Sustainable waste management in developing countries – Part B

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DFID – 22 February 2016
Scope & learning objectives

PART A – The SWM problem
1. Why is SWM important?
   - What are the drivers?
2. Current status and trends
3. Importance of integrated sustainable waste management
   - Governance factors
4. World Bank perspective

PART B – Alternative solutions
5. Some local/innovative approaches
6. Making the case for action & Reflections on success factors

Photos: Kaine Chinwah John R Holmes
5. SOME LOCAL AND INNOVATIVE APPROACHES TO SWM IN DEVELOPING COUNTRIES

Photo credits: © Alodia Ishengoma, Sonia Maria Dias
Priority Global Waste Management Goals

**Ensure by 2020:**

1. Access of all to adequate, safe and affordable solid waste collection services

2. Stop uncontrolled dumping & open burning

*How to provide basic waste services sustainably in fast growing low income cities?*

Photos: UN-Habitat, David C Wilson
Is technology transfer the answer?

Collection and landfill in Lusaka, Zambia

Photo credits: Lusaka City Council/ Jan G Tesink
Actual data on proposed MSW investments 2013-2014

- $300 bn total waste investment projects ‘active’
- $85 billion in municipal solid waste (MSW)
- $26 billion in developing countries
- Average project size $100 million

Need to consider the local waste composition
Average data from the UN-Habitat cities

<table>
<thead>
<tr>
<th>Income Level</th>
<th>paper</th>
<th>glass</th>
<th>metal</th>
<th>plastic</th>
<th>organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>24%</td>
<td>6%</td>
<td>5%</td>
<td>11%</td>
<td>29%</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>13%</td>
<td>6%</td>
<td>5%</td>
<td>13%</td>
<td>52%</td>
</tr>
<tr>
<td>Lower-middle</td>
<td>8%</td>
<td>2%</td>
<td>1%</td>
<td>10%</td>
<td>67%</td>
</tr>
<tr>
<td>Low</td>
<td>6%</td>
<td>2%</td>
<td>1%</td>
<td>7%</td>
<td>71%</td>
</tr>
</tbody>
</table>

The waste is very different in middle- and low-income countries
*High organic content: higher density, wet, lower calorific value*

## Financial sustainability - affordability

<table>
<thead>
<tr>
<th>Income Level</th>
<th>City SW budget per capita</th>
<th>City SW budget per capita as % of GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>range</td>
<td>average</td>
</tr>
<tr>
<td>High</td>
<td>$75 -100+</td>
<td>0.03 - 0.40%</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>$33</td>
<td>0.14 - 1.19%</td>
</tr>
<tr>
<td>Lower-middle</td>
<td>$10</td>
<td>0.40 - 1.22%</td>
</tr>
<tr>
<td>Low</td>
<td>$1- 4</td>
<td>0.14 – 0.52%</td>
</tr>
</tbody>
</table>

Note: Based on 16 out of the original 20 cities – some corrections made using other data to allow for small sample size

**Affordability is a key constraint in the lower income countries**
- Fees 0.3-0.6% (< 1%) of household income

Requires access to funds for investment

- *Raising finance for investment in modern facilities continues to be a challenge in all countries*
- Developing country municipalities need partners:
  - National government
  - Development grants
  - International agency loans
  - Private investment
- Most partners only provide capital costs
- **Municipality still needs to be able to afford operating costs**

Photo credits: UN-Habitat & Jeroen IJgosse
Timothy O'Rourke for The New York Times
1st Step: DO MORE WITH YOUR MONEY

- Often cities spend 90% of the SWM budget collecting waste from 50% of population

- Improve performance and divert resources to extend collection coverage &/or improve waste disposal

- Work with communities/informal sector to expand service coverage

Key Messages of the WB’s ‘Planning Guide’

Link: http://www.worldbank.org/urban/solid_wm/erm/start_up.pdf
Improve efficiency of collection

Problems:
A. Multiple Manual Handling

B. High loading height

Photos from India: Kolkata, from web:
DCW, Chennai
KM1: Eliminate Multiple Manual Handling

1. Pick up waste just once
2. On-time collection

3. Avoid need for manual unloading

Photos (clockwise from top left): Adam Slee; Kaine Chin wah, IC; UN-Habitat, Jeroen Ijgosse; Adam Slee; David C Wilson
KM2. Match Collection Vehicles to Local Situation/Needs (1) 

*Different approaches in Lusaka, Zambia*

Formal collection

Peri-urban secondary collection

Photos: LCC-WMU
Photo Library, 
Jan G. Tesink
KM2. Match Collection Vehicles to Local Situation/Needs (2)


KM1: Eliminate multiple manual handling
Important for all vehicles to discharge loads directly
Can someone design a quick release harness please!

Pakistan
Photo: Manus Coffey
KM3. Need Good, Preventative Maintenance

Two examples from Dar-es-Salaam:

1. Truck provided within a 20-year structural loan, economic life only 3-4 years. Cannabalised for spare parts for other trucks.

2. 6 Italian reconditioned collection vehicles – not adapted to local conditions so over-heated – a new model in Tanzania so local dealer had no spare parts. After one year, only one truck still operating

Photos: Manus Coffey
Key questions for a city to ask when accepting investment in collection vehicles

Grants for (reconditioned) collection vehicles

- Do you need compaction?
- Access issues?
- Legal axle loads?
- Can vehicles and hydraulics be maintained locally?
- Are spare parts available & affordable?

Collection in Lusaka, Zambia

Photo credits: Lusaka City Council/ Jan G Tesink
GWMG 2: Stop uncontrolled dumping & open burning

Illegal roadside dumps, Port Harcourt, 2006
Photos: 2006, Kaine Chinwah, Imperial

A village dump

Large city dump - Dar-es-Salaam

Photo: John Holmes

(Photo: 2003, David C Wilson)
Step 1 - Engineered Control

Operational control - Compact & cover

Top: Ouagadougou, Burkina Faso, 2009
Photo: Jeroen Ijgosse

Bottom: Junk Bay, Hong Kong 1983
Photo: HKEPA
Key questions for a city to ask when accepting investment in modern landfills

Sanitary landfills to EU standards

- Are the operating costs affordable?
- Is an intermediate step (‘controlled disposal’) necessary?

Danish-funded landfill in Lusaka, Zambia

Photo credits: Lusaka City Council/ Jan G Tesink
Key questions for a city to ask when accepting investment in treatment facilities

**Waste-to-energy incinerators**

- Will our waste burn unsupported?
- Does it compete with recycling for paper, plastics?
- Can we afford the gate fee?
- Is there a market for heat?
- Does the environmental regulator have the powers & institutional capacity to control and monitor the gas cleaning?

**Baoan incinerator, Shenzhen, China**

**Novel technology**

- Is it proven?
- *Beware the magic solution*
- *If it seems too good to be true – then it probably is!*

Photo credit: Timothy O'Rourke for The New York Times
Cautionary tales

The world is littered with failed technologies

West African Incinerator, 1980

Photo: J.R. Holmes
‘The wrong sort of waste’

- Anaerobic Digestion - AD) plant built in Lucknow, India as a national demonstration in 2003
- Cost: USD 15 million
- Input: mixed waste
- Wastes piled up around the site
- Closed in 2004
Jam Chakro Landfill, Karachi

Built as a sanitary landfill in 1996, photos taken 2001

Photos: Jonathan R. Rouse
1980s Failed Mechanical Composting: Bangkok

Photos: DCW
Composting has high potential in developing countries

➢ High organic content
➢ Often a need to improve soils
➢ BUT high quality compost requires separation at source

_Ecaru, Egypt_

Photos: Mike Wenborn, 2004
Smaller scale composting

Canete, Peru

Photos from above clockwise: Bhushan Tuladhar, SWAPP, IPES

Educating women, Siddhipur, Nepal

All photos 2009

Philippines
Innovative funding mechanisms: Climate finance (1)

- Kyoto Clean Development Mechanism CDM)
- Early focus on methane from landfill
- Very bureaucratic…
- .. but provide a steady income, and
- an incentive to maintain your (new) landfill site

Payatas landfill gas recovery plant, Quezon City (Photo: SWAPP);
Climate finance (2)

CDM extended to composting:
- Dhaka Bangladesh
- Bulta compost plant
- 130 tonnes per day
- Receives source separated organics
- Employs informal collectors

Next challenge was recycling
- CDM very bureaucratic for community/informal sector

NAMAs – nationally appropriate mitigation actions

Photos: Waste Concern
Innovative funding mechanisms: EPR

- Extended producer responsibility
- Aims to transfer financial burden of end-of-life products and packaging from the municipality to the ‘producer’
- EPR has spread from the EU
- … wide interest in developing countries but progress is slow
- *How best to extend SWM partnerships to include the producers?*
- *Voluntary schemes vs legislation?*

Tunisia is an example of successful EPR

Photo: Sousse Municipality
WEEE in Africa
How to pass from this…

“Poisoning the poor – E-Waste in Ghana”

Trained ex-informal sector collectors as entrepreneurs, delivering WEEE for safe dismantling, recycling and disposal

Photos: Greenpeace, East Africa Compliant Recycling and Prof Margaret Bates
**RECYCLE!**

Existing recycling rates

Developing countries often have good recycling rates due to the informal sector.

2012 data for selected cities

GWMO Figure 3.11. Data for 36 Wasteaware cities
Major opportunity for win-win solutions through partnership with the informal sector

- Build recycling rates
- **Create jobs & improve livelihoods**
- Phase out hazardous and polluting working conditions
- Save the city money

[Itinerant waste buyer in Brazil](http://wmr.sagepub.com/content/30/9_suppl/43.full.pdf+html)

**Lots of work and guidance on selecting appropriate interventions for informal sector integration**

[Sorting recycled plastics in Delhi](http://wmr.sagepub.com/content/30/9_suppl/43.full.pdf+html)

*Photo credits: © Jeroen Ijgosse, Enrico Fabian*
Example 1: Quezon City, Philippines

- Sharp increase in recycling

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>IWBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>2006</td>
<td>25%</td>
<td>16%</td>
</tr>
<tr>
<td>2009</td>
<td>37%</td>
<td>24%</td>
</tr>
</tbody>
</table>

- NGO-led ‘Linis Ganda’
  - Linkages across supply chain
  - Recognition & respectability
    - uniforms, ID, access
    - politically connected
  - Organise co-operatives
  - Facilitate affordable credit

Photo credits: Embassy of Japan in the Philippines; Government of the Philippines, 2006
Example 2: ‘Waste to wealth’ in Africa

- Living Earth Foundation 2010-15: using SWM as a catalyst for wider development
- Pilot projects in 5 countries
- EU, DFID, Comic Relief funding
- 840 new jobs in waste recycling
- 60,000 slum dwellers with access to waste collection
- 7000 people making an income from waste recycling streams
- Business training to 150 MSEs
- Profits increases of 15-30%
- 19 public private partnerships signed with local government

Briquette-making in Sierra Leone

Collecting plastic wastes to make paving slabs in Cameroon

http://wastetowealth.livingearth.org.uk/waste-to-wealth-programme/
Example 3: Working with women in Gambia

- Women are the main actors in waste management in households
- Also most concerned at health impacts when wastes unmanaged
- Tiny cash incentives enough for effective source separation
- Identified 4 local business opportunities: charcoal briquettes, compost and fish meal from organic wastes; paving slabs from plastics
- Recycling Innovation Centre – training women in simple technologies and business skills

Dump site in Brikama

Making charcoal briquettes from mango leaves

Wasteaid.org.uk
Pro-Poor Public-Private Partnerships - 5Ps

- Services by the poor for the poor
- Pioneered by ILO, e.g. in Dar-es-Salaam, Tanzania

Photos: Alodia Ishengoma (2009); David Wilson (2003, top right)
Local initiatives
Case 1: Moshi, Tanzania

- Population 184,000
- Focus on cleanliness
- Driven by local culture (Chaga and Pare tribes)
- Political commitment
- Stakeholder platform since 1999
- Collection extended into unplanned settlements

Clean streets – below Mount Kilimanjaro
Loading container
Plastics recycling

Photos: Alodia Ishengoda, 2009
Local initiatives

Case 2: Ghorahi, Nepal

- Population 59,000
- Clear vision
- Strong municipal commitment
- Active stakeholder participation, landfill management committee
- City funded site selection, accepted by community, funds allocated by Government
- Landfill is source of civil pride

Karauti Danda Sanitary Landfill including waste sorting / recycling

Concept: 2000; Operational: 2005
Disaster Waste Management
GWMO Case Study: Typhoon Haiyan

Key lessons learned:

- Clear debris quickly
  - Cash-for-work programme using local contractors/labour
  - Demolish unsafe buildings
- Manage healthcare waste
- Re-establish MSWM systems
- Cluster local government units
- Use cash-for-work to re-establish recycling businesses

UK specialist NGO
http://www.disasterwaste.org

Photos: © Thorsten Kallnischkies
Short video: landfill gas project in Ekurhuleni Metropolitan Municipality, South Africa

- Controlled landfill site
- Municipality financed and operated
- Features the landfill gas utilisation project – originally conceived in 2005 as a CDM project
- Main driver: meeting the municipality’s 10% renewable energy target
- Large population of pickers
6A. Making the political case for action on SWM
Waste management is an essential utility service

**Public health priority**
Extend municipal solid waste collection to **100%** of the urban population

**Environmental priority**
Eliminate open dumping and burning
Achieve **100%** controlled disposal

**2-3 billion people** without access to a basic waste management service

Cartoon: High Moon
The costs of inaction

- Health care
- Lost productivity
- Flood damage
- Damage to business & tourism
- Clean-up costs

Costs to society exceed the financial costs of proper waste management by a factor of 5-10

Data are scarce
But evidence is clear
Need to act NOW, rather than waiting for ever for perfect information

Source: GWMO
Benefits of waste and resource management

Waste management has strong linkages, and provides an ‘entry point’, to a range of other global challenges, including:

- Climate change
- Employment/sustainable livelihoods
- Good governance

Waste management is an integral part of the 2030 Agenda for Sustainable Development

Source: GWMO
# 2030 Agenda for Sustainable Development

<table>
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<tr>
<th>GLOBAL WASTE MANAGEMENT GOALS</th>
<th>RELATED SDGs</th>
</tr>
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<tbody>
<tr>
<td><strong>Ensure by 2020</strong></td>
<td></td>
</tr>
<tr>
<td>W.1 Access for all to adequate, safe and affordable solid waste collection services</td>
<td>3 – Health for all, 11 – Safe cities</td>
</tr>
<tr>
<td>W.2 Stop uncontrolled dumping, open burning</td>
<td>3 – Health for all, 11 – Safe cities, 6 – Clean water and sanitation, 14 – Marine resources, 15 – Terrestrial ecosystems</td>
</tr>
<tr>
<td><strong>Ensure by 2030</strong></td>
<td></td>
</tr>
<tr>
<td>W.3 Achieve sustainable and environmentally sound management of all waste, particularly hazardous waste</td>
<td>12.4 – Managing all waste, 7 – Access to energy, 13 – Climate change</td>
</tr>
<tr>
<td>W.4 Substantially reduce waste generation through prevention and the 3Rs (reduce, reuse, recycle) and thereby create green jobs</td>
<td>12.5 – The 3Rs, 8 – Growth &amp; employment, 1 – End poverty, 9 – Sustainable industry</td>
</tr>
<tr>
<td>W.5 Halve per capita global food waste at the retail and consumer levels and reduce food losses in the supply chain</td>
<td>12.3 – Food waste, 2 – End hunger; food security</td>
</tr>
</tbody>
</table>

Source: GWMO
10-point Call to Action to achieve the Global Waste Management Goals

- Short-term actions to meet the 2020 goals
- Actions on each stakeholder group
  - International community
  - Specific to developing countries
  - All national and city governments
  - You and me as individuals
Short term actions to meet the 2020 goals

- **Extend basic waste services to all.** As an initial step:
  - Achieve 100% collection coverage in cities with population > 1 million
  - Eliminate open burning
  - Close large open dumps → controlled disposal

- **Mobilize Overseas Development Assistance:**
  - 0.3 % → 3.0%
  - Support the least developed countries

Source: GWMO
How much official development finance is spent on waste issues?

Actions: international community

- Assist the poorest countries to extend access for all to waste services
- Establish/strengthen wide reaching capacity development programmes in developing countries
- Hazardous wastes – *finance* both enforcement and ensuring the provision of sound facilities within developing countries for their own waste
- Promote producer responsibility programmes to ensure that international companies take their fair share of responsibility for waste management in developing countries.

Source: GWMO
Actions: Specific to developing economies

- Meet the 2020 goals by extend basic waste services to all

- Develop a holistic approach to managing all residuals. E.g. integrate sanitation and solid waste management services

- Build on existing small-scale entrepreneurial recycling systems while eliminating hazardous working practices

Photo: I. Zabaleta

Source: GWMO
Actions: ALL National and City governments

All countries still have some way to go to meet the 2030 goals

➢ Improve access to financing for sound waste management facilities and operations
➢ Reduce waste at source. Engage citizens, industries and other stakeholders
➢ Improve substantially the availability and reliability of waste & resource management data
➢ Use the governance ‘toolkit’ in the GWMO to help select the appropriate set of actions

Source: GWMO
Actions: You and Me

**General public**
- Take responsibility for your own waste
- Present waste for collection as instructed by the municipality
- Do not dump, litter or burn waste

**Business and industry**
- Take responsibility for waste and expect to pay the full economic costs of sound management

**Everyone**
- Segregate waste at source and keep materials separate to avoid contamination and make reuse and recycling easier
- Save money and resources through the 3Rs of reduce, reuse, and recycle

Source: GWMO
6B. REFLECTIONS ON SUCCESS FACTORS

Photos from Ghorahi and Siddhipur, Nepal:
© Bhushan Tuladhar, 2009
The global challenge we face

2-3 billion people still lack access to basic waste services

This is simply UNACCEPTABLE!
The World community MUST work together URGENTLY to address it

Photos: UN-Habitat; Natalia Reyna
Priorities are defined by the physical requirements …

• Extend collection coverage
• Reduce waste generation
• Build recycling rates
• Eliminate open dumping
• Environmentally sound management

DCW’s version of the waste hierarchy
.. but successful implementation requires good governance

- Partner with all stakeholders
- Build sound institutions
- Make finances sustainable
- If you don’t measure it, you can’t manage it
Behaviour change takes time

- Public education & awareness
  - Needs a comprehensive, culturally appropriate programme

- Effective behaviour change
  - Requires a sustained change in the public’s habits and behaviours regarding their waste management/handling practices

Dengue fever clean-up campaign, Manila
Educating women on composting, Nepal

Photos: SWAPP; Bhushan Tuladhar
Success factors

• *No one size fits all – every city needs to develop its own local and sustainable solution*

• Commitment does more than money: several poor cities with good systems

• Building on what you have works

• *Integrate informal activities into the system*
  – *They make a big contribution, save the city money*

• Technical ambitions need to be modified to achieve affordability: e.g. a sanitary landfill is worth nothing if it the city can’t afford to use it
ALL stakeholders need to work together to achieve the

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</tr>
<tr>
<td>W.4</td>
</tr>
<tr>
<td>W.5</td>
</tr>
</tbody>
</table>
A ‘Thank You’ - to the millions of professionals around the world who make a living from waste - as do I

Clockwise from top left: Canete, Nepal, Delhi, Sousse, Cairo, Bengaluru, Dhaka, San Francisco, Rotterdam

Photo credits in same order: © Oscar Espinoza; Bhusan Tuladhar; Enrico Fabian; Verele de Vreede; David C Wilson; Jeroen Ijgosse; Waste Concern; Portia M. Sinnott; Rotterdam
Reference list with weblinks


  http://www.icevirtuallibrary.com/content/article/10.1680/warm.12.00005


- ISWA FRAMEWORK FOR INFORMAL SECTOR INTEGRATION: Velis et al, 2012 - http://wmr.sagepub.com/content/30/9_suppl/43.full.pdf+html

Thank you for your attention!

Discussion Session

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