Climate Change Mitigation/ Co-benefits/ CDM

Session 3: Challenges and Opportunities in the 3Rs/ Waste Management in Asia Cutting Issues

Presented by:
A. H. Md. Maqsood Sinha
Waste Concern

Inaugural Meeting of the Regional 3R Forum in Asia
Tokyo, Japan
November 11-12, 2009

web: www.wasteconcern.org
Presentation Outline

1. 3R Challenge in Asia?
2. Human Response to Climate Change
3. Linkages Between 3R and Climate Change Mitigation and CDM
4. Potential Sectors
5. Experience in Waste Sector
6. Co-benefits of 3R
7. Way Forward
Human activities create waste, which is posing risks to the environment and to public health, if not managed properly....

Most of the Asian cities and towns as a whole are experiencing rapid urbanization, increasing population, industrialization and changing lifestyle and consumption patterns are resulting in the generation of increasing amounts of wastes.

Waste management is mainly focused with end-of-pipe solution which is based on collection, transportation and Disposal.
• In Asian developing countries municipal solid waste management costs consume 20%-50% of municipal revenues and

• Collection service level remain low with only 50%-70% of resident receiving service.

• Land is scarce and expensive for many cities in Asia

### 3R Challenge in Asia?

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 developing countries of Asia.
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.
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)
Open dumping practiced in most of the cities and towns, which is the cheapest and easiest solution for them...
Challenges Faced to Promote 3R

- Waste streams from different sources are frequently mixed;
- City authorities are facing challenges to manage this mixed wastes;
- Lack of policy and regulations favoring 3R practice;
- Less incentives for reduce, reuse and recycling of wastes;
- Mostly unsanitary waste disposal method practiced;
- Lack of proper baseline information;
- Lack of awareness about the health impacts of improper waste disposal;
- Limited technical know how; and
- Limited financial resources;
Climate Change & Kyoto Protocol

**Earth is Getting Warmer!**

Increasing scientific evidence reveals that earth is getting warmer due to rapid increase of Green House Gases. This phenomenon is known as **Global Warming** and changes in the atmosphere is known as **Climate Change**.

**1992**
UNFCCC adopted framework to address Global Climate Change.

**1997**
Kyoto Protocol


The **Kyoto Protocol** to the UNFCCC, has set target for 39 industrialized countries for reducing green house gas emission to 5.2% below 1990 levels by 2008-2012.

web: www.wasteconcern.org
Human Response to Climate Change

ADAPTATION
Adaptation involves developing ways to protect people and places by reducing their vulnerability to climate impacts.

MITIGATION
Mitigation involves attempts to slow the process of global climate change by lowering the level of greenhouse gas emission in the atmosphere.

Linkages Between 3R and Climate Change Mitigation and CDM
Mitigation involves attempts to slow the process of global climate change by lowering the level of greenhouse gas emission in the atmosphere. 3R also promotes energy efficiency and low material consumption as well as waste production. Thus lowering the use of fossil fuel and reducing greenhouse gas emission.
Carbon Market

Compliance Market

CER (under CDM)
(Certified Emission Reduction)

Voluntary Market

VER
(Verified Emission Reduction)

Linkages Between 3R and Climate Change Mitigation and CDM

CER in 2009 is US $20.5 per ton

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Potential projects/activities</th>
</tr>
</thead>
</table>
| Wastes                  | • Composting from municipal organic waste.  
• Landfill gas recovery and use for electricity generation.  
• Waste-to-energy conversion activities (e.g. biogas, biogasification). |
| Energy                  | • Development of renewable energy sources (hydro, solar, wind and biomass).  
• Fuel substitution measures.  
• Improvement in electricity transmission and distribution network.  
• Reduction of leakage in transport, handling and distribution of oil and gas. |
| Buildings (residential, commercial and government) | • Energy-efficient design of buildings including cogeneration.  
• Energy-efficient appliances.  
• Energy conservation measures.  
• Reuse of waste water  
• Use of renewable energy sources. |
| Agriculture             | • Solar and wind pumping  
• Improvement in use of agrochemicals (fertilizers and pesticides).  
• Reduction of energy use for irrigation through efficient pumps and demand-side management.  
• Improvement in cultivation practices to reduce methane emissions. |
| Forests                 | • Afforestation and reforestation. |
| Industry and Manufacturing | • Cogeneration  
• Energy conversion and energy-efficiency measures.  
• Process modifications in order to lower emissions.  
• Change of feedstock in boilers (e.g. oil to gas). |
| Mining                  | • Coal bed methane recovery. |
| Transport               | • Introduction of alternate fuels (dedicated CNG vehicle).  
• Fuel-efficiency measures.  
• Improvement in public transport.  
• Urban planning and traffic management. |
Clean Development Mechanism (CDM) is an important component of the Kyoto Protocol (Article 12).

Clean Development Mechanism known as CDM allows 39 industrialized countries to achieve part of their greenhouse gas emission (GHG) reduction target through investment in projects in developing countries that reduce GHG emission from the atmosphere.

web: www.wasteconcern.org
How Does CDM Works?

CDM allows developing country entrepreneurs and others to get investment fund for doing projects, which reduce Green House Gas.

Two things are important in CDM, namely,

• The project proponent from developing country must prove that the GHG reduction would not have occurred in the absence of the project

• The project must promote sustainable development
There is a flow of finance either up front or annually from developed countries.

In return developing countries will reduce a certain quantity of Green House Gas, through projects, which will flow to developed countries as CERs after approval by the Executive Board of the UNFCCC.
3R practice
linked to Mitigation
There is a clear linkages between municipal waste management and climate change in developing nations of the Asia-Pacific.

Organic wastes in traditional landfills normally degrade under partly anaerobic conditions and generate methane emissions.

Methane is a more potent GHG than carbon dioxide (CO2) and is a major contributor to climate change.

Collecting and using landfill gas, composting and biogas production from organic wastes are examined as possible ways of minimizing this GHG.

Extracting energy (and raw materials) from waste is consistent with the “reduce, reuse, recycle” (3R) approach being adopted as part of sustainable development strategies and is further evidence of how the climate change and sustainable development can be integrated.
Experience from Waste Sector Projects

- Landfill Gas Recovery & Utilization
- Composting of Municipal Waste

The waste sector projects prevent the release of methane from bio-methanation processes.

The methane collected can be flared or used to generate electricity.
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

web: 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.
Landfill Gas Extraction and Utilization at Matuail Landfill Site in Dhaka
Unsanitary Crude Dumping Practice
CDM project Registered with UNFCCC

Project cost: 3.5 million US$

Can take care of 59% of the total collected waste (1700 ton/day) of Dhaka City Corporation (DCC) per day

This project will recover methane gas which is a major Green House Gas (GHG) from waste dumping site at Matuail and also to generate 3 MW (minimum), using the recovered methane gas.

Will increase the existing height (from existing 5 meter) of the Matuail waste dumping site to 25 meters to enhance the life to of the existing site

Reduce 990,000 tons of carbon dioxide (GHG) over the 8-year period
The project will use landfill gas collection technology in the existing landfill of Matuail.

- No financial investment, no free or subsidized electricity or gas required from GoB
Experience in Waste Sector

700 Tons/day Capacity Compost Plant at Dhaka of Waste Concern
Examples of 3R practice: Dhaka experience CDM

700 Tons/day Capacity Compost Plant at Dhaka of Waste Concern
Examples of 3R practice: Dhaka experience CDM

UNFCCC/CCNUCC

CDM – Executive Board

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 Mutuaiti 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

www.wasteconcern.org
Organic Waste
COMPOST PLANT
Joint Venture
WCC-WWR, FMO, Triodos, EVD

Project Investment
Harnessing CDM

CER (carbon credits)
Compost

International Market
Rural Farmers
Urban Population

BOI
CDM Board
DCC

Signed concession agreement for 15 years
Project Approval

• Direct Collection from Vegetable markets
• Paying CBOs/NGOs for waste delivery
• Promoting source separation and community participation

Attracted 12 Million Euro Foreign Direct Investment

Examples of 3R practice: Dhaka experience CDM

BOI-Board of Investment; DCC-Dhaka City Corporation
Before-After: Waste Collection System

Present Collection Practice

Improved Covered Collection by WWR
Parameters to be Monitored **During Implementation**

**Weighing of Waste Input**
Forced Aeration by Blowers to Provide Oxygen in the Compost Pile
Process Quality Control

Regular Oxygen Monitoring
Temperature Control

Parameters to be Monitored During Implementation
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:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BARI</th>
<th>BINA</th>
<th>SRDI</th>
<th>Guaranteed Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>Dark grey to black</td>
<td>Very dark greyish brown</td>
<td>Dark brown</td>
<td></td>
</tr>
<tr>
<td>Physical condition</td>
<td>Non-granular form</td>
<td>Soft body, Granular in size</td>
<td>Non granular</td>
<td></td>
</tr>
<tr>
<td>Odour</td>
<td>Absence of foul odour</td>
<td>Not smell</td>
<td>Odour less</td>
<td></td>
</tr>
<tr>
<td><strong>Chemical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>6.0 - 8.5</td>
<td>8.3</td>
<td>8.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Organic Carbon</td>
<td>10 - 25%</td>
<td>23.8</td>
<td>20.20</td>
<td>24.9</td>
</tr>
<tr>
<td>Total Nitrogen (N)</td>
<td>0.5 - 4.0%</td>
<td>2.01</td>
<td>1.90</td>
<td>1.95</td>
</tr>
<tr>
<td>C : N</td>
<td>Max. 20:1</td>
<td>11.81</td>
<td>10.63</td>
<td>12.8</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>0.5 - 1.5%</td>
<td>1.7</td>
<td>2.2</td>
<td>1.25</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>1.0 - 3.0%</td>
<td>2.68</td>
<td>2.52</td>
<td>2.60</td>
</tr>
<tr>
<td>Sulphur (S)</td>
<td>0.1 - 0.5%</td>
<td>0.30</td>
<td>0.09</td>
<td>0.35</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>Max. 0.1%</td>
<td>0.04</td>
<td>*</td>
<td>0.03</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>Max. 0.05%</td>
<td>0.009</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>Max. 20 ppm</td>
<td>19.3</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>Max. 50 ppm</td>
<td>*</td>
<td>*</td>
<td>20.2</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>Max. 5 ppm</td>
<td>3.81</td>
<td>*</td>
<td>2.28</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>Max. 30 ppm</td>
<td>27.4</td>
<td>*</td>
<td>26.0</td>
</tr>
<tr>
<td>Mercury (Mg)</td>
<td>Max. 1 ppm</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>Max. 30 ppm</td>
<td>16.85</td>
<td>*</td>
<td>26.1</td>
</tr>
<tr>
<td>Inert material</td>
<td>Max. 1%</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

*Not analysed*
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

- Very low (<1.0%): 17%
- Low (1.1%-1.7%): 21%
- Medium (1.7-3.5): 45%
- High (3.5%): 17%

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%
Concession Agreement with Dhaka City Corporation

Collection of Organic municipal waste from vegetable markets using our own collection system

700 tons/day
Production capacity: 175-210 tons per day
Employment: 800 person, specially women
Emission reduction: 89000 tons CO2/yr.

Compost Plant (land and plant belongs to Company)

Initially 8000 tons/year and reach 50,000 tons/year (Cheaper than chemical fertilizers)

Rural Areas (Farmers)

No investment from public agency in this project

PROBLEMS

- Green House Gas Emission
- More Land Required for Landfill

Waste Bins Demountable Containers

Collection

Transportation

Landfill

700 Tons/day Capacity Compost Plant at Dhaka

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.

www.wasteconcern.org
Input
- Collection (Organic Waste From Markets)
- Saving DCC cost

Process
- Aerobic Composting
- Saving Landfill Area

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

Pro-poor element
- 700 tons/day of waste collection
  Starting from 100 tons/day
- Job Creation
  400 new jobs
- Creating 800 new jobs
- Focusing on Waste Pickers
- Health Insurance
- Daycare Center
- Free Meal
- Cheaper
- Less Irrigation
- Soil Quality Improved
- Higher Yield
- Leads to higher income
Mitigation-Adaptation Loop

Mitigation

Adaptation
Reducing Green House Gas

Complying with the MDG

Attracting Foreign Direct Investment (FDI)

Global Impact

Local Impact

Reducing poverty

Reduces consumption of energy and raw materials

Promoting Partnerships

Reducing Solid Waste Management cost of

Enances food security

Implements environment

Reduce health hazards

Co-Benefit OF 3R Based PROJECT

Improves environment

Reduces consumption of energy and raw materials

Promoting Partnerships

Reducing Solid Waste Management cost of

Enhances food security

Global Impact

Local Impact

Co-Benefit OF 3R Based PROJECT

Improves environment

Reduces consumption of energy and raw materials

Promoting Partnerships

Reducing Solid Waste Management cost of

Enhances food security

Global Impact

Local Impact

Co-Benefit OF 3R Based PROJECT

Improves environment

Reduces consumption of energy and raw materials

Promoting Partnerships

Reducing Solid Waste Management cost of

Enhances food security
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.

- **Lengthy CDM Project approval process needs to be simplified.**

- **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