



Environmentally Sound Waste Management in Asia

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Solid Waste Management Issues

Major Constraints of MSW management

- ✓ Inadequate infrastructure
- ✓ Inadequate finance
- ✓ Lack of clear roles and responsibilities
- ✓ Uncontrolled disposal of solid waste (dumped in suburb and city boundaries)
 - ✓ Threat to public health and sanitation
 - Environmental pollution



MSW solutions are not only with the Engineers:

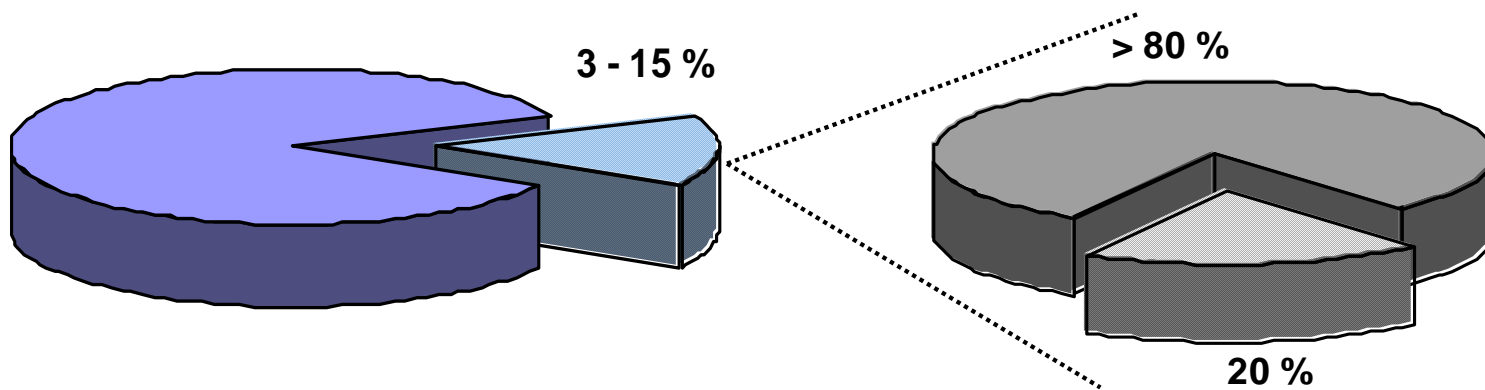
50 % Engineering

50 % Social – Policy and Institutional Issues.



MSW Management & Economy

More than 80% → Collection only



■ Total Budget of Local Authority

■ Collection and Transportation

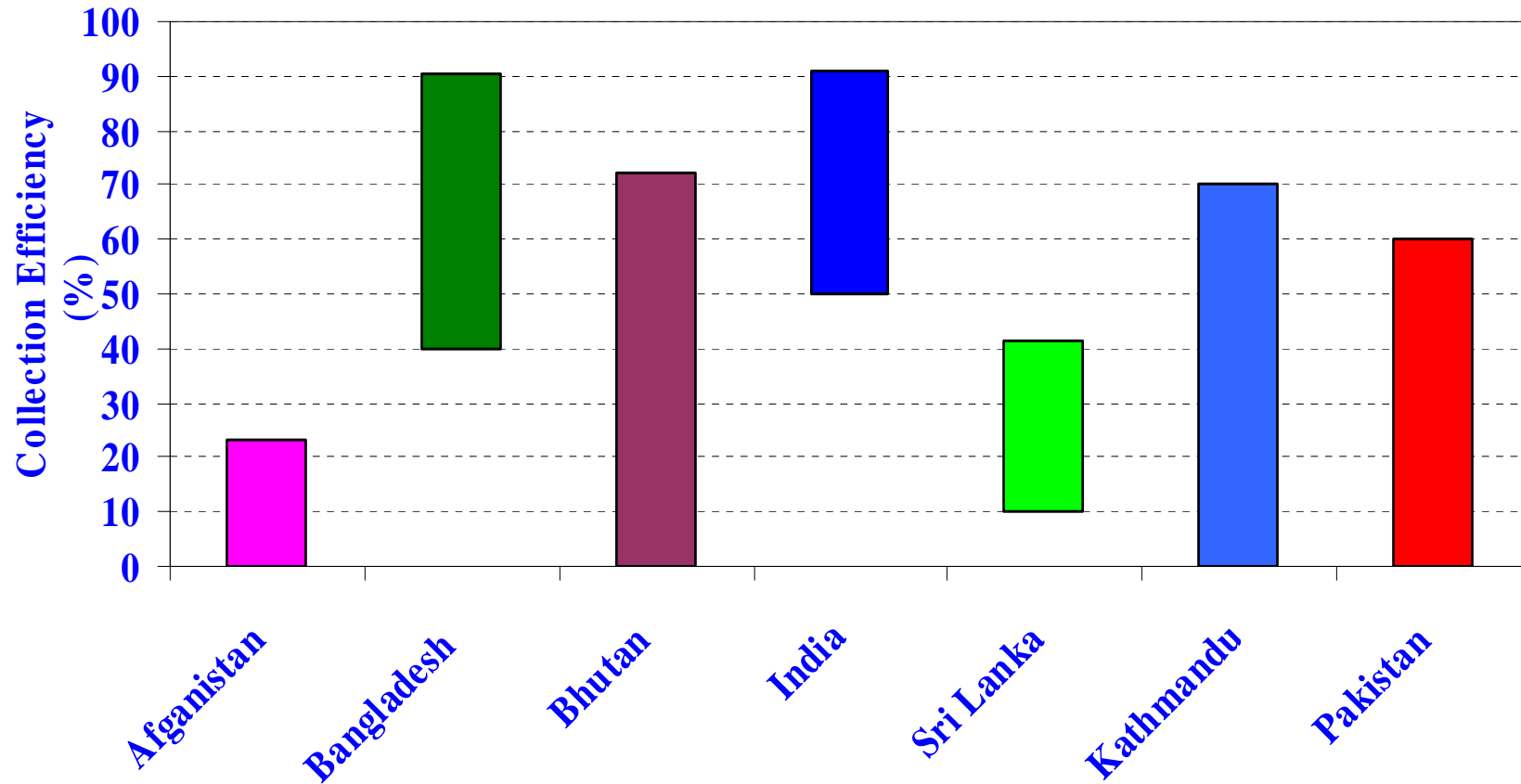
■ SWM budget

■ Others

Total budget allocations for MSWM in Sri Lanka



MSW Collection Efficiency in South Asia

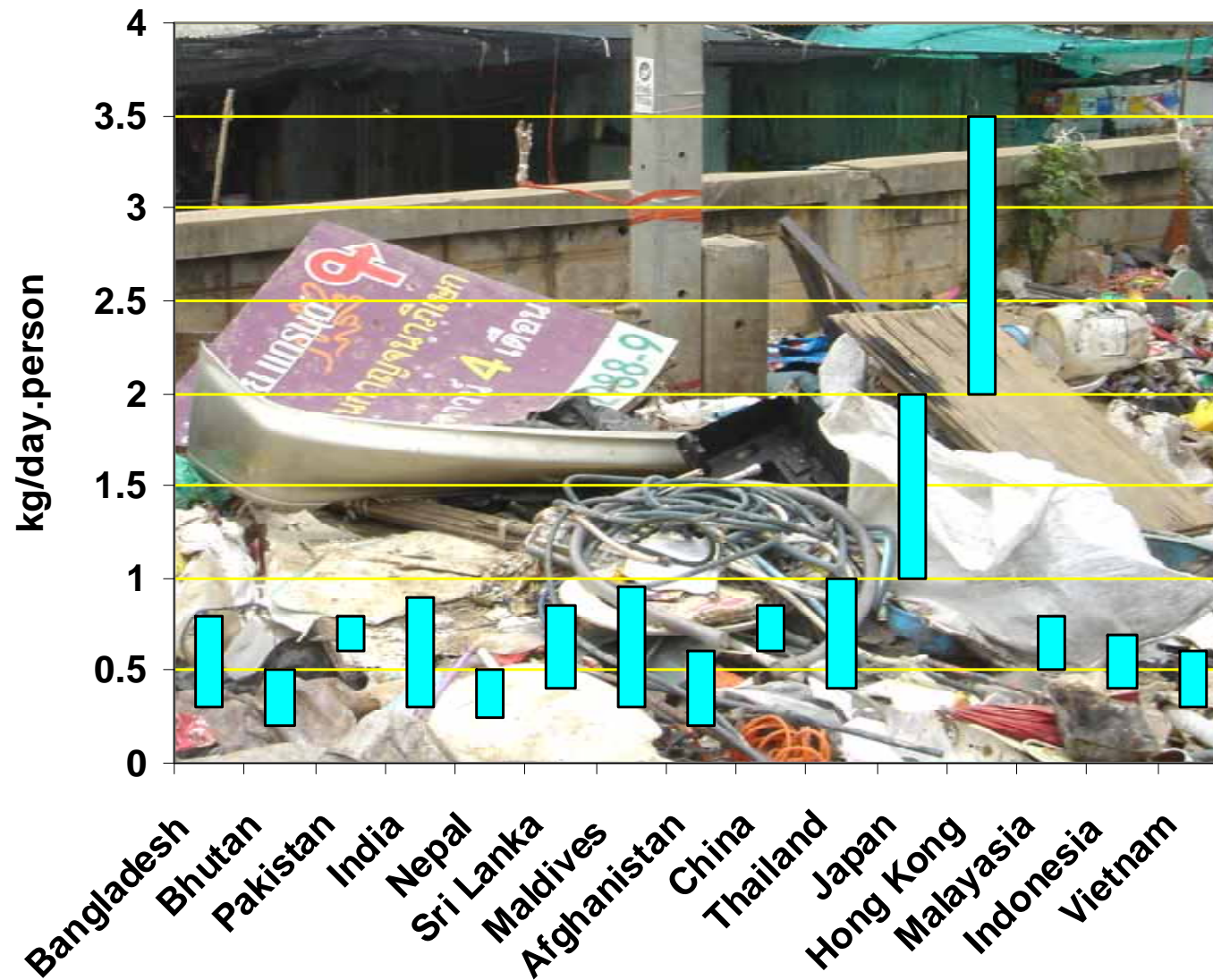


Poor Collection system





Solid Waste Generation

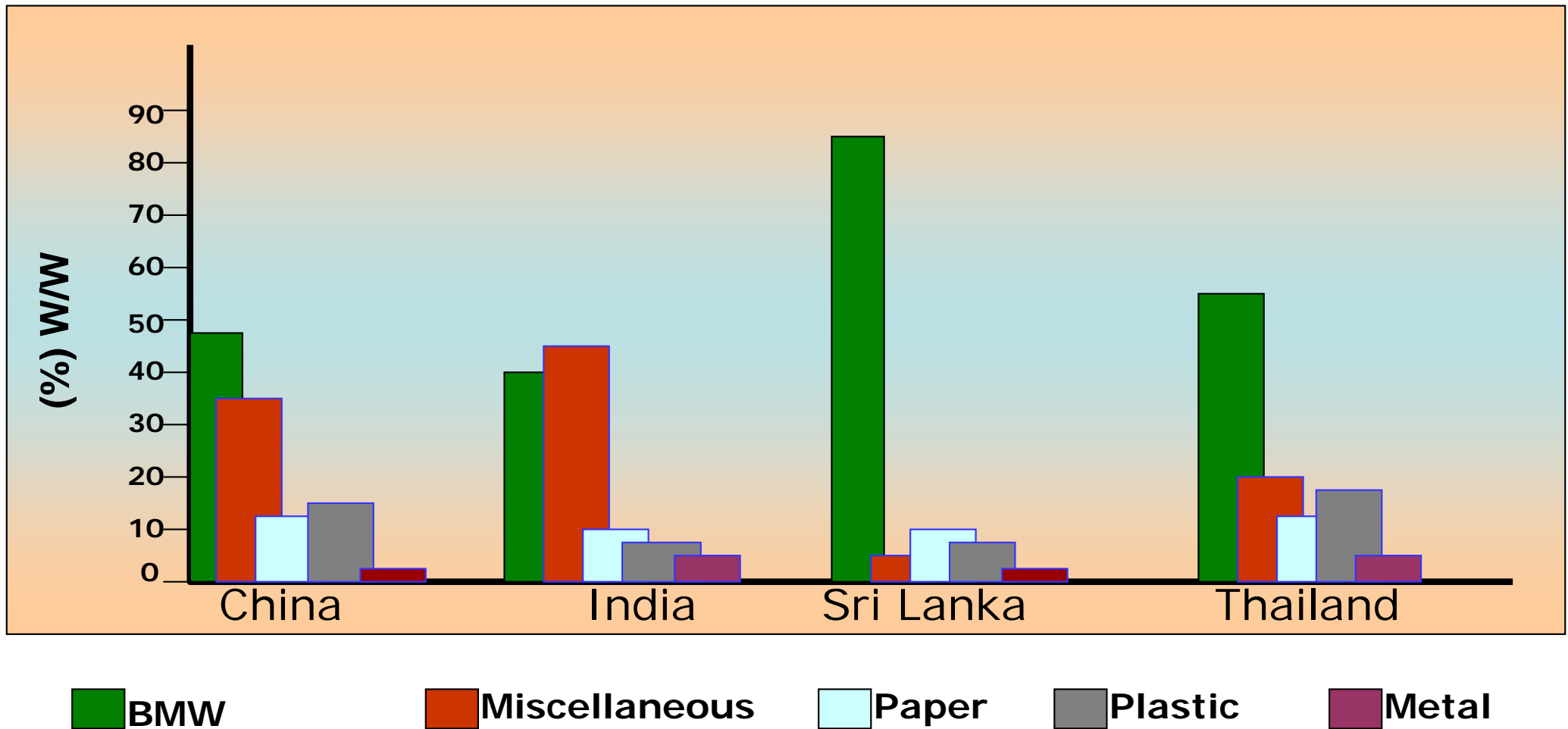


Per capita waste generation ranges from 0.2- 4 kg/person. Day



Waste Characteristic and Composition

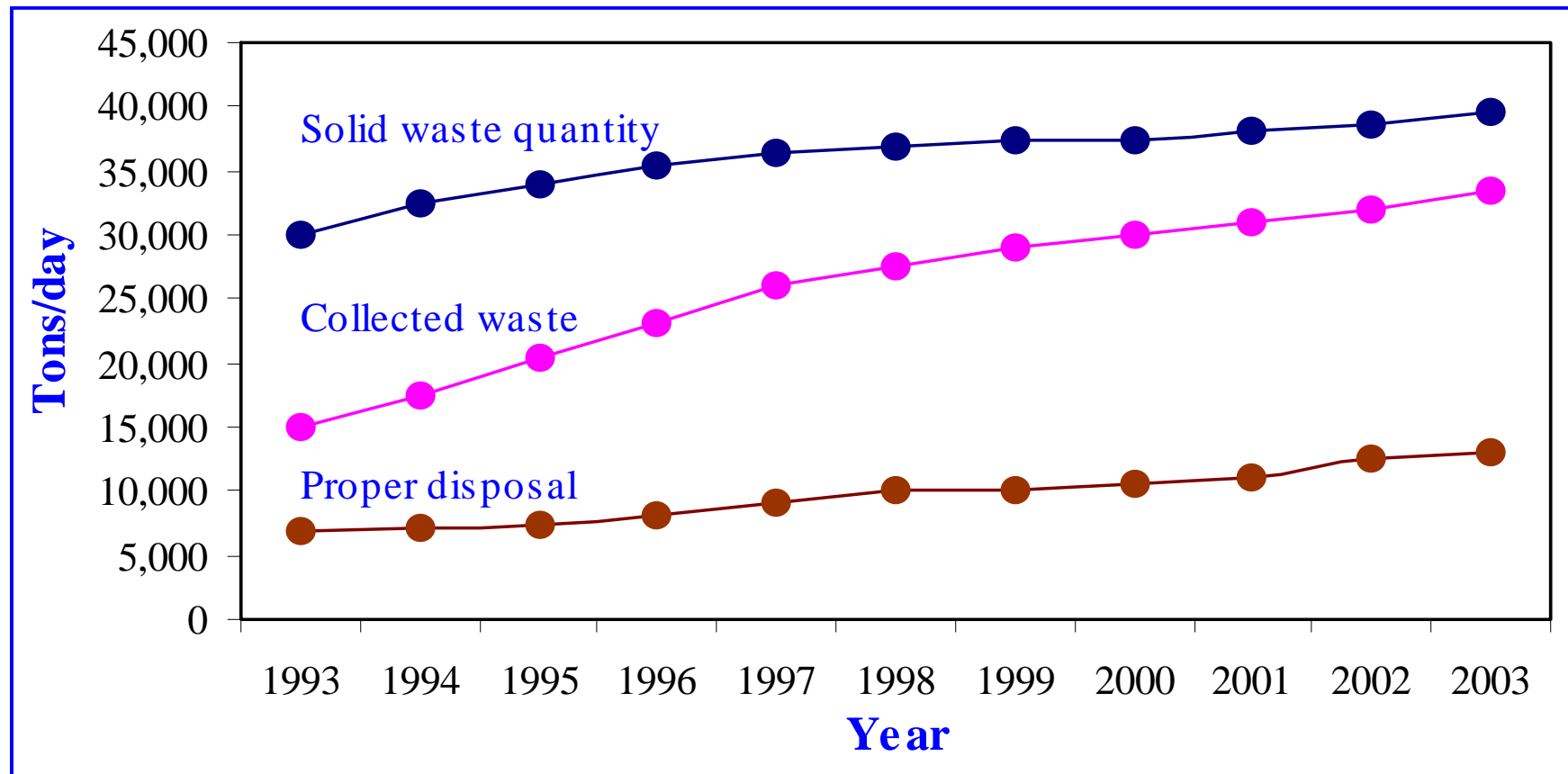
Major focused/ successful area: Biodegradable Municipal Waste (BMW)
Emerging concern: E-waste generation





Collection and Transport

In Thailand: Waste collection has improved after introducing the color coded bins and waste campaigns





Collection and Transport

Coloured-coded bin employed in BANGKOK



Green bin: for organic wastes (food, vegetables, etc. will be disposed off in landfill)



Yellow bin: for recycle wastes (plastic, glass, metals, etc. will be collected for recycling)



Gray bin, red lid: for household hazardous wastes (herbicide, insecticide, batteries, fluorescent tubes will be collected and disposed in hazardous waste landfill)



Collection and Transport

Privatization of Colombo and Chennai garbage collection

Colombo:

- ✓ Burns Environmental Technologies (BETL) is operating the modern composting plant, managing about 800-900 tones of garbage per day.
- ✓ 50% of the waste collection of the city is under private contract with Abans Environmental Services.

Chennai:

CES-ONYX, a French multi national company.

Approximately 1,000 tonnes of garbage are cleared per day.

The operation is mechanised, with movable bins, one-tonne autos, mechanical loaders and Bobcarts (machine to clean up sand).



Gaps in collection & transport



COMPACTOR

**Privatized
Collection
System**



ROAD SWEEPING EQUIPMENT



Collection Efficiency

Primary Waste Collectors

GREEN FLEET:

- Only in dev. countries
- Door-to-door collection
- Encouraging source segregation





Community Based Solid Waste Management:





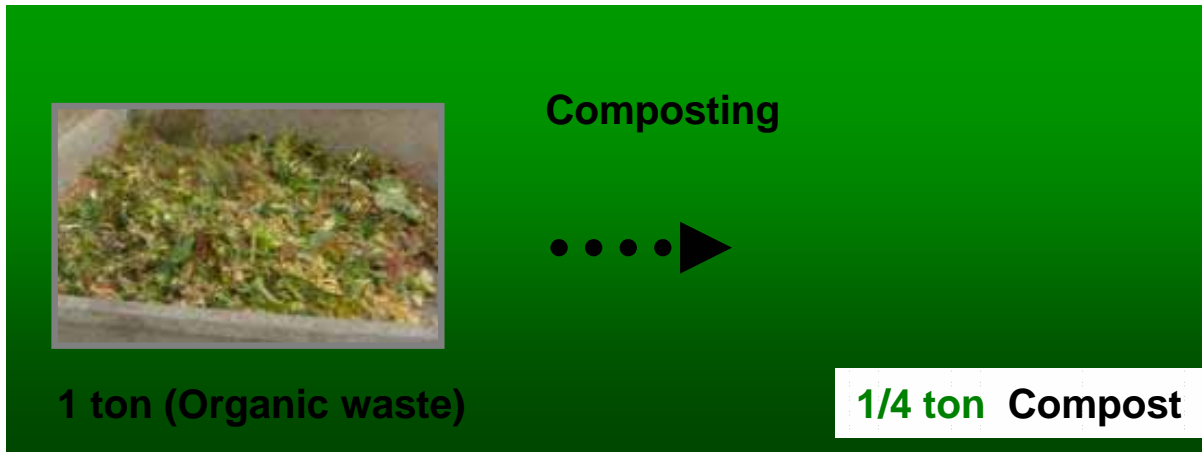
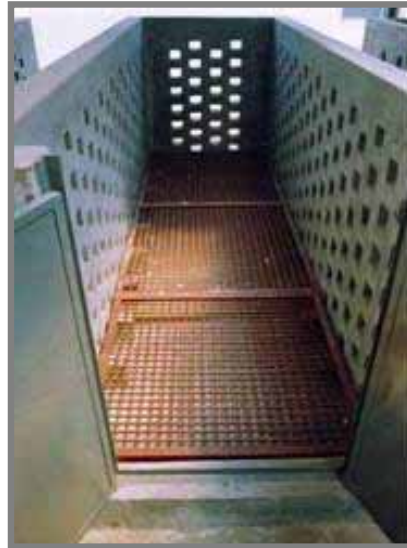
Community Based Solid Waste Management

- Creating the sense of ownership and citizen role
- Non-gender biased participation
- Significant reduction in the Littering of Waste
- Improved the solid waste and health problems of the slum
- Creating jobs within the community
- Cleaner and healthier environment
- Reducing Municipal cost of handling the waste
- Overall reduction in waste disposal
- Profiting through compost sale and biogas generation, recycling etc.
- Many more..





Community Based Composting - Bangladesh



Community Based Urban Solid Waste Management in Dhaka (component 3.3.2)

Agency: Ministry of Environment & Forest

Agency: Waste Concern; **Supported by:** UNDP

Source: Waste Concern



Community Based Composting - Bangladesh

Barrel Composting



Box Composting



Windrow Composting



Combating organic waste: from Slums to Urban Area *(Bangladesh: Waste Concern)*



Boromtriloknat 21 Community in Phitsanulok

- Borommatrilokanat 21 Community is located in Nai Muang Subdistrict, Muang District, Phitsanulok Province
- Consist of 120 households with 425 populations
- This community has been setting up the committee to solve the solid waste management problem since 1997.
- Their activities include Solid Waste Bank, Shared Composting, backyard composting Vermicomposting.

Collective Composting by the Community





Boromtriloknat 21 Community in Phitsanulok

Backyard composting



Consist of 120 households

Vermicomposting



Composting units at Households



Community Participation and NGOs

Cooperation of the community is essential for bringing changes in the MSW management, specially in the aspects of

- ❖ source segregation,
- ❖ recovery of recyclable materials
- ❖ storage prior to collection

Garbage for Eggs Project, Bangkok, Thailand

In 1997, "The Garbage for Eggs Project" was initiated by a group of 25 residents of the "70 Rai developing Community", which is part of the Klong Toey Slum area of Bangkok, Thailand.

Woman participation



Courtesy: Waste Concern





Resource Recovery and Recycling





Resource Recovery and Recycling



INDIA

THAILAND





Resource Recovery and Recycling

India:

- Private sector participation- (Metro cities)
- Plastic recycling & Composting of organic waste
- Adoption of cleaner technology, strengthening of the informal sector system of collection
- Recycling of various materials and develop and implement strategies for recycle,
- Reuse and final environmental friendly disposal of plastic waste





Positive changes – Taking shapes

Newly constructed (by SWMRMC & JICA) operated landfill site (NEPAL)



Newly constructed split level platform (Nepal)

Courtesy: KMC (Nepal)



Positive changes – New Fleet on the Road





Positive changes – New Fleet on the Road

Increased efficiency in waste collection (80%) -Nepal

Introduction of PPP program

Door-to-door collection service

At present app. 30% of waste being collected via PPP programs

Secondary Waste Collectors



THEN

Courtesy: KMC (Nepal)



NOW



Positive changes - Dumpsite Rehabilitation



THEN

NOW

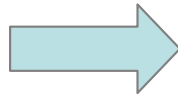


Positive changes - Dumpsite Rehabilitation

Plastic wastes recovery from dumpsite waste



mined wastes
from dumpsite



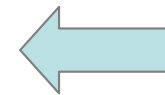
manual
separation



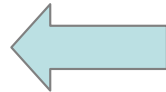
Trommel Screening & size
reduction



purified plastic wastes



RDF production



RDF Briquettes

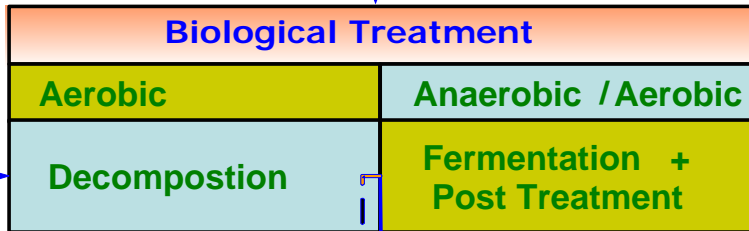
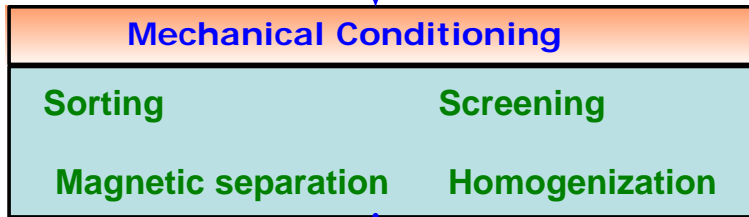
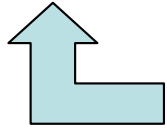


Positive changes - MBT Activity

Phitsanulok (Thailand)

Waste Input Control

Non - biodegradable
Recyclable
High - energy
Fractions



Cover



Disposal to Landfill

Inert fractions

LANDFILL
LEACHATE
WITH MBT

LEACHATE FROM
CONVENTIONAL
LANDFILL



Significant reduction in landfill
gas emission

FABER-UMBRA



Anaerobic Plant (Pilot Scale)

Rachathewa Landfill, Bangkok

- Location: Samutprakarn Province
- Size: Diameter 12m and Height 5m
- Type: "Rottaler Modell" developed in Germany for decentralized organic waste treatment
- Experimented with the organic fraction of the MSW from Bangkok metropolitan administration
- Capacity for this reactor: 10 - 15 tons / day





Construction of Semi-Engineered Landfills

Few simple steps could make a huge difference



- ✓ Restricting entry of water entering into waste from sides
- ✓ Covering with soil and spreading

- ✓ Removal of leachate from side and bottom
- ✓ Compaction of waste in layers
- ✓ Isolation of waste from surroundings by controlling emission of leachate, odor, breeding of disease vectors, etc.
- ✓ Proper disposal plan.





Growing Practices: Solid Waste Minimization

Developed/ ing Asian Countries

- Cleaner Production
- Eco-Industrial Networking
- Green Procurement
- Eco-labeling
- Circular Economy (CE)





Waste to Energy and Fertilizer Project (Rayong, Thailand)

Case Study



Project objective:
production of electricity
while the by-product
(digestate) is to be used
as soil conditioner or
fertilizer.

Plant capacity: 25,500 tons
of biowaste annually and
may produce 5,800 tons of
soil conditioner and 3,826
MWh surplus of electricity.



Waste to Energy and Fertilizer Project (Rayong, Thailand)

Front-end treatment area



Anaerobic digester



Gas holder



Gas engine





Regional and National Policy Conflicts

**MNES & ILFS ARE ACTIVELY PROMOTING FAILED “RDF”
PROJECTS IN VIOLATION OF SAARC
RECOMMENDATIONS.... In India**

SAARC Recommendations Oct 2004 at Dhaka:

“SAARC countries agree that incineration as well as unproven technologies such as Plasma, should not be considered as an option for the treatment of their municipal solid wastes for low calorific value and environmental pollution potential.”

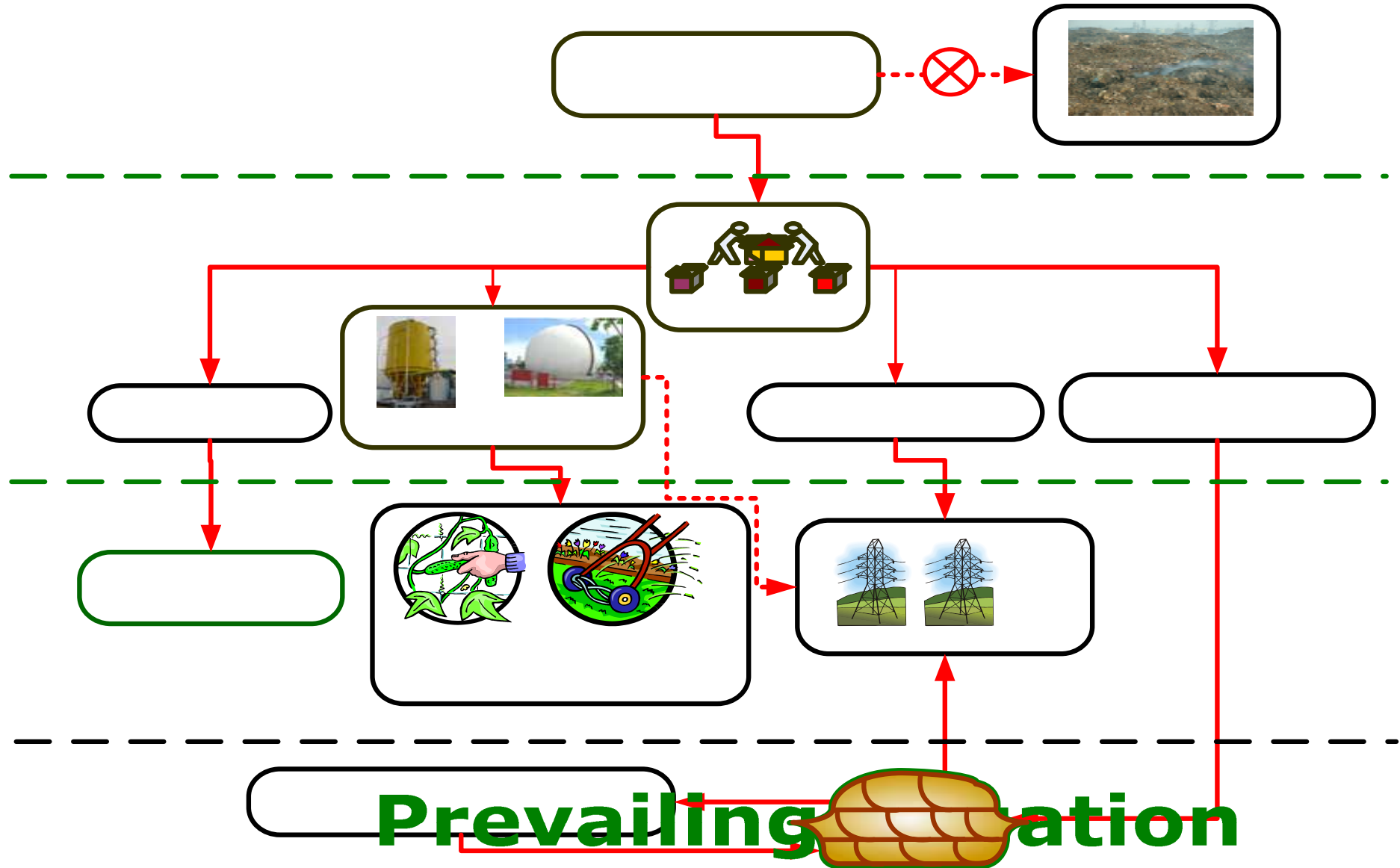
RDF use is also incineration





Conclusion

Sustainable Solid Waste Management Approach





Key Points from the Technical Discussion

3 R South Asia Expert Workshop, 30 Aug- 1 Sept, 2006 Kathmandu, Nepal

To promote the 3Rs in domestic solid waste management, the participants identified that the priority overall issues are:

- Establishing 3R-related policy along with environmentally sound recycling industries:
- Supporting and improving informal waste recycling:
- Utilizing financial incentives and market forces:
- Technologies must be adapted to local needs and conditions.





Key Points from the Technical Discussion

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Social Dimension

- The informal sector should be integrated into the mainstream economic benefit system.
- Community-based solid waste management requires close consultation with community officials and real involvement with all stakeholders
- Introducing micro-enterprises and access to micro-loans to the informal sector
- Better cooperation and communication between the formal and informal sectors is needed.
- Public-private partnership relationships should be developed between industry and community for better understanding of respective problems and possibilities for cooperation.



Key Points from the Technical Discussion

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Proposed Solutions

- **Social/institutional** – such as community involvement in recycling, organizing the informal sector in waste management, voluntary programs for reusing/recycling, awareness raising, worker protection from toxic exposure, and role of NGOs;
- **Financial/economic** – such as deposit refund systems, incubation of recycling and reuse market and businesses, waste banks, taxation and subsidies, and the Clean Development Mechanism (CDM); and
- **Technological/engineering** - such as development of new technology to reduce or recycle wastes, adaptation of existing technology to local conditions, safe and environmentally sound waste treatment technology, new products using recycled materials, technical information dissemination and networking, and application of information technology.



DO NOT WAIT FOR THIS TILL TOMORROW

THE FUTURE LIES TODAY

