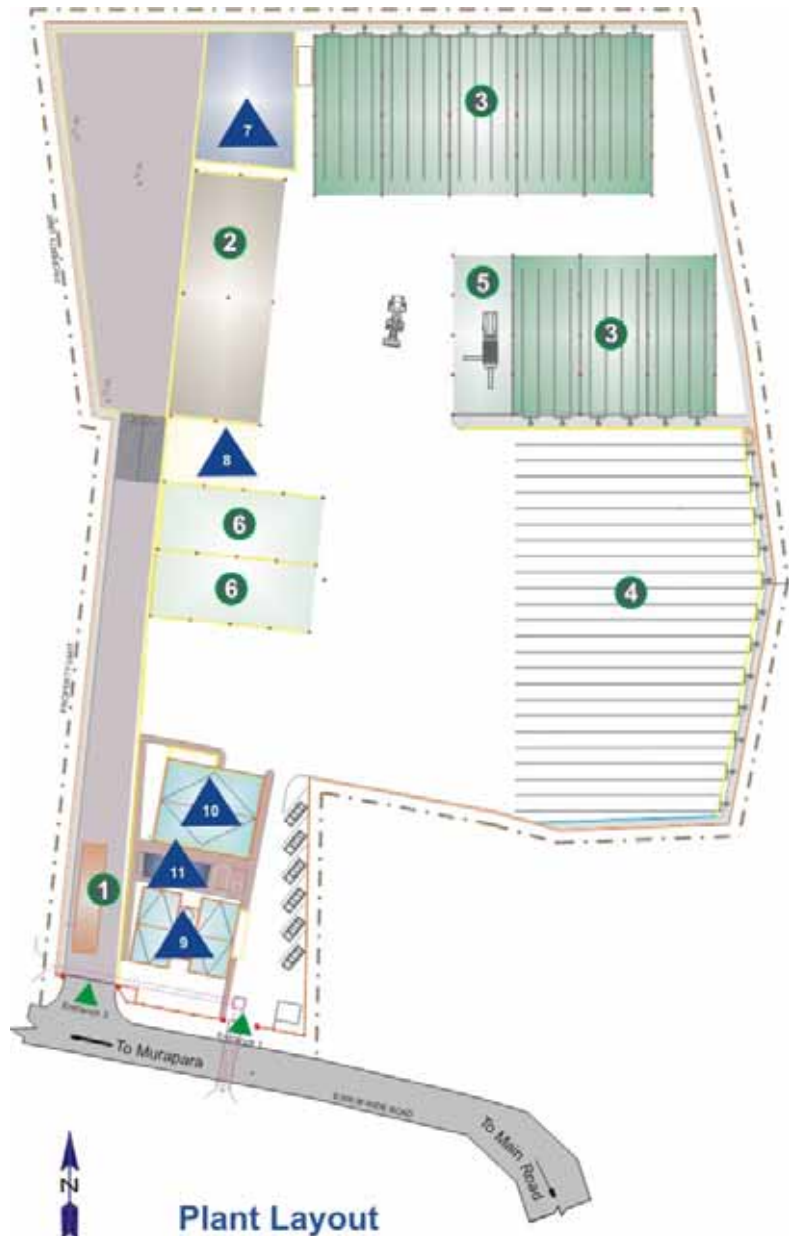
Collection Route of Vegetable Waste from Kawran Bazar to Compost Plant



Plant layout

LEGEND

- ① Weigh Bridge
- ② Reception, Sorting & Pre-treatment Area
- ③ Pre-Composting Area
- ④ Maturing Area
- ⑤ Screening Area
- ⑥ Compost Storage
- ▲ Leachate Water Storage Pond
- ▲ Structural Material Storage
- ▲ Building 01: Administration & conference
- ▲ Building 02: Cafeteria, Day care & washing facilities
- ▲ Harvested Rain Water Reservoir



Plant Layout

Basic Information of the Plant

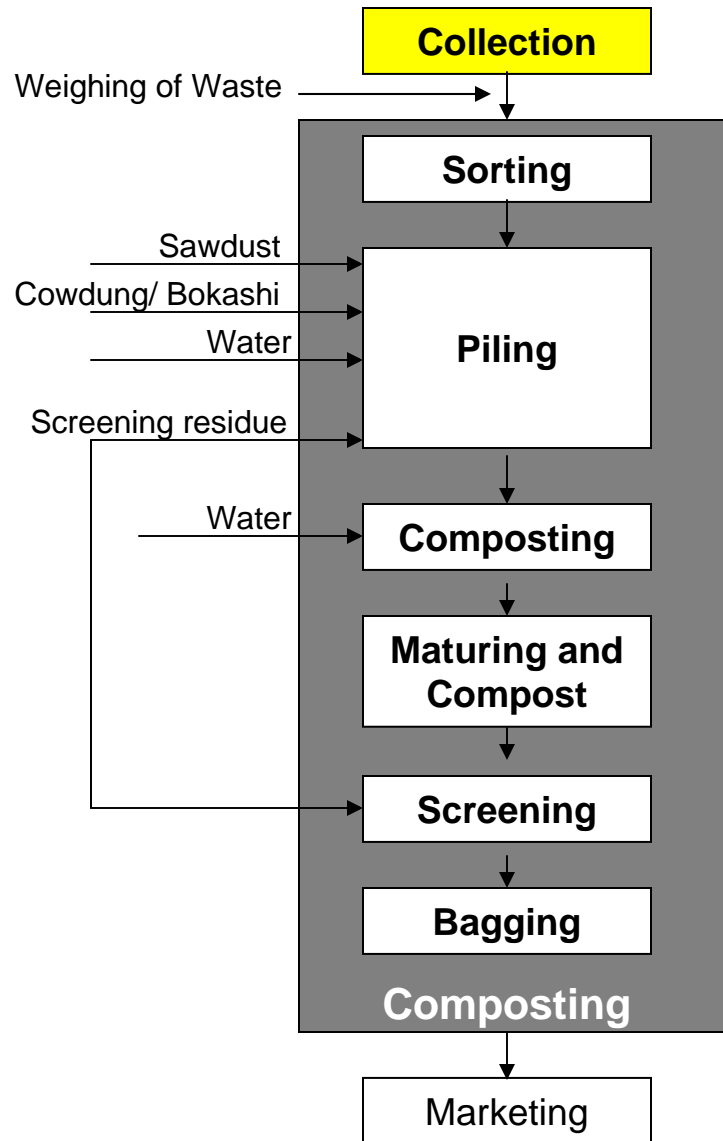
Basic information:

- Total plant area: 14744 sq. M.(11.015 bighas)
- Employment creation: 90 persons
- Organic waste recycled: 130 tons/day
- Production capacity: 32-39 tons/day
- GHG emission reduction: 15600 tons CO₂e/yr.
- Land filling avoided: 52195 m³/yr.

Special Features:

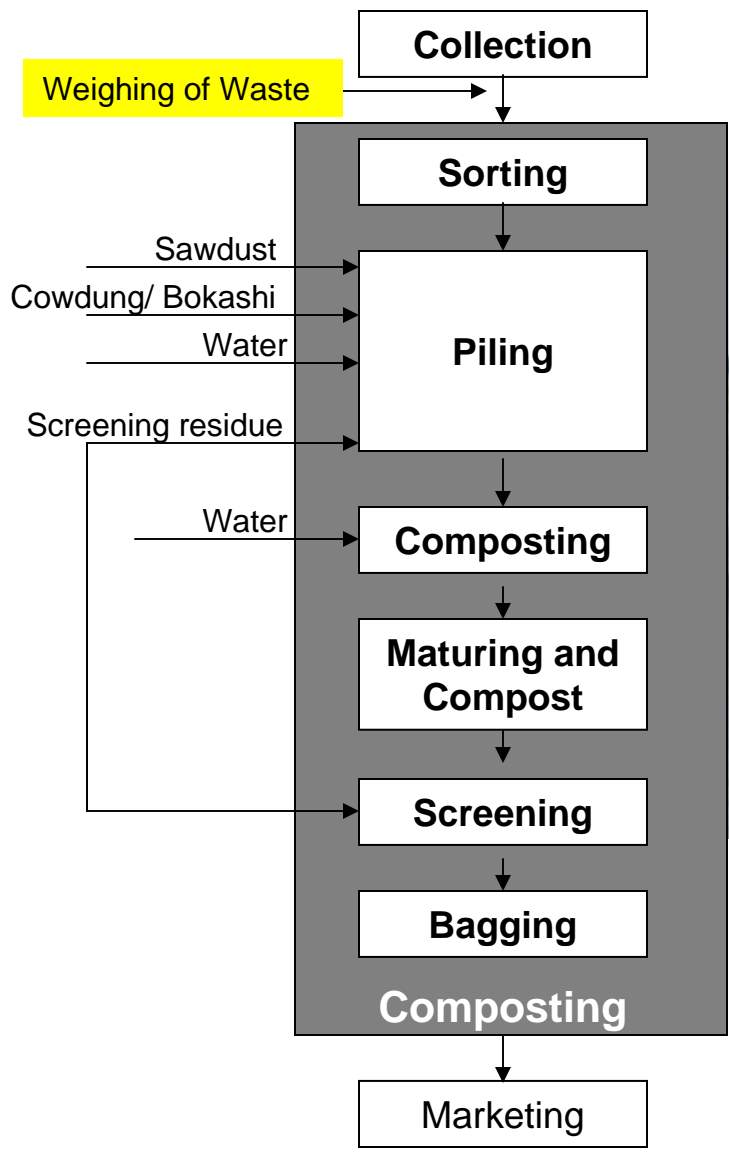
- 100% on-site waste water recycling
- Rain water harvesting from total roof and hard surface area
- Day care center for female staff
- Free meal for the workers
- Health insurance for the workers

Different Steps of Composting Process



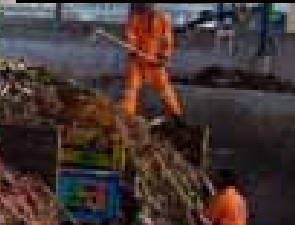
Collection

Parameters to be Monitored **During Implementation**



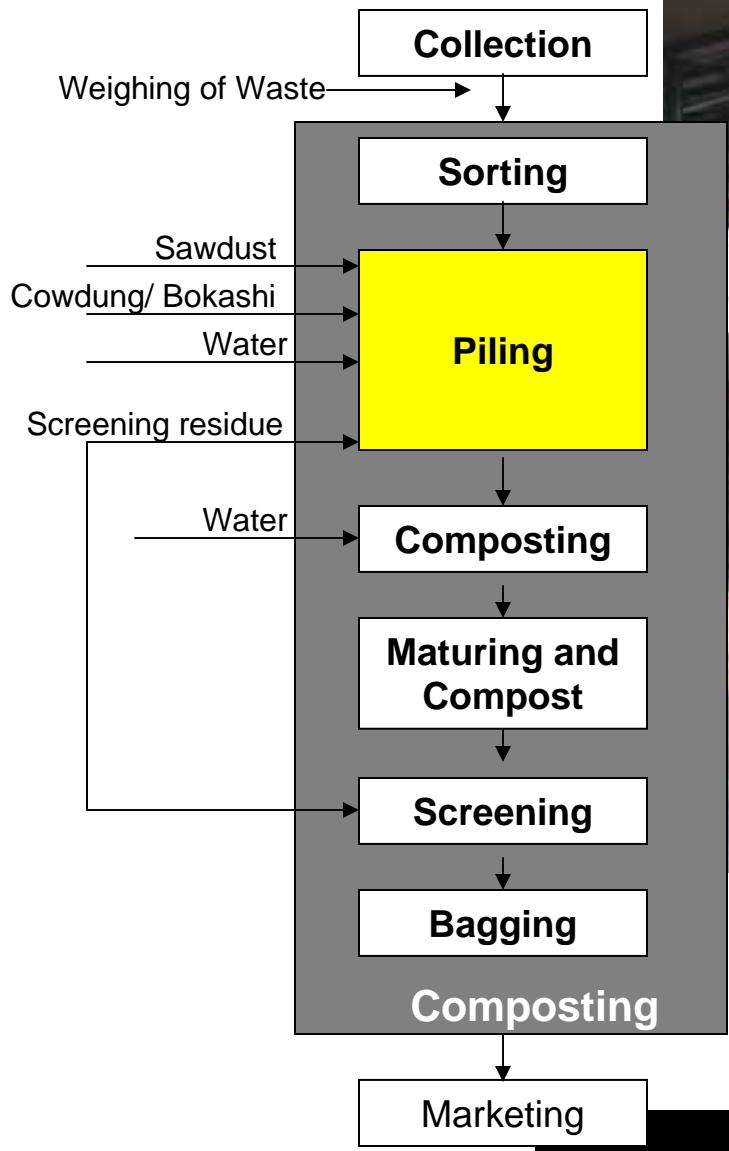
Weighing of Waste Input

Parameters to be Monitored **During Implementation**



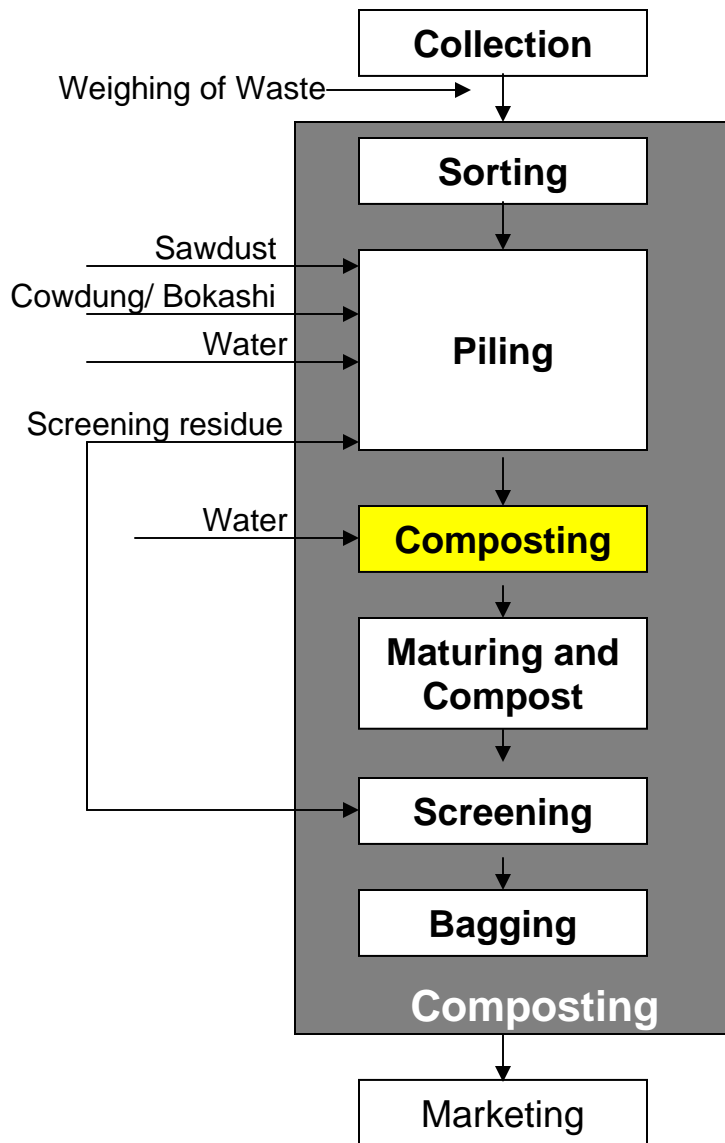
Unloading of Incoming Waste and Preliminary Sorting

Parameters to be Monitored **During Implementation**



Piling of Waste in the Pre-composting Box

Parameters to be Monitored **During Implementation**



Moisture Control
Reuse of leachate water

Parameters to be Monitored **During Implementation**



Temperature Control



Process Quality Control



Regular Oxygen Monitoring

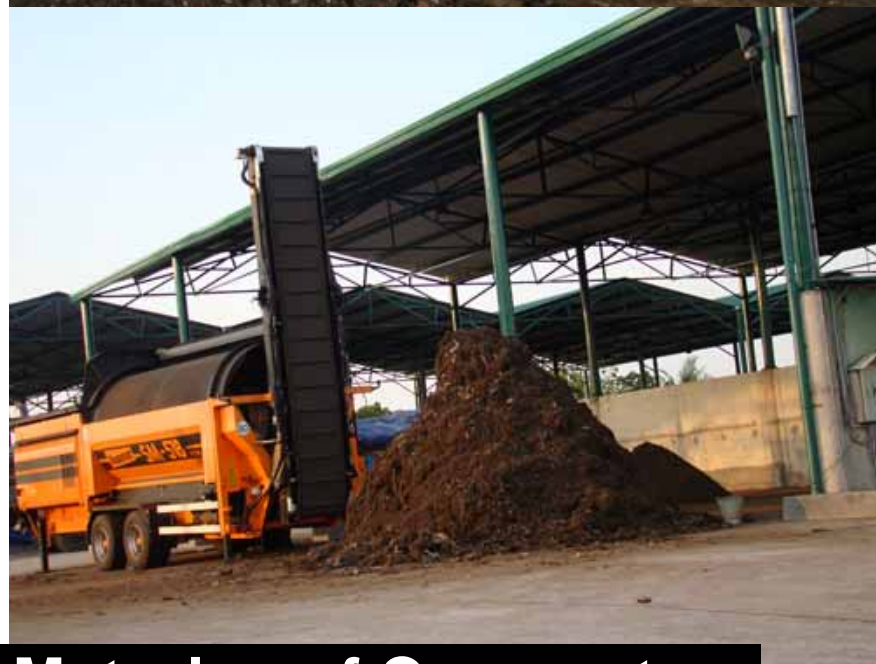
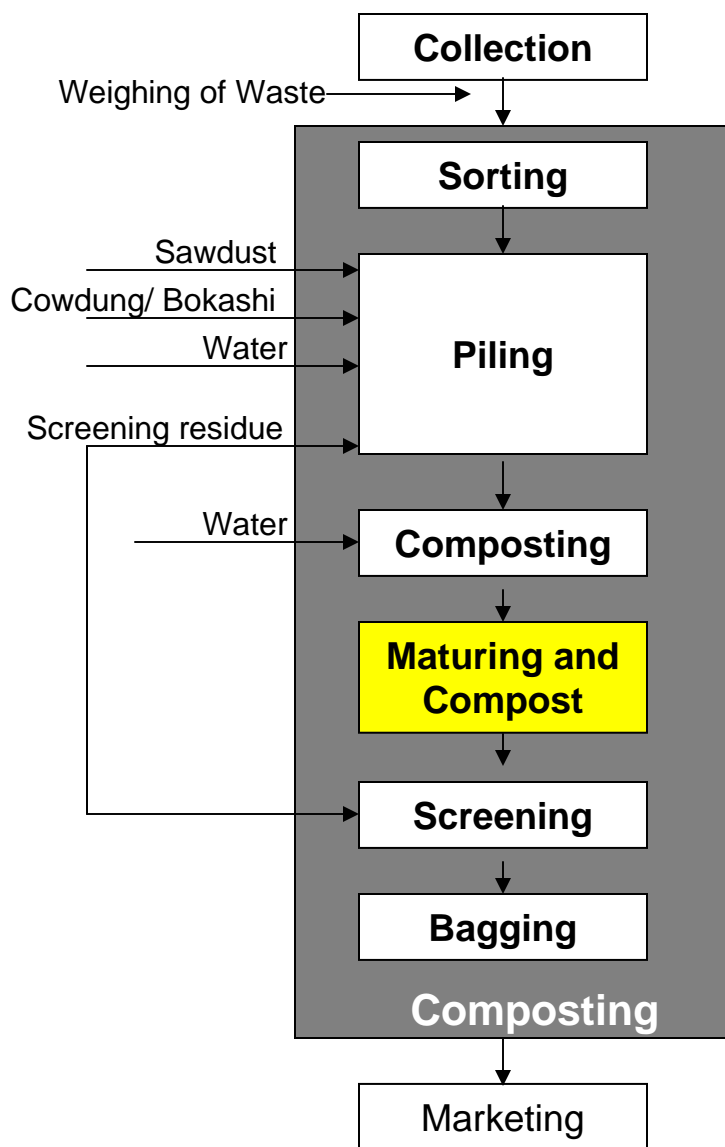


Process Quality Control



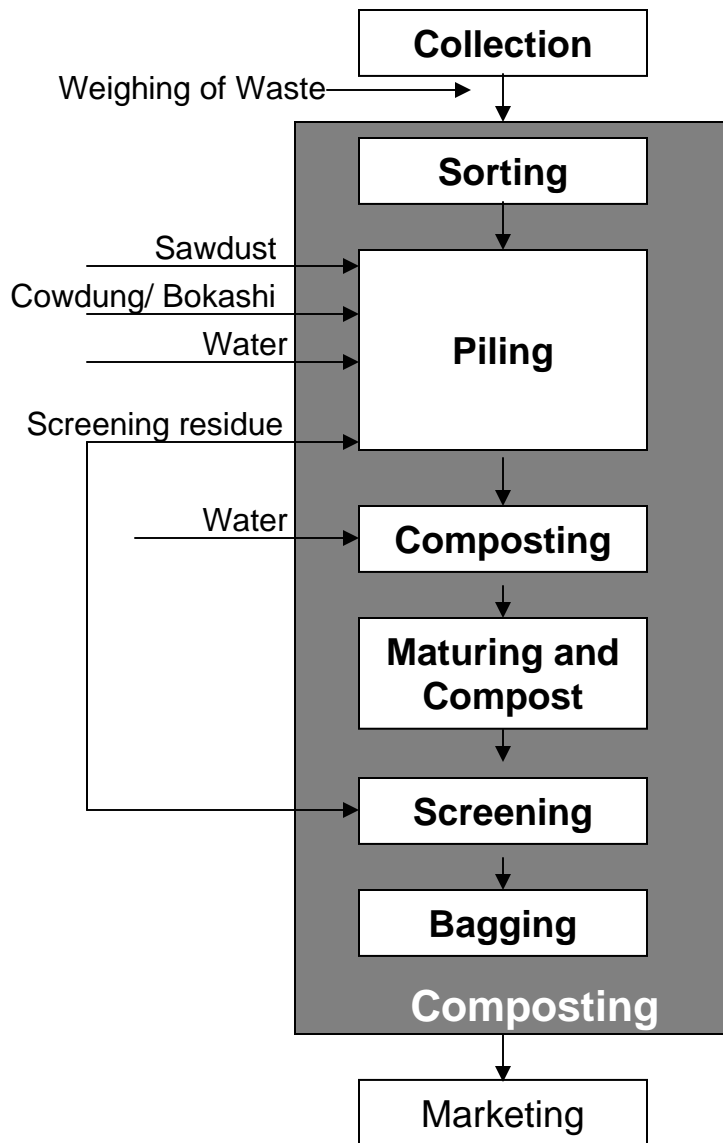
Forced Aeration by Blowers to Provide Oxygen in the Compost Pile

Different Steps of Composting Process



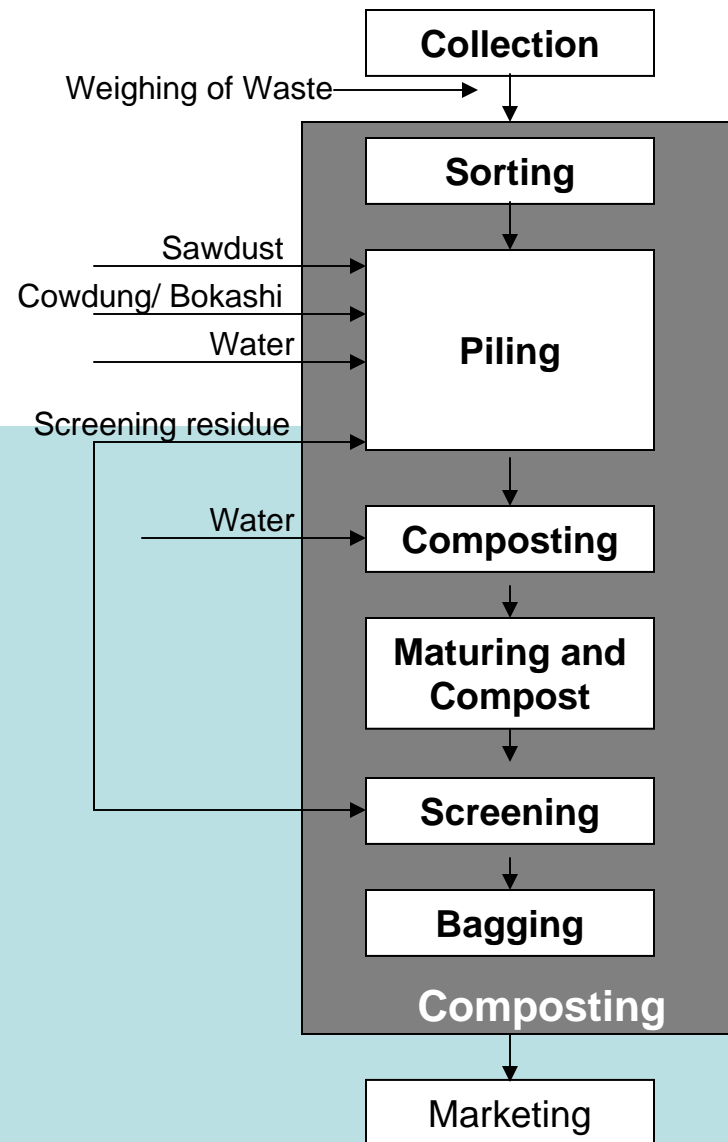
Maturing of Compost

Different Steps of Composting Process



Screening of Compost

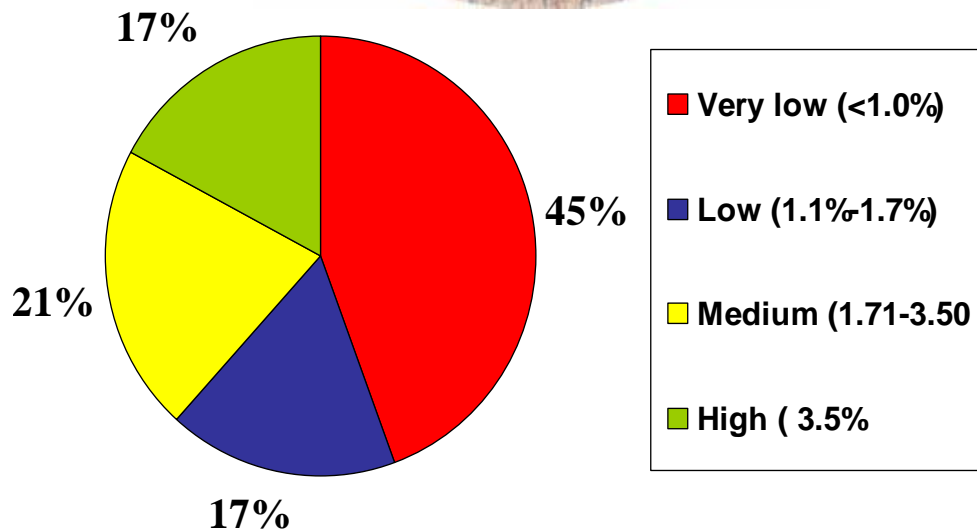
Compost Produced from Organic Waste



From 1 (one) Ton of Organic Waste Quarter ton of compost harvested

SOIL CONDITION AND **IMPACT OF COMPOST**

83% of cultivable land in Bangladesh has less than 3.5% organic matter (more than 3.5% is considered to be good soil)



Pie Diagram Showing Depletion of Organic Matter From the Soil of Bangladesh



FIELD TRIAL EXPERIENCE

Reduces the use of chemical fertilizer 25-30
increased yield 30%

Quality Control

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**

F:\FERTILIZER\26 th meeting\Analytical Result (Edited).doc



Quality Control Laboratory

Improved Working Condition



Informal sector working in unsafe working condition



Informal Sector Given Better working Environment

How Carbon Credit Can Help the Poor?



Input

➤ Collection

(Organic Waste From Markets and Residential Areas Free of Cost)

- Saving Municipal 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/ year)

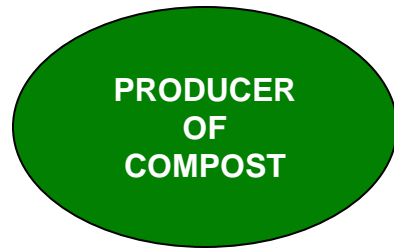
- Producing environment friendly product

Pro-poor element

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

MARKETING OF COMPOST

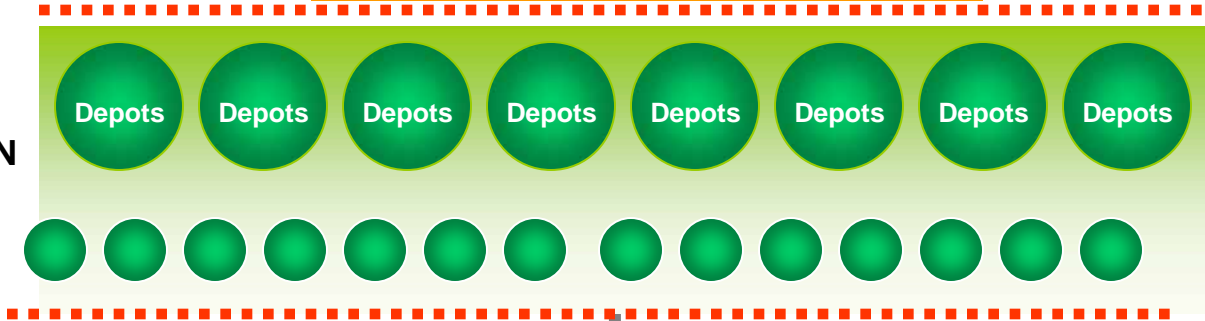
Compost Produced in
Decentralized Composting
Plants and other towns
(8mm 40kg bag @ Tk.6kg)
Factory Gate Price



MARKETED BY ACI Fertilizer

Retail Price
(8mm 40kg bag @ Tk.10kg)

DISTRIBUTION CHANNEL



Dealers/ retailers
under distributors



FARMERS AT RURAL AREAS

US\$ 1= Tk 69

Marketing Strategy

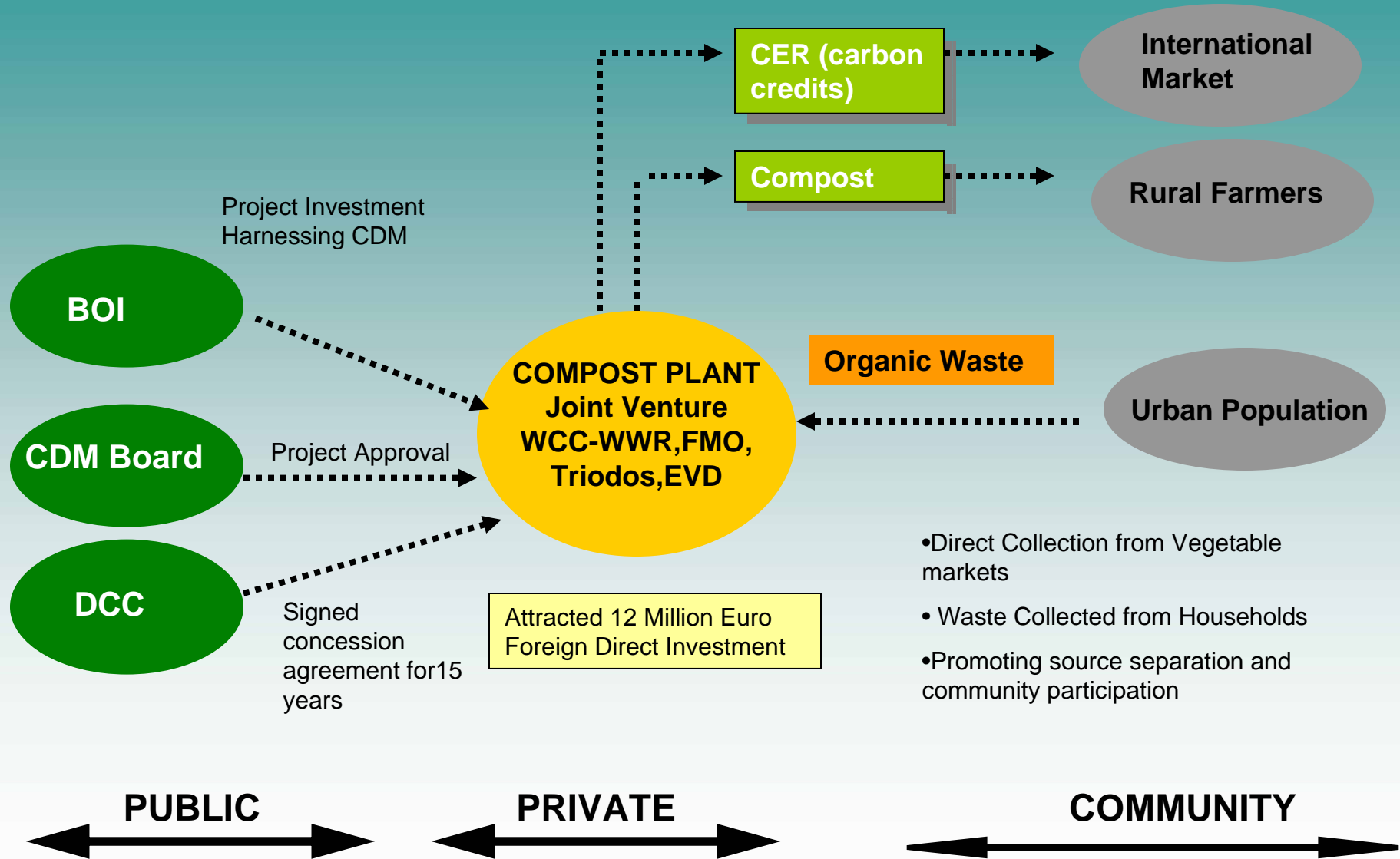
- ✓ **Survey on Compost Use and Demand**
- ✓ **Develop a Marketing Strategy**
- ✓ **Quality Control and Compliance with Standard**
- ✓ **Field Trial**
- ✓ **Establish Experienced Specialized Fertilizer Marketing Company**

Large Scale Compost Plant

Financial Aspect

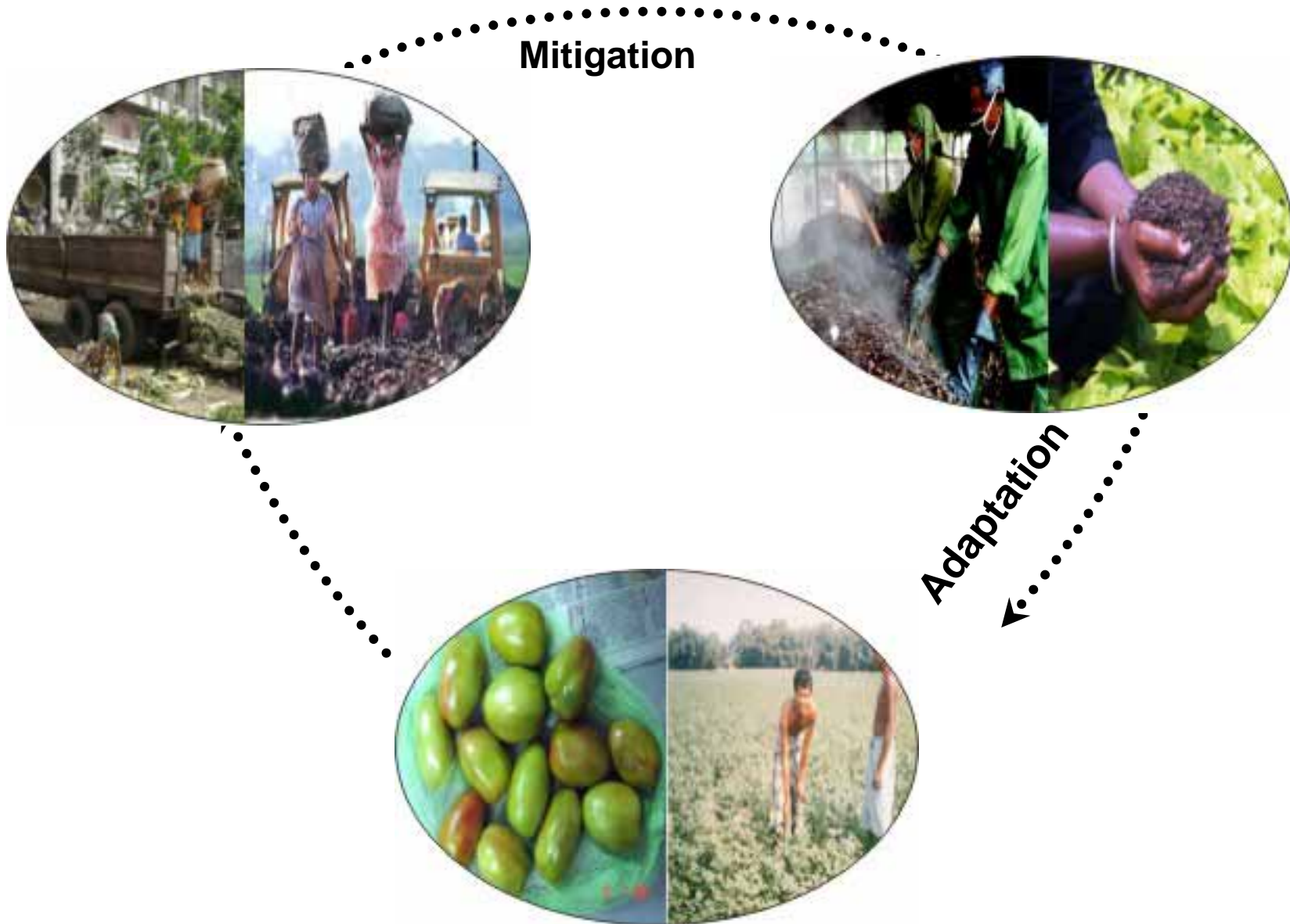
- **130 tons/day capacity compost plant at Bulta**
- **Investment= 2.5 million euro** (land, construction, machinery and upfront investment for PDD preparation and validation and registration)
- **Operation cost = 0.325 million euro/year**
- **Compost production capacity = 9000-10,000 tons/year**
- **Selling Price of Compost = 6000 taka/per or 60 euro per/ton**
- **Income from sale of compost= 0.54 million euro- 0.6 million euro**
- **CERs= 14000 tons/year**
- **Income from sale of CERs $14000 * 13 \text{ euro/ton} = 0.19 \text{ million euro}$**
- **Total income= 0.73 million euro/ton**
- **Carbon credits= 27% of the total income**

PPP Model



BOI-Board of Investment; DCC-Dhaka City Corporation

Mitigation-Adaptation Loop



Global Impact

Attracting
Foreign
Direct
Investment
(FDI)

Reducing
Green House
Gas

Complying
with the MDG

Local Impact

Reduces
consumption
of energy
and raw
materials

Reducing
poverty

Promoting
Partnerships

Reduce health
hazards

Reducing
Solid Waste
Management
cost of

improves
environment

Co-Benefit
OF 3R
Based
PROJECT

Enhances
food
security

Growth Over Time and Barrier Faced

- Lack of technology
- Lack of finance
- Lack of awareness
- Lack of partnership

- Land for composting provided by Government
- Policy change
- Majority Grant from GoB & External Agencies for Piloting and some private investments

Land and waste collection by private sector
 Waste Concern Signs Concession Agreement with DCC to Manage Waste up to 700 tons/day

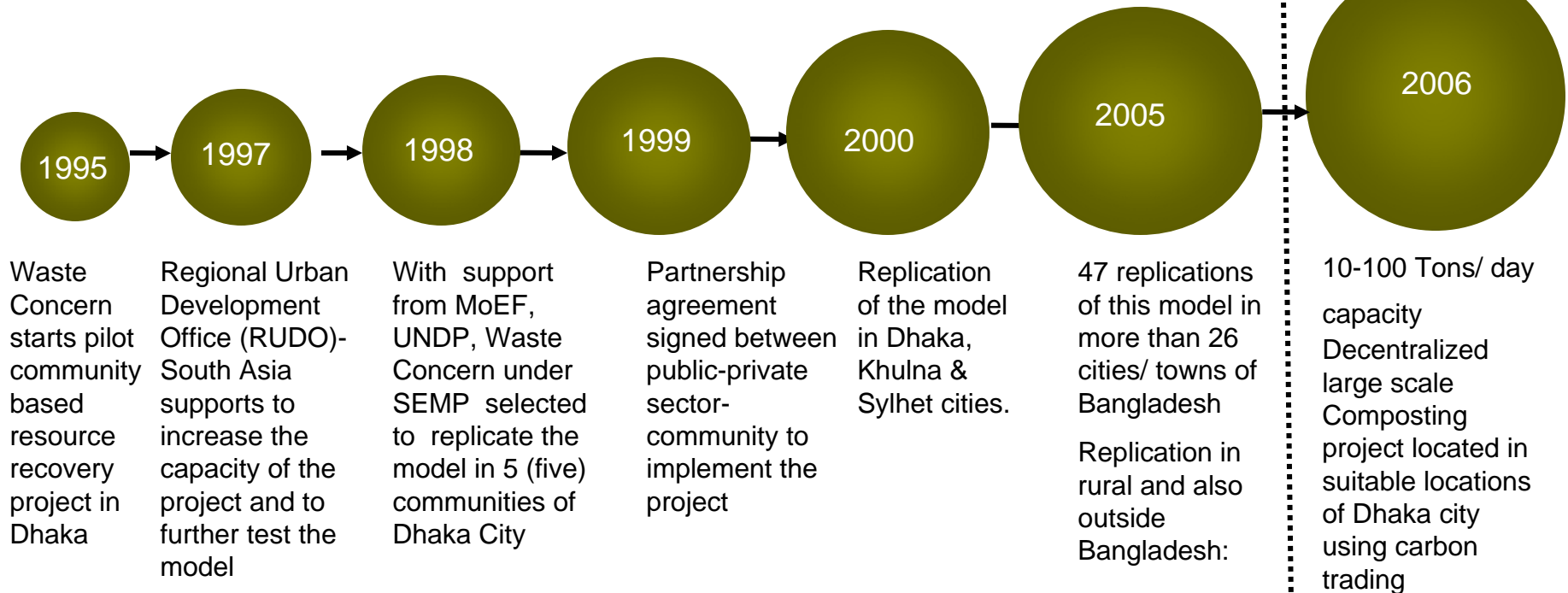
small and medium scale

Demonstration

Partnership

Replication

Scaling-up



Global Replication of **Waste Concern's Model**



The Objective of the Project

To enable participating local governments, civil society organizations and organizations of the poor to develop and implement town-wide solid waste management strategies that are decentralized, pro-poor, low carbon and finance able through the sale of carbon credits.

Project Area: 10 cities of Asia Pacific (Phase 1)) and 10 cities of Africa (Phase 2))

Partners: ESCAP and Waste Concern, with funding from the Bill and Melinda Gates Foundation.

Duration: 2009-2012 (Phase 1)



Pro-poor and Sustainable Solid Waste Management in **Secondary Cities and Small Towns**

A three day long exposure workshop under the project, was organized by Waste Concern in partnership with ESCAP, Bill and Melinda Gates Foundation and UNDP, Bangladesh Office in Dhaka during February 22-24, 2010. The project is based on an earlier project that ESCAP and Waste Concern undertook from 2004 to 2007 in Sri Lanka and Viet Nam. More than 60 international participants from Bhutan, Cambodia, India, Indonesia, Pakistan, Maldives, Philippines, Sri Lanka, Vietnam, Thailand, Egypt, Ghana, Australia, Japan, USA and France participated in the workshop. They were representing government organizations, non-government organization, private sectors, financing organizations, NGOs, research bodies and universities are participating in this workshop.

Pilot 3R Project in Kushita, Bangladesh



Successfully established a pilot 1.5 tons/day capacity composting plant in Kushtia Municipality in partnership with UNCRD, IGES, Ichinomiya South Lion's Club, DoE-Bangladesh, Kushtia Pourashava and Waste Concern. The project was established in October 1, 2007

Recycling Training Center (RTC), Katchpur, Narayanganj, Dhaka



This training center consists:

TRAINING CENCER: For 30 participants/batch

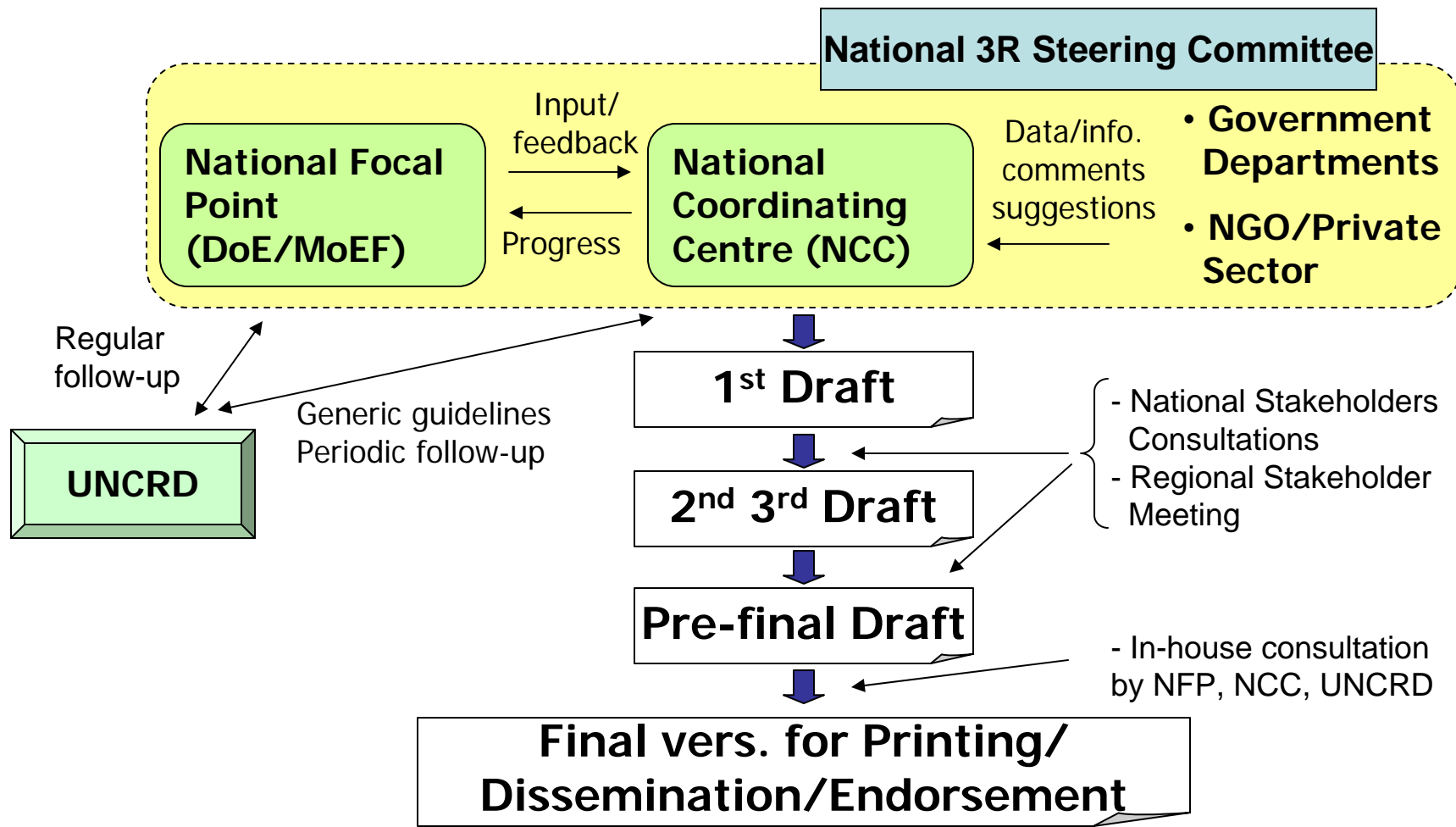
TECHNOLOGY DEMONSTRATION:

- 8 (eight) tons capacity composting plant
- Waste Water Treatment
- Eco-toilet
- Rain water harvesting
- Biogas Plant & Bio Diesel from Cooking Oil
- Training Room Facility
- Compost Enrichment Facility



RTC was established with the support from UNDP under the Sustainable Environment Management Program (SEMP) to Provide Hands on Training on Eco-friendly Initiatives. Later in 2009, Bill and Melinda Gates Foundation and UNESCAP supported RTC under the project 'Pro-poor and Sustainable Solid Waste Management in Secondary Cities and Small Towns'.

Bangladesh National 3R Strategy Formulation: Participatory & Consultative Process



Recent Impact of 3Rs Initiative

National Coordinating Centre (NCC)

National 3Rs Strategy (2nd Draft)

Impact in 2010

Draft National Solid Waste Management Handling Rule (being finalized)

Implementation of 3Rs (Reduce, Reuse and Recycling) Pilot Initiative in Dhaka and Chittagong Cities to Reduce Green House Gas Emission (Phase 1)

Programmatic CDM using organic Wastes of Urban Centres (Phourashava/ Municipalities) throughout Bangladesh (in 64 Districts): Pilot Phase Fund: Government used its Climate Change Fund

UNICEF initiated the replication of Waste Concern's Composting Model and Promoting 3Rs in 19 towns of Bangladesh based on the Action Plan

Way Forward

- ✓ 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.
- ✓ Lengthy CDM Project approval process needs to be simplified. Compost Plant at Bulta needed 53 permissions/approvals before implementation.
- ✓ Capacity building training programs and research on 3R required for both public and private sector
- ✓ 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.
- ✓ Role of Media needs be promoted to inform people and raise mass awareness on 3R.

Thank You