Solid Waste Management in South Asia

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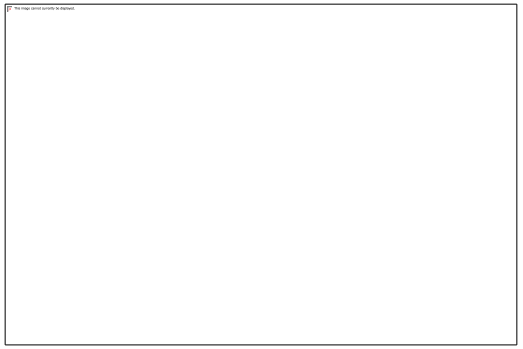
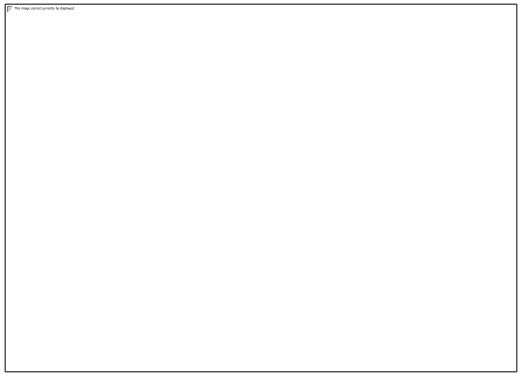
Outline

1. SWM in SAUW operations
2. Overview of SWM in South Asia
3. Projects in Bangladesh
4. Summary of key issues and recommendations

SWM in SAUW Operations (2010)

- 50% of all SAUW projects had SWM components (4 out of 8 projects)
- Total lending in SWM was $30 million (5% of total SAUW lending)
  - Waste collection ($5 million)
  - Transportation ($6 million)
  - Disposal ($19 million)
- SWM in CPS
  - IND 2009-2012
  - NEP 2010-2012
  - SL 2009-2011
  - BAN 2006-2010





Snapshot: SWM in South Asia

(BAN, BHU, IND, MLD, NEP, SRI)

Feature	Statistic
Avg. municipal waste (kg/capita/year) Avg. per capita (kg/capita/day)	200 0.46
Formal collection rate of municipal waste	< 50-60%
Statutory waste management framework	No or weak national environmental strategy, little application of the statutory framework, weak statistics
Informal collection	Highly developed, substantial volume capture, tendency to organize in cooperatives or associations, Informal recycling 15%
Municipal waste composition	**(% weight basis)**
Organic or fermentable	65–78
Paper and cardboard	4–15
Plastics	5–12
Metals	1–5
Glass	1–5
Moisture content (%)	50–80
Caloric value (in kcal/kg dry basis)	800–1,100
Waste treatment	Uncontrolled landfills > 50%
Informal recycling	Highly developed, substantial volume capture, tendency to organize in cooperatives or associations

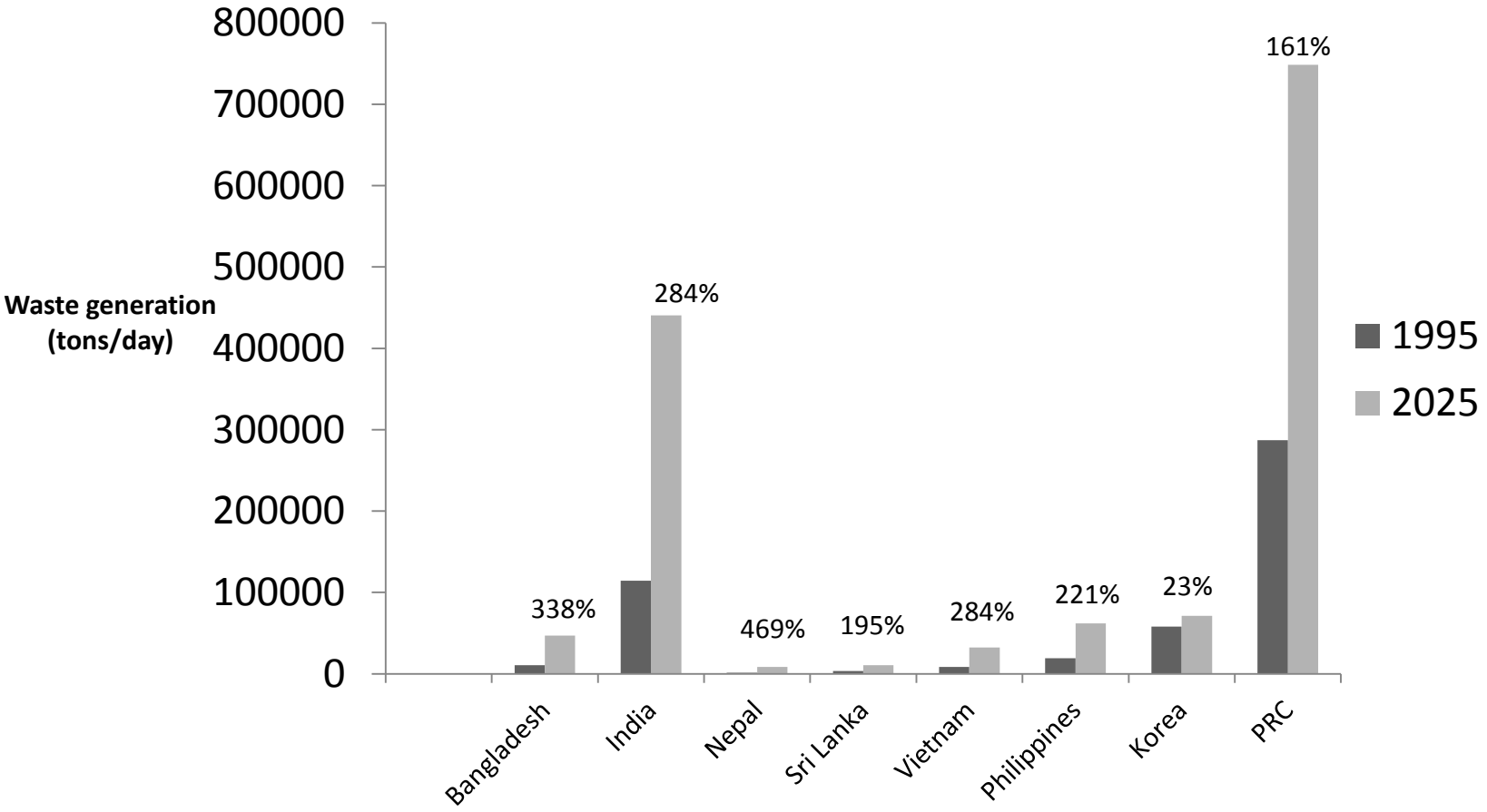
Status of Laws and Policies

	3R Strategy , SWM Policy, Rules, and Standards	Promotion of Source Segregation	Feed-In Tariff for Waste to Biogas or Electricity	Experience in Giving Free Government Land for Recycling Plants	Standard for Compost, Promotion of IPNS, and Co-Marketing of Compost with Chemical Fertilizers
Bangladesh	Yes	Pilots	No	In some cases	Yes, enforced
India	Yes	Partial	Yes	Yes	Yes, not enforced
Nepal	Under preparation	No	No	No	No
Sri Lanka	Yes	No	No	Yes	Yes, not enforced

Solid Waste Generation in South Asia (1995-2025)

Country	Current					2025				
	GNP Per Capita 1995 ($)	1995 Population		Urban Waste Generation		Predicted GNP Per Capita[a]	Predicted Population		Predicted Urban Waste Generation	
		Total (millions)	Urban (% of Total)	Generation Rate (kg/capita/day)	Total Waste (tons/day)		Total (millions)	Urban (% of Total)	Generation Rate (kg/capita/day)	Total Waste (tons/day)
Bangladesh	240	119.8	18.3	0.49	10,742	440	193.1	40.0	0.6	47,064
India	340	929.4	26.8	0.46	114,576	600	1,392.1	45.2	0.7	440,460
Nepal	200	21.5	13.7	0.50	1,473	360	40.7	34.3	0.6	8,376
Sri Lanka	700	18.1	22.4	0.89	3,608	1,300	25.0	42.6	1.0	10,650

Solid Waste Generation in South Asia (1995-2025)



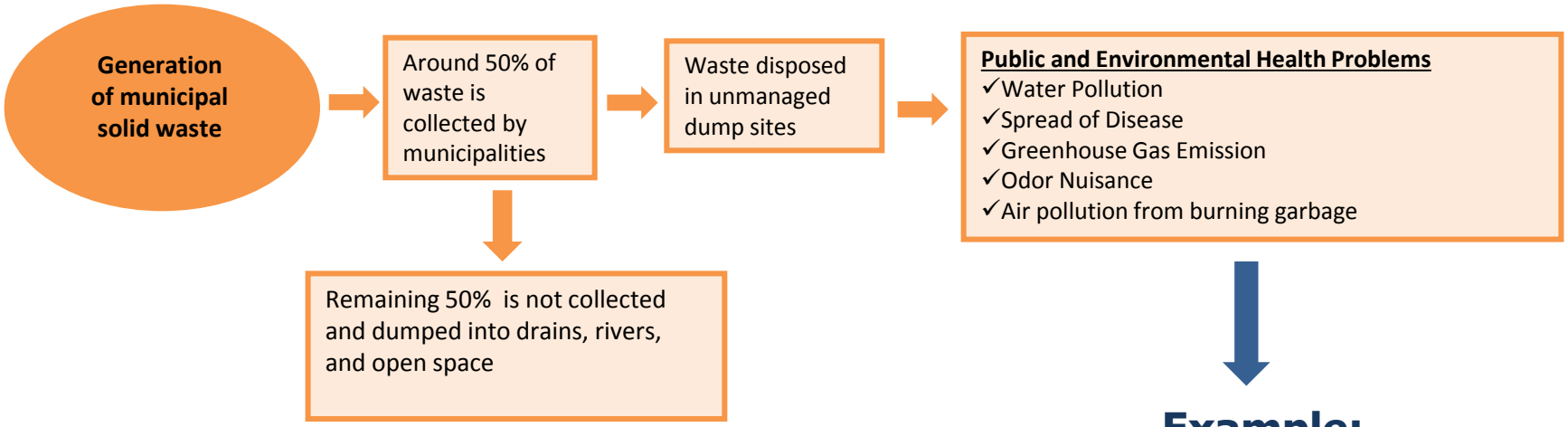
Source: World Bank (1999)

Existing Treatment and Disposal Practices (%)

South Asia vs. Others

	Untreated	Sanitary Landfill	Composting and Recycling	Incineration
Bangladesh (2011)	88	10	2	0
India (2001)	60	20	15	5
Nepal (2001)	85	10	5	0
Sri Lanka (2001)	85	5	10	0
PRC (2006)	48	43	2	8
European Union	0	45	36	19
United States (2007)	0	54	34	13
Japan (2005)	0	8	19	73
Singapore (2007)	0	10	0	90

Typical Scenario of SWM in South Asia



Example:
Bubonic plague outbreak in Surat, India in 1994

Delhi: Failed Experience in Incineration

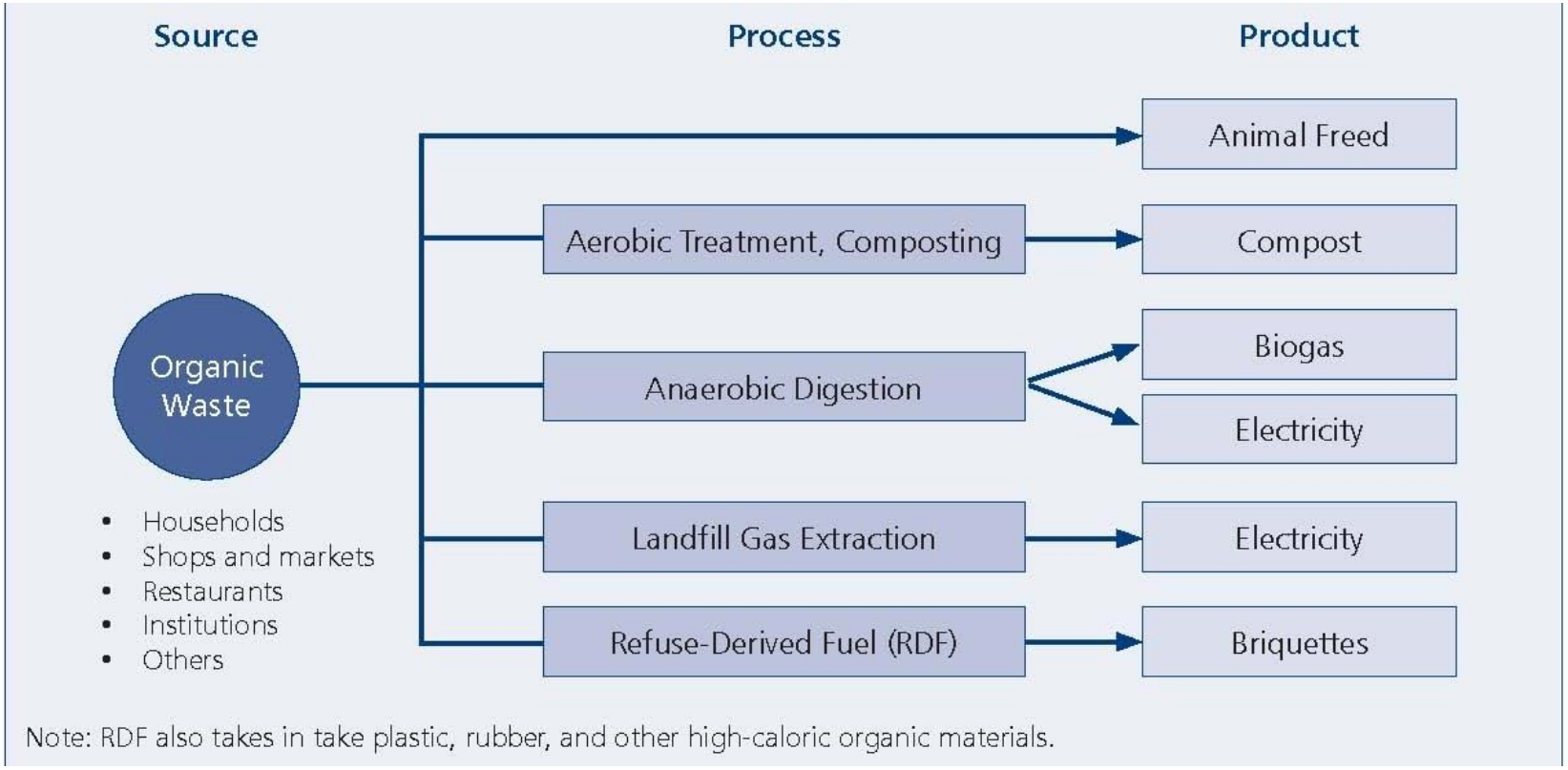
- In 1987 a 300 tons/day (t/d) incineration plant was established in Timarpur, Delhi.
- Expected to produce 3.75 megawatts (MW), failed, and ultimately shut down in 1990 due to high the volume of refuse with low caloric value
- Few efforts to develop incineration since then
- Until the caloric value of waste improves, or technology and processes for incineration advance, it will be difficult to implement incineration.

SAARC Meeting on Solid Waste Management, October 2004

- The South Asian Association for Regional Cooperation (SAARC) agreed in Dhaka that "…incineration, as well as unproven technologies such as plasma, should not be considered as an option for the treatment of their MSW of low caloric value and high environmental pollution potential."


Organic Waste Fraction of Solid Waste in South Asia, 2005-2010
Bangladesh
Sri Lanka
Nepal
India
South Asia
USA
78%
65%
74%
65%
66%
28%
0
50
100
150
200
250
300
Million tons/year
Organic Waste
Total Solid Waste Generation

Alternative Treatment Options for Municipal Organic Waste



Gorai Landfill closure and Gas Capture Project in Mumbai

Estimated Resource Recovery Potential from Organic Waste in South Asia

	Organic Waste Generation (million tons/yr)	Compost (million tons/yr)	Biogas to Electricity (million kWh/yr)	RDF (million tons/yr)
Bangladesh	3.8	0.95	380	0.15
India	27.3	6.82	2,730	1.09
Nepal	0.5	0.13	50	0.02
Sri Lanka	1.8	0.45	180	0.07
Total	**33.4**	**8.35**	**3,340**	**1.33**

Sources: BAN, Waste Concern. 2005; India: GOI, 2005 ; Nepal: GON, 2004; Sri Lanka: GOSL, 2005.

Estimated Value of Resource Recovery in South Asia ($ million/yr)

	Compost	Biogas to Electricity	RDF	Potential Value of Carbon Credits
Bangladesh	80.75	79.8	7.5	Depends on price of carbon
India	579.7	573.3	54.5	
Nepal	10.6	10.5	1.0	
Sri Lanka	38.2	37.8	3.5	
TOTAL	**709.25**	**701.4**	**66.5**	

2011 prices

Integrated Treatment & Sanitary Landfill Site, India

- Capital investment and O&M expenditure by private sector
- Tipping fee payable by municipality
- Municipality to deliver (un-segregated) waste

Case Study:
Business Opportunities in Resource Recovery
Waste Concern, Bangladesh

- Waste Concern (WC) is Bangladesh's largest municipal compost manufacturer
- Compost production: 15,000 tons per/yr (2011)
- Collects market waste from Dhaka. Signed an MOU.
- Markets and distributes compost through Advanced Chemical Industries (ACI), the country's biggest fertilizer marketing company
- ACI purchases bagged compost from WC, then transports and distributes it through its own established network
- WC sells compost to ACI for $88/ton, while ACI sells it to the farmers at $130/ton, which includes transport, storage, and promotional costs
- ACI does promotion and product launchings
- Successful partnership since 2000

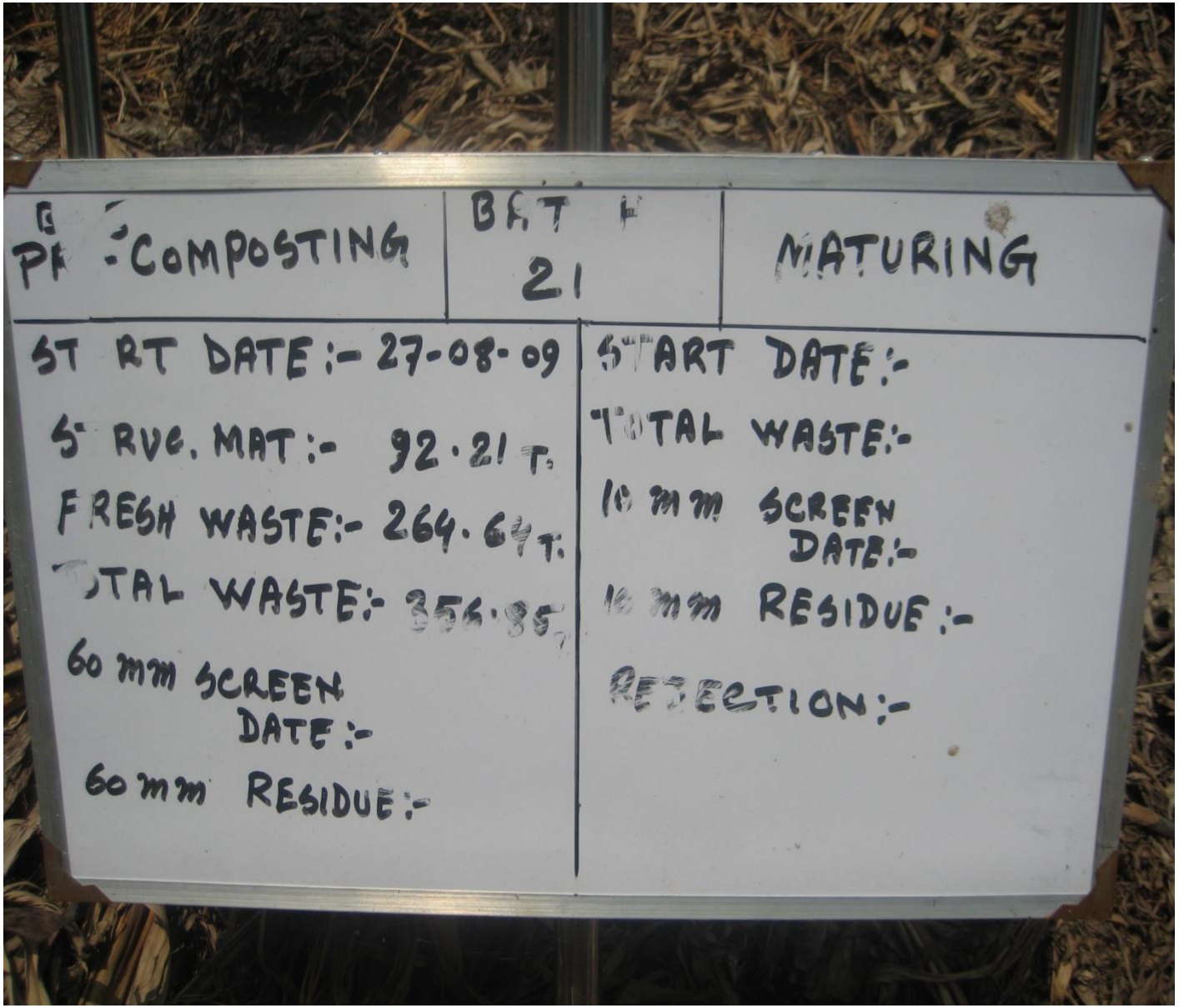

Waste Concern
Bulta Municipal Compost Plant
Dhaka, Bangladesh
Compost Storage


Pre-Composting Area
8
7


Doppstadt
Doppstadt SM-518


1
Batch
24
MATURING


1
2
PRE-COMPOSTING
BOX 1
BATCH
24
MATTURING
START DATE : 16.09.09
STRUCTURE MAT. : 154.130 T.
FRESH WASTE : 311.530 T.
TOTAL WASTE : 468.32 T.
PRE-SORTING REJECTIONS : 2.660 T.
START DATE :
TOTAL WASTE :
10mm SCREEN DATE :
10mm RESIDUE :
REJECTION :
COMPOST :


PH :-COMPOSTING
BAT #
21
MATURING
ST RT DATE :- 27-08-09
S RVG. MAT :- 92.21 T.
FRESH WASTE :- 264.64 T.
TAL WASTE :- 356.85
60 mm SCREEN DATE :-
60 mm RESIDUE :-
START DATE :-
TOTAL WASTE :-
10 mm SCREEN DATE :-
10 mm RESIDUE :-
REJECTION :-


BW
GASALERTMAX XT


Structure Material Storage


Compost Storage

ADB Project Experience - BAN

- BAN L2555: Urban Public and Environmental Health Sector Development Program
- Effectiveness: May 2010
- Completion: June 2017
- Loan Amount:
  - Project loan: $60 m
  - Program loan: $ 70 m

ADB Project Experience - BAN

- Project loan:
  - 1 integrated sanitary landfill in Khulna ($15.9 m)
  - 4 controlled landfills ($7.0 m)
  - STS in 6 cities ($8.6 m)
- Program loan:
  - 3R Strategy (2010)
  - SWM Rules (pending)
  - SWM Action Plans in 6 cities
  - Improving financial management

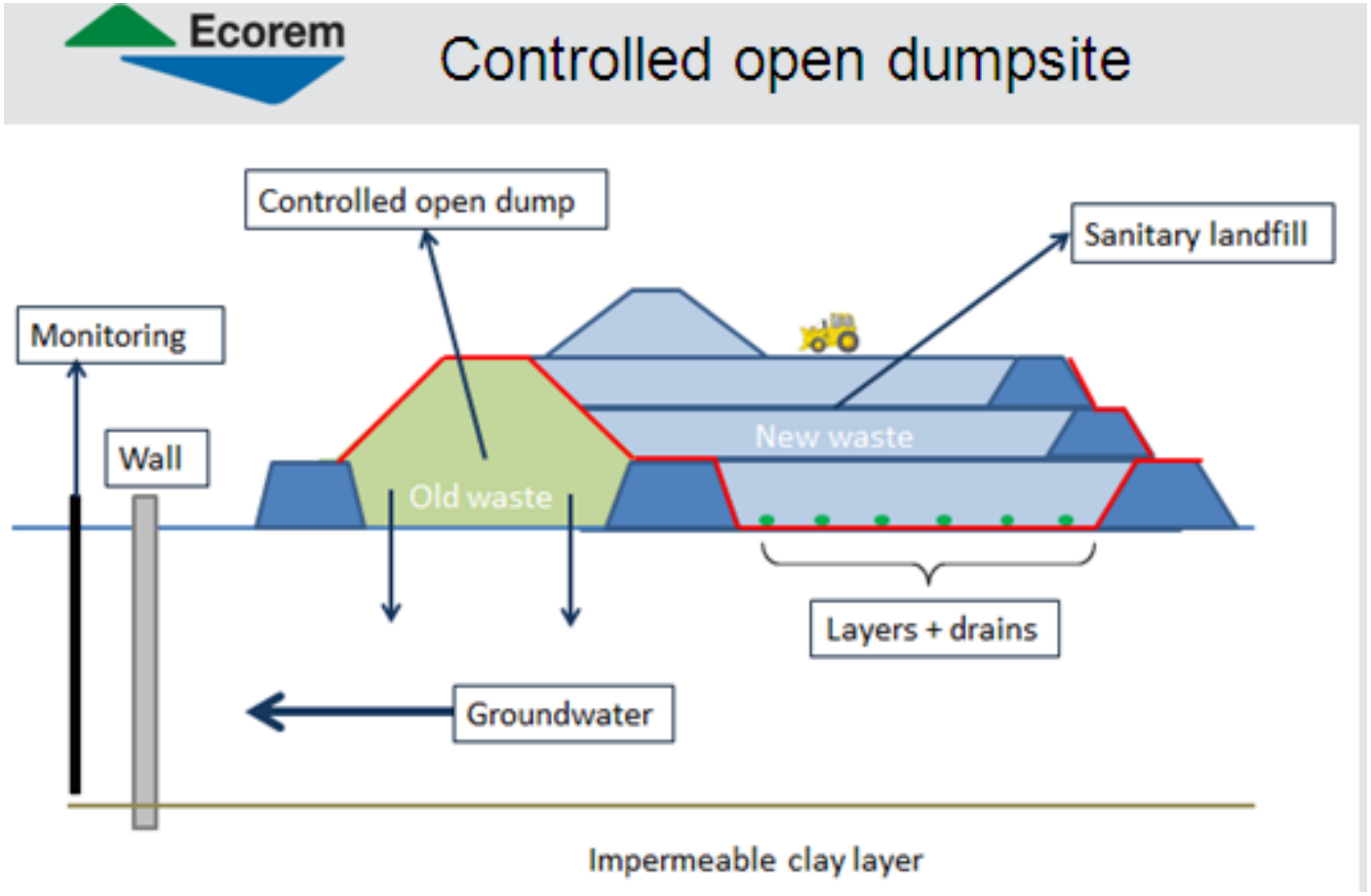
BAN L2555 UPEHSDP

Barisal City ($1.8 M)

Sylhet City ($1.6 M)

Chittagong City ($1.7 M)

Rajshahi City ($1.9 M)



Controlled landfills: Intermediate waste cover, buffer basin, groundwater drainage and treatment, groundwater monitoring, central leachate drainage and treatment, landfill gas drainage

Summary:
Key Issues in SWM in South Asia

- land scarcity and high cost of land
- low public awareness/behavior)
- weak municipal finances and budgeting (20-40% of annual budgets to SWM in South Asia)
- low collection coverage (40-60%)
- open dumping
- weak institutions and capacity (technical and management)
- mixed waste (no segregation)
- technology selection
- limited marketing of resources recovered (e.g., compost, biogas)

Summary:
Key Issues in SWM in South Asia

- **Low level of service cost recovery**
  - Dhaka : SWM (conservancy tax) is 2 percent of property tax
  - Dhaka earns total Tk.150 million but spends Tk.600 million on SWM
  - Cost recovery is only 25%
- **High dependence on government grants**
  - The central government transfers account for more than 50 percent of local government revenues.
  - Not a reliable source of funding

Key Areas for Capacity Building

- land use planning
- statutory compliance and monitoring
- outsourcing and contract management
- financial management (tax collection and assessment, budgeting and accounting)
- operation and maintenance
- effective human resource management

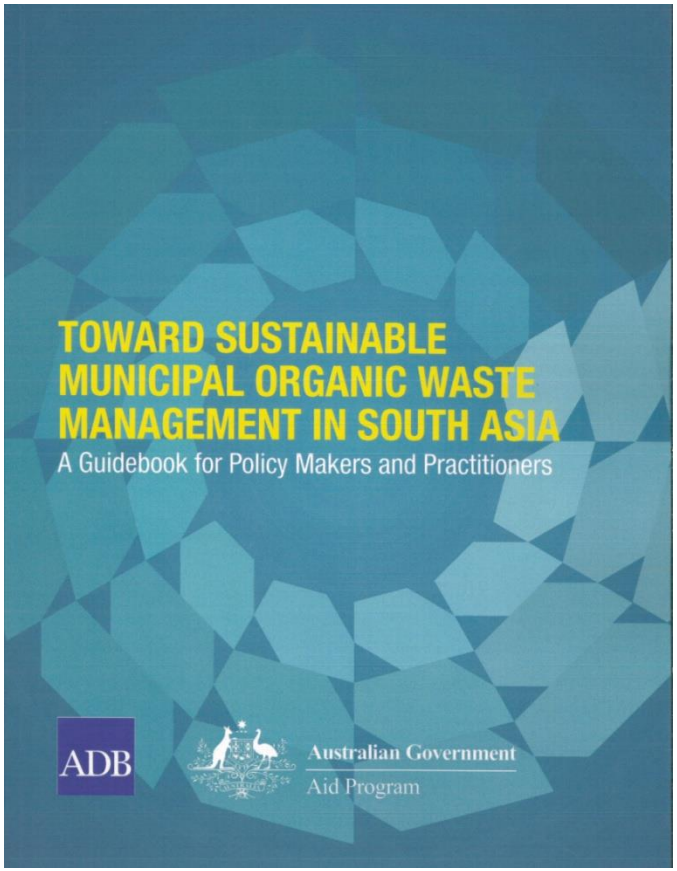
Recommendations

- increase collection to 100% with a focus on source segregation
- apply user charges/collection fees to households
- improved land use planning
- adopt municipal ordinances
- awareness and education campaigns
- allocate land for treatment and disposal (for 25-30 year life)
- pilot and demonstration activities (similar to 24X7 water)
- mainstreaming organic waste considerations into project designs
- knowledge promotion

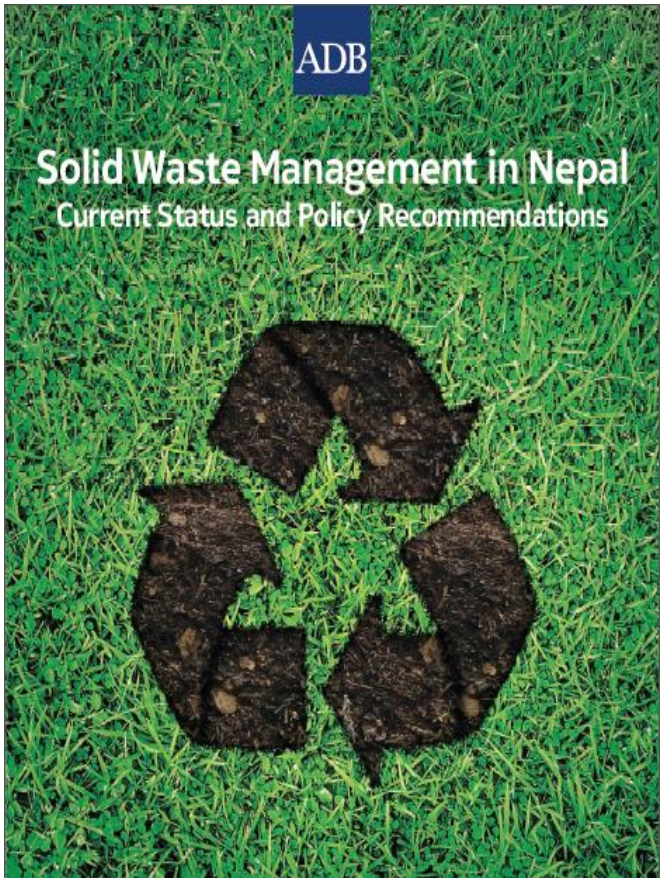
Recommendations

- promote programmatic CDM
- reward good performing wards with budget bonus for achieving source segregation (Coimbatore , India)
- select right technology
- marketing of organic products
- build capacity and train
- tax subsidies for private operators
- exemption from customs duty on import of machinery
- concessionary rates for utilities such as electricity, diesel, and water
- creating a level playing field with chemical fertilizers

SAUW Publications in SWM



2011



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