Sustainable waste management in developing countries – Part B

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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

Moshi – the ‘cleanest city in Tanzania’

Waste & Citizenship Forum, Belo Horizonte

5. SOME LOCAL AND INNOVATIVE APPROACHES TO SWM IN DEVELOPING COUNTRIES

Photo credits: © Alodia Ishengoma, Sonia Maria Dias

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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

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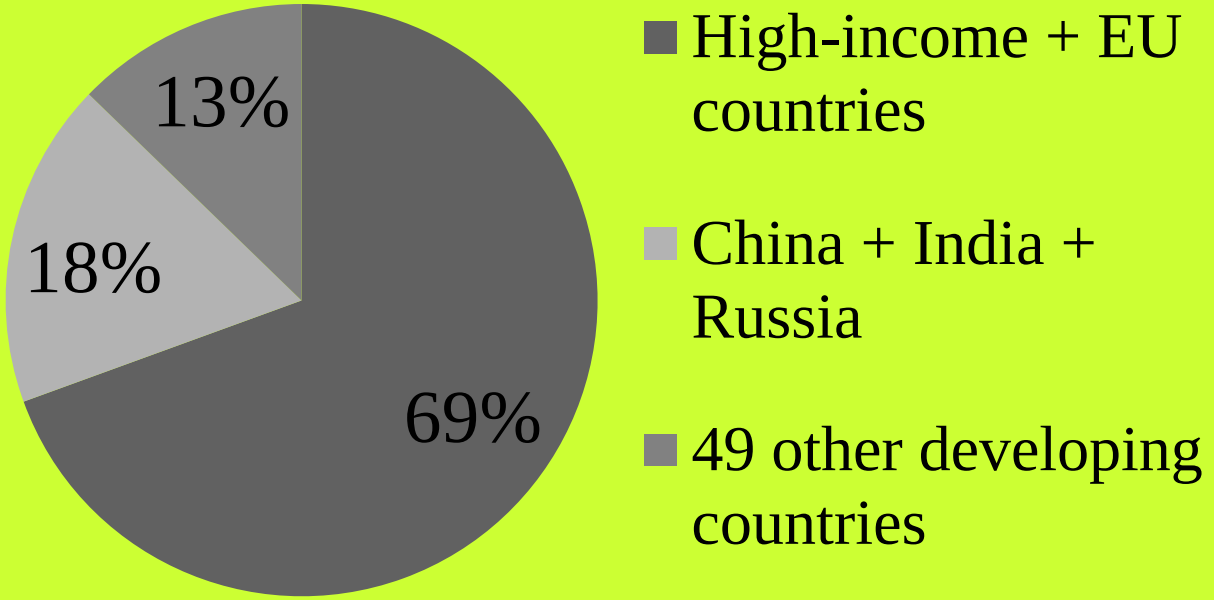
Is technology transfer the answer?

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*



Data extracted from AcuComm's Waste Business Finder database for GWMO. Data covers Jan 2013 to Dec 2014.

Need to consider the local waste composition

Average data from the UN-Habitat cities

Income Level	paper	glass	metal	plastic	organic
High	24%	6%	5%	11%	29%
Upper-middle	13%	6%	5%	13%	52%
Lower-middle	8%	2%	1%	10%	67%
Low	6%	2%	1%	7%	71%

The waste is very different in middle- and low-income countries

High organic content: higher density, wet, lower calorific value

Data source: Scheinberg A, Wilson D.C. and Rodic L. (2010). *Solid Waste Management in the World's Cities*. Published for UN-Habitat by Earthscan, London

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Financial sustainability - affordability

Income Level	City SW budget per capita	City SW budget per capita as % of GDP per capita	
		range	**average**
High	**$75 -100+**	0.03 - 0.40%	**0.13 - 0.17%**
Upper-middle	**$33**	0.14 - 1.19%	**0.6%**
Lower-middle	**$10**	0.40 - 1.22%	**0.7%**
Low	**$1- 4**	0.14 – 0.52%	**0.3 - 0.9%**

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

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Data source: Scheinberg A, Wilson D.C. and Rodic L. (2010). *Solid Waste Management in the World's Cities*.

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**

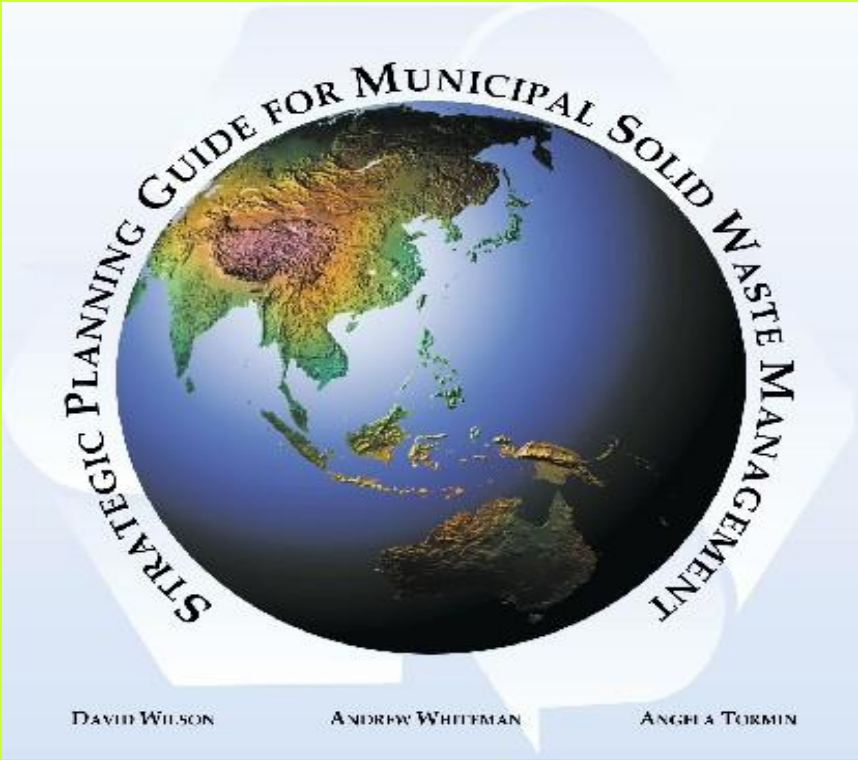
Photo credits: UN-Habitat & Jeroen IJgosse
Timothy O'Rourke for The New York Times

1st Step: DO MORE WITH YOUR MONEY

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

Key Messages of the WB's 'Planning Guide'

- **Improve performance and divert resources to extend collection coverage &/or improve waste disposal**
- *Work with communities/ informal sector to expand service coverage*



Link: http://www.worldbank.org/urban/solid_wm/erm/start_up.pdf

Improve efficiency of collection

Collecting the morning garbage

Problems:

A. Multiple Manual Handling

B. High loading height

DCW

Photos from India: Kolkata, from web: DCW, Chennai

KM1: Eliminate Multiple Manual Handling

1. Pick up waste just once

2. On-time collection

∧ Chennai

∧ Port Harcourt

∨ Dar-es-Salaam

∧ Managua

∨ Exnora, Chennai

3. Avoid need for manual unloading

Photos (clockwise from top left): Adam Slee; Kaine Chinwah, IC; UN-Habitat, Jeroen Ijgosse; Adam Slee; David C Wilson

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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

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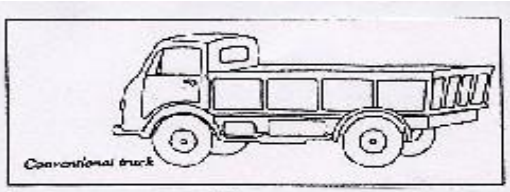
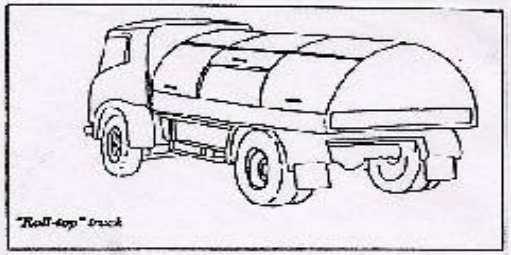
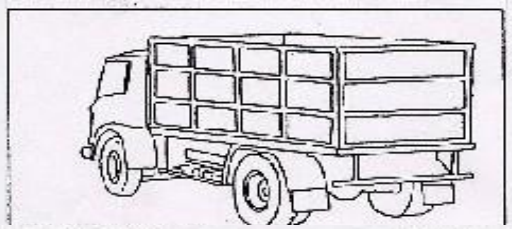
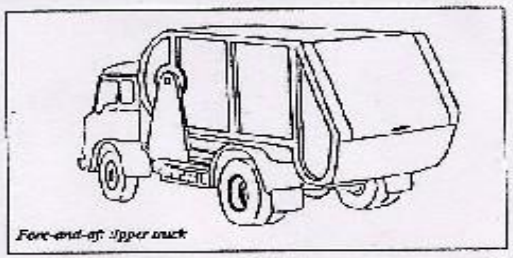
KM2. Match Collection Vehicles to Local Situation/Needs (2)

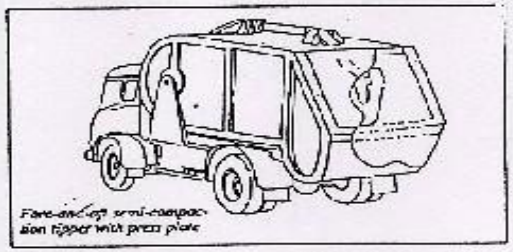
Source: Refuse Collection Vehicles for Developing countries, UN-Habitat ISBN 92.1.1310660.0.

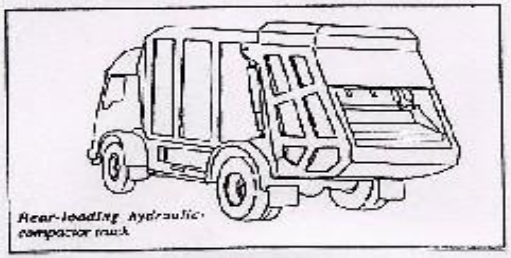


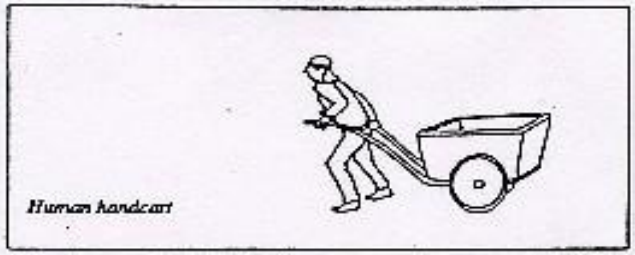


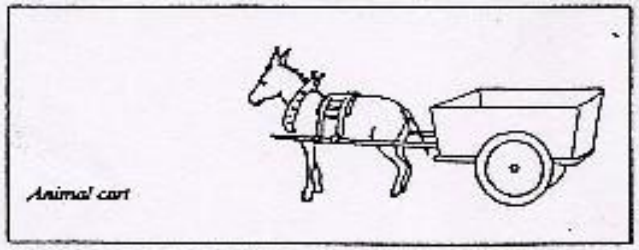


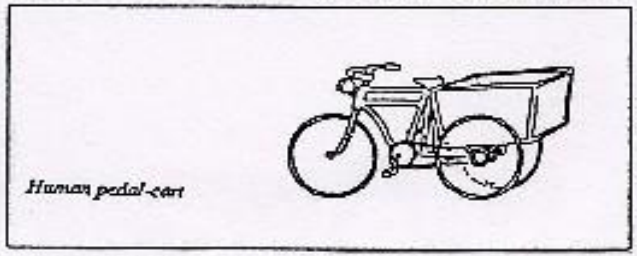


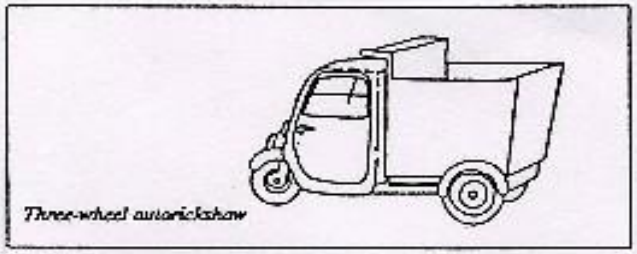


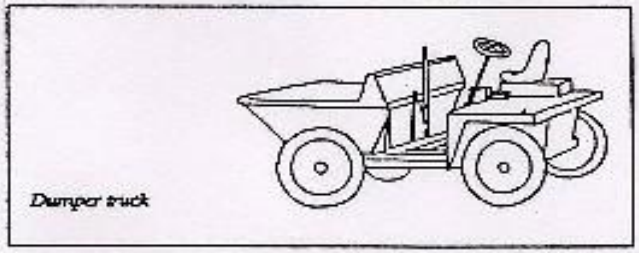


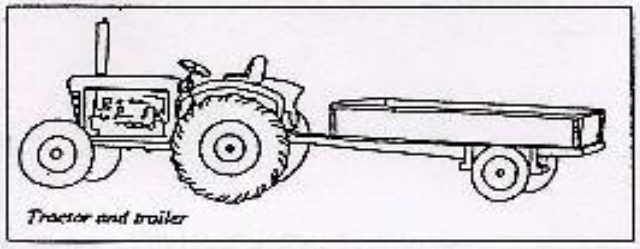












KM1: Eliminate multiple manual handling

Important for all vehicles to discharge loads directly

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Can someone design a quick release harness please!

Pakistan
Photo:
Manus
Coffey

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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

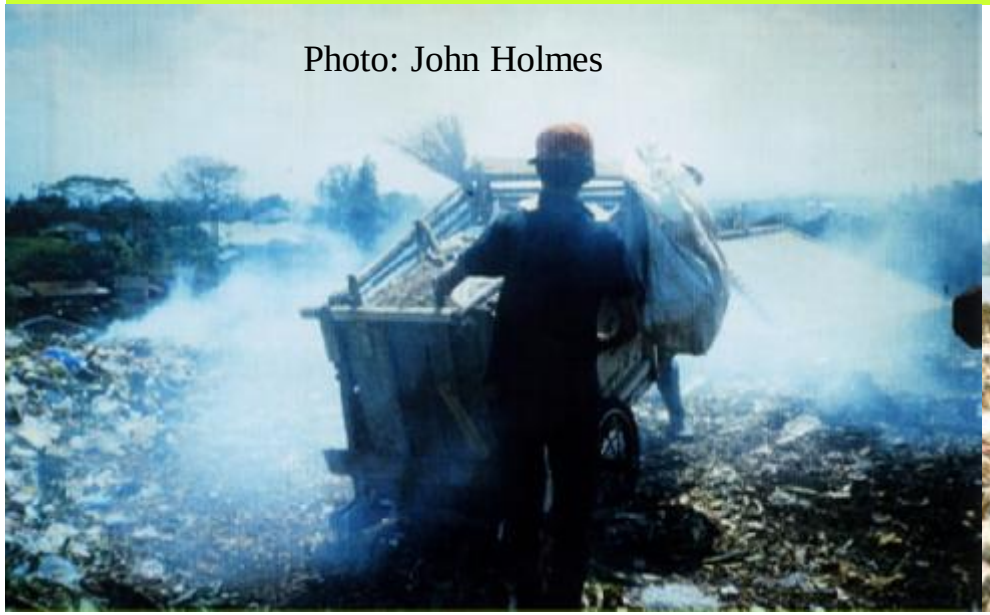
Illegal roadside dumps, Port Harcourt, 2006

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!*

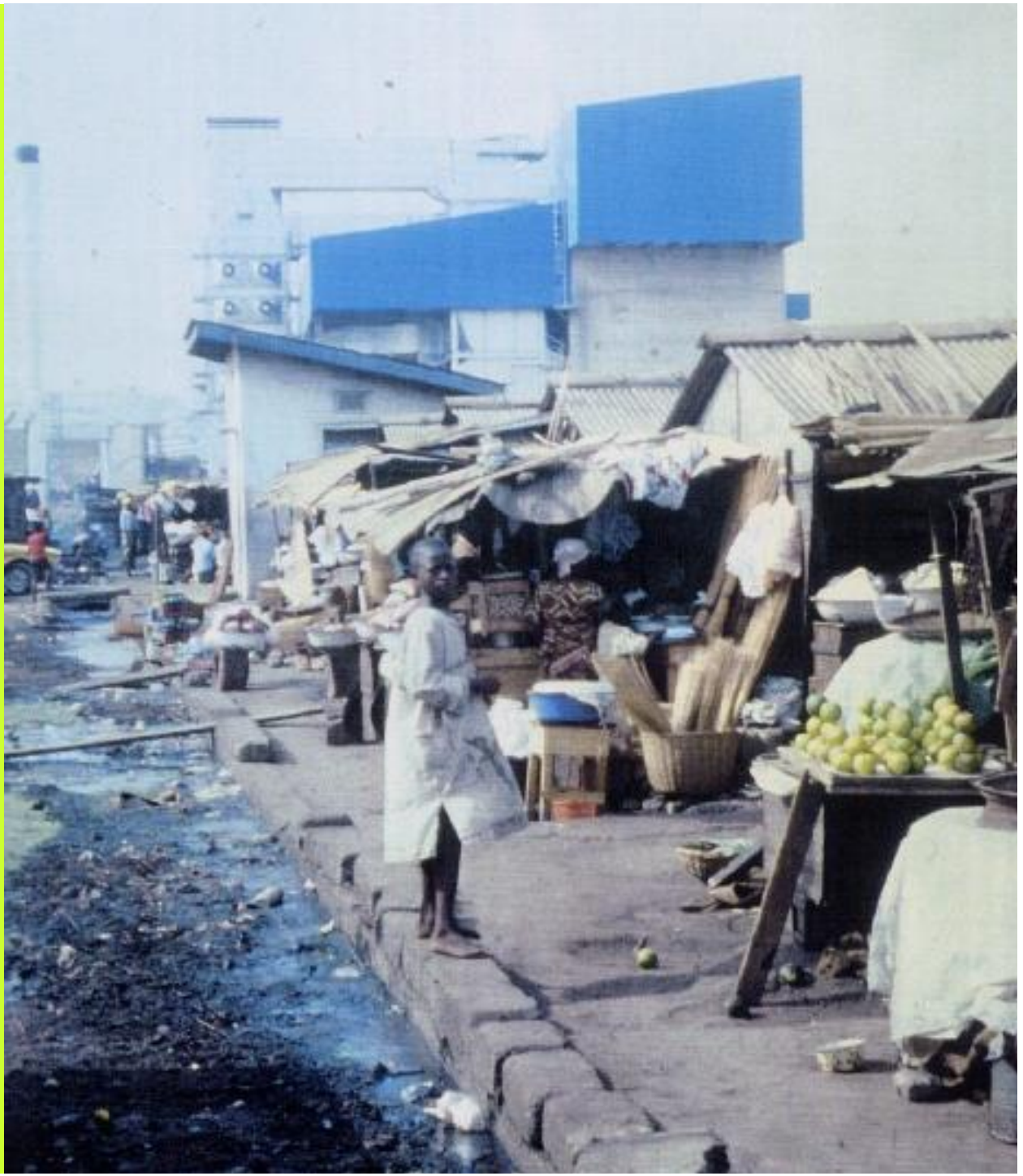
Photo credit: Timothy O'Rourke for The New York Times

Cautionary tales

The world is littered with failed technologies

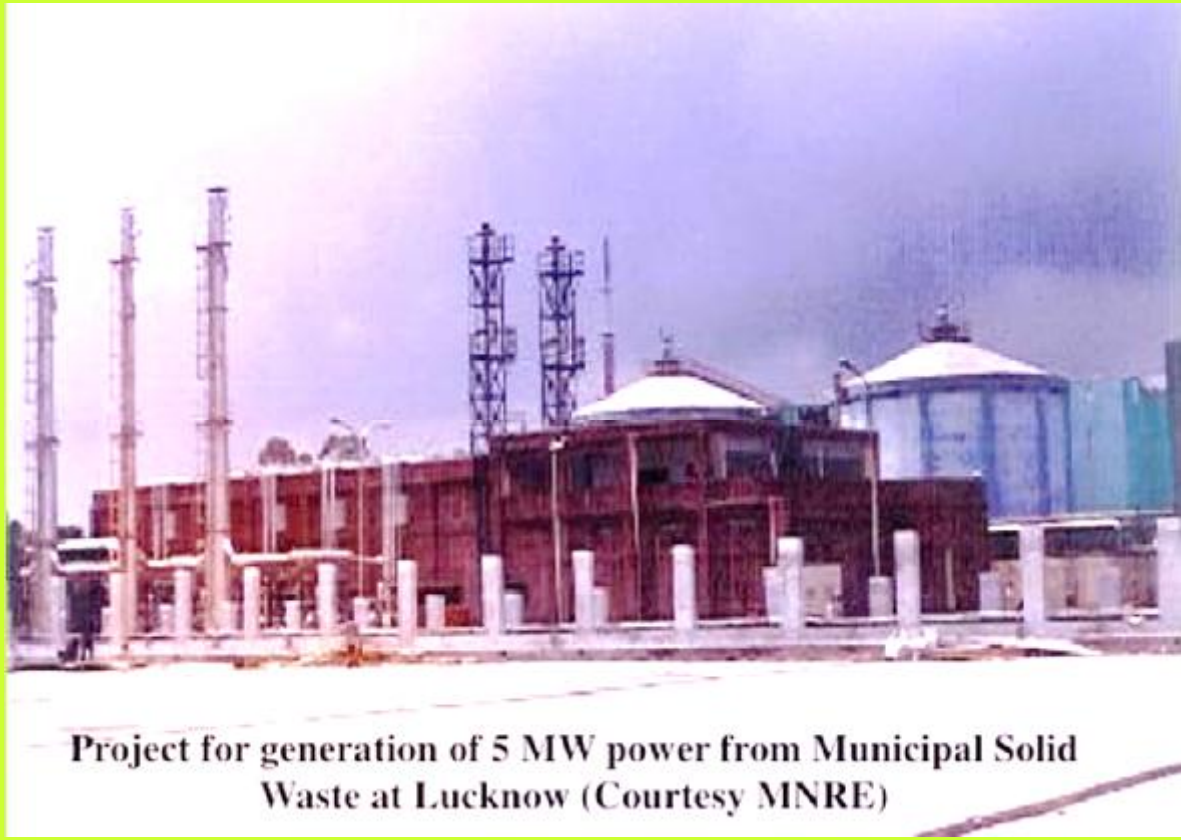
West African Incinerator, 1980

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



Project for generation of 5 MW power from Municipal Solid Waste at Lucknow (Courtesy MNRE)

Jam Chakro Landfill, Karachi

Built as a sanitary landfill in 1996, photos taken 2001

Photos: Jonathan R. Rouse

Photos: DCW

1980s Failed Mechanical Composting: Bangkok

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

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Smaller scale composting

Canete, Peru

Educating women, Siddhipur, Nepal

Philippines

All photos 2009

Photos from above clockwise:
Bhushan Tuladhar, SWAPP, IPES

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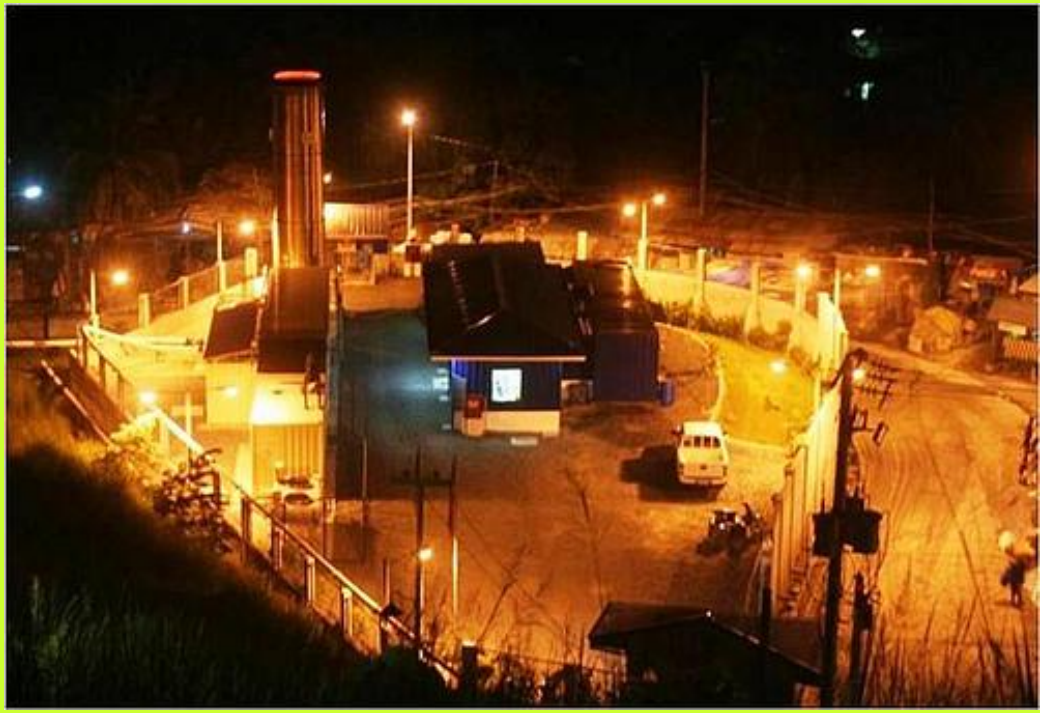
Innovative funding mechanisms: Climate finance (1)

- 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);

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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"

… to this?

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

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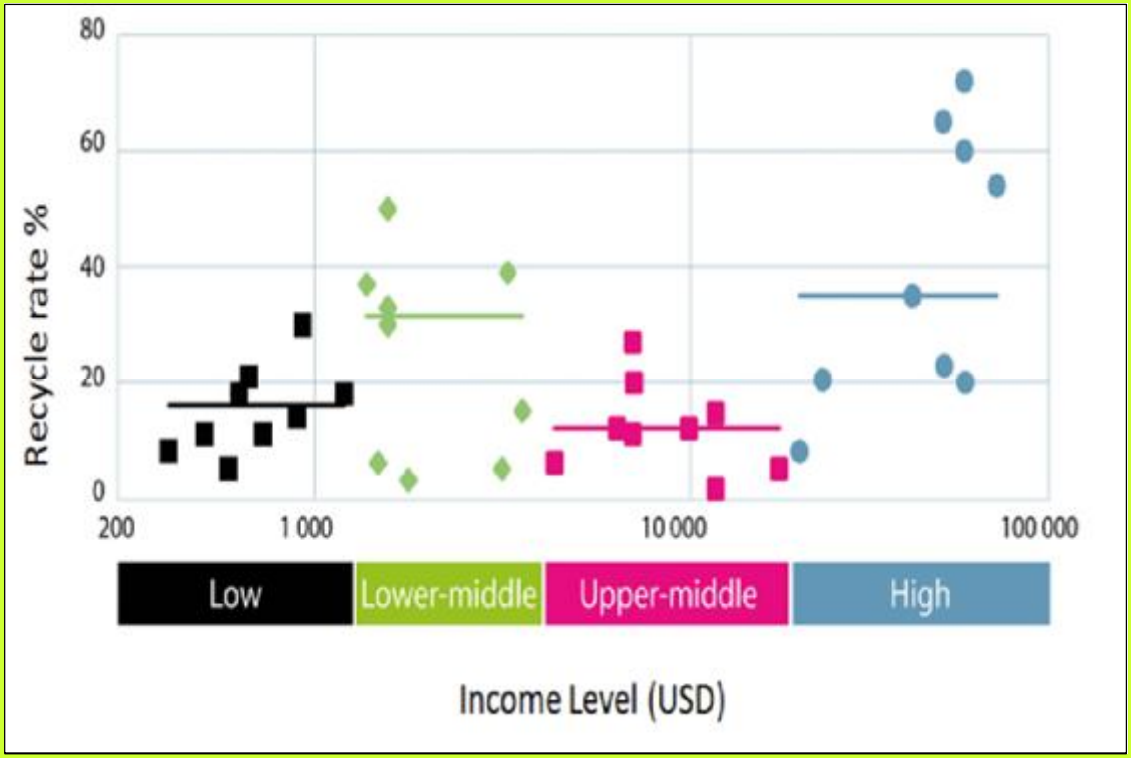
RECYCLE!

Existing recycling rates



2012 data for selected cities

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

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

Sorting recycled plastics in Delhi

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

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

Year	Total	IWBs
1997	6%	4%
2006	25%	16%
2009	37%	24%

- 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

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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

FAY FENGO NAFAA-SIYATA
Making Waste Useful

wasteaid UK

Wasteaid.org.uk

Womens Initiative – The Gambia

GAMBIA

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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

DcW

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

Photo credits : © Bhushan Tuladhar

Karauti Danda SanitaryLandfill

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

Disaster Waste Recovery

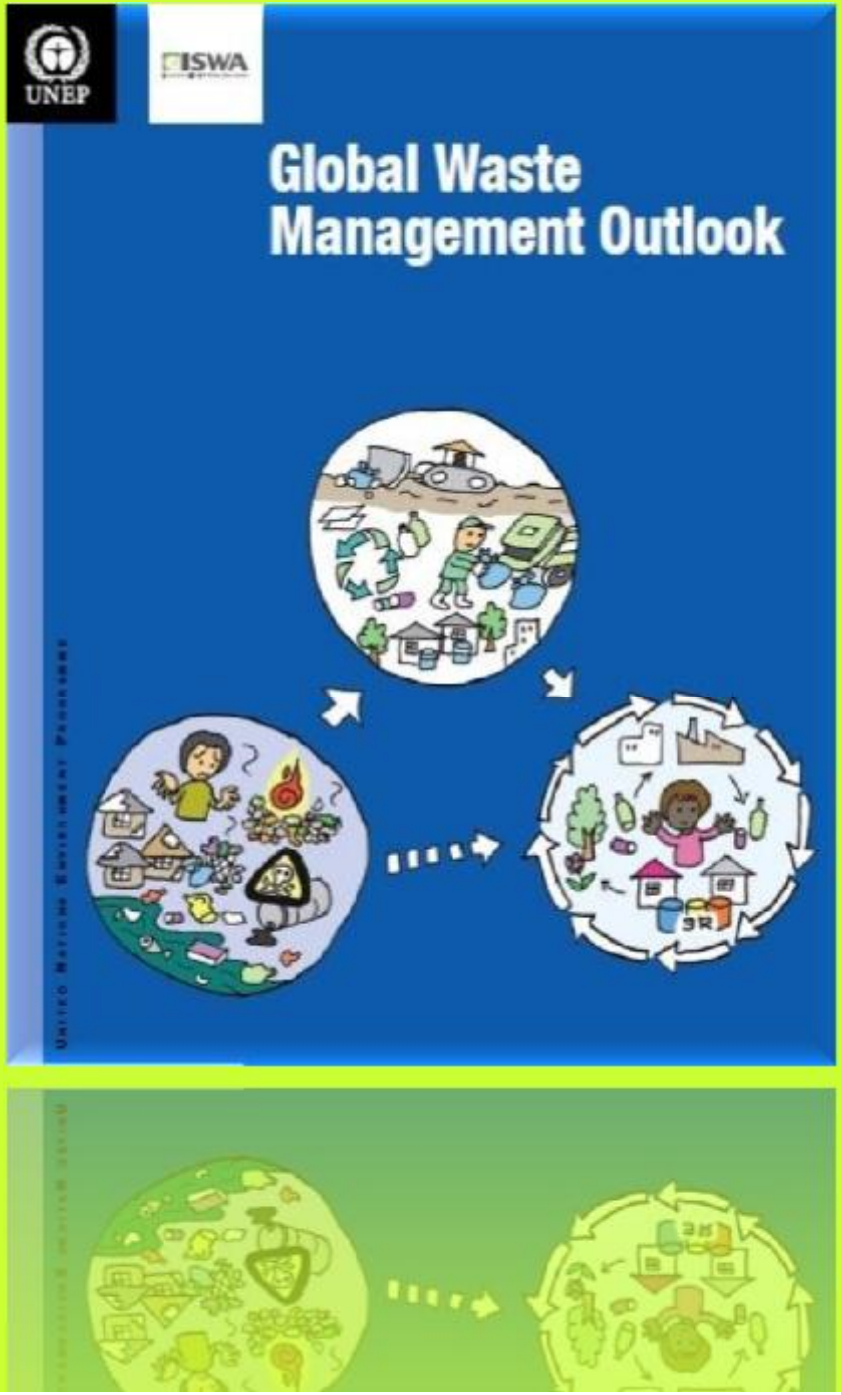
UK specialist NGO
http://www.disasterwaste.org

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

DcW

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

High Moon

Data are scarce

But evidence is clear

Need to act NOW, rather than waiting for ever for perfect information

Source: GWMO

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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

GLOBAL WASTE MANAGEMENT GOALS			RELATED SDGs	
Ensure by 2020	W.1	Access for all to adequate, safe and affordable solid waste collection services	3 – Health for all	11 – Safe cities
	W.2	Stop uncontrolled dumping, open burning	3 – Health for all 11 – Safe cities 12 – Sustainable consumption and production (SCP)	6 – Clean water and sanitation 14 – Marine resources 15 – Terrestrial ecosystems
Ensure by 2030	W.3	Achieve sustainable and environmentally sound management of all waste, particularly hazardous waste	12.4 – Managing all waste 13 – Climate change	7 – Access to energy
	W.4	Substantially reduce waste generation through prevention and the 3Rs (reduce, reuse, recycle) and thereby create green jobs	12.5 – The 3Rs 8 – Growth & employment	1 – End poverty 9 – Sustainable industry
	W.5	Halve per capita global food waste at the retail and consumer levels and reduce food losses in the supply chain	12.3 – Food waste	2 – End hunger; food security

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Source: GWMO

THE WORLD WE WANT

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

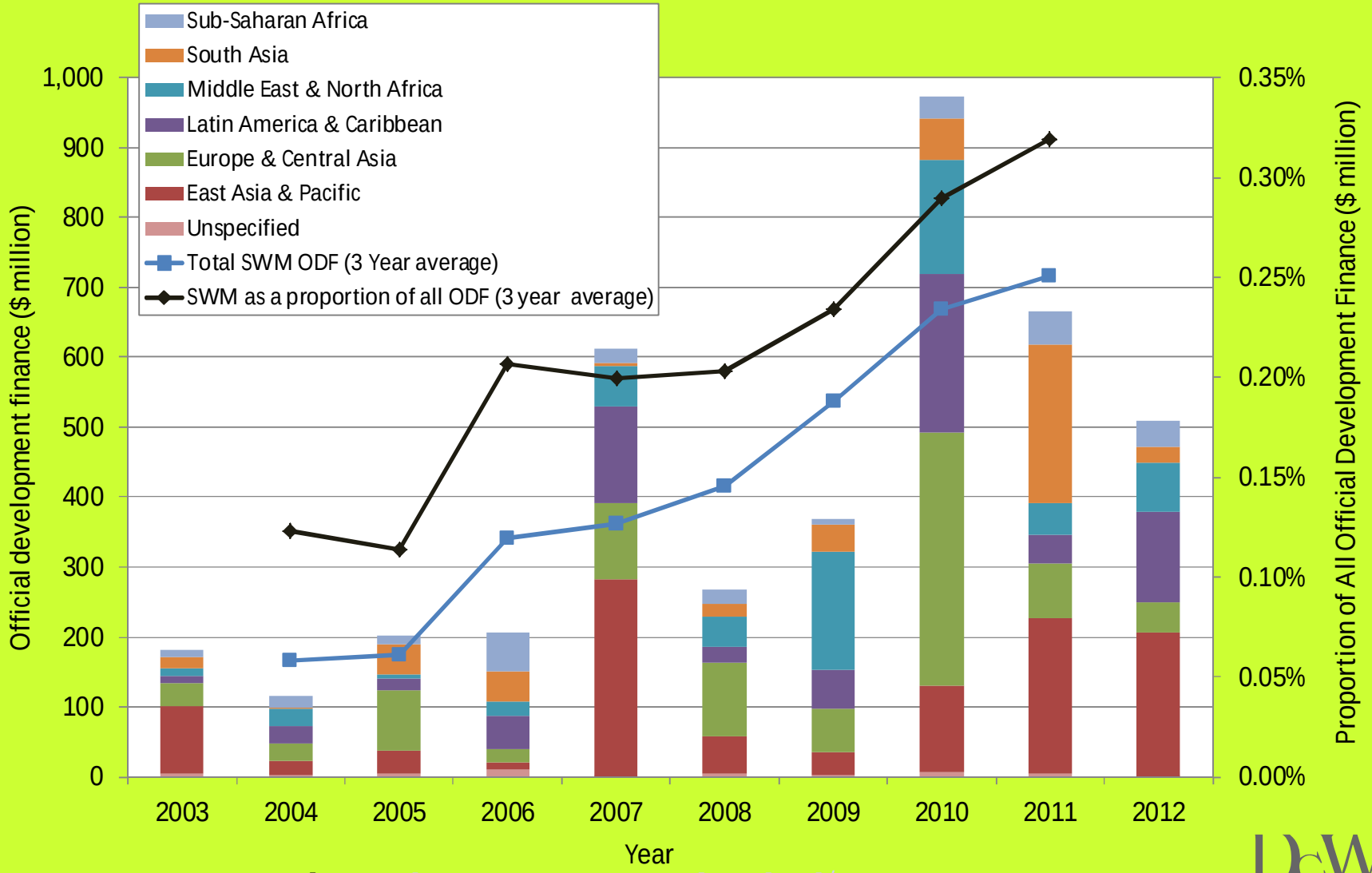
Short term actions to meet the 2020 goals

- **Extend basic waste services to all**. As an initial step:
  - Achieve 100% collection coverage in cities with population >1million
  - 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?



Source: Lerpiniere et al, 2014 http://iswa2014.org/download/

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*

DcW

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

DEW

Source: GWMO

On time collection

Itinerant waste buyer

Educating women on composting

6B. REFLECTIONS ON SUCCESS FACTORS

Photos from Ghorahi and Siddhipur, Nepal:

The global challenge we face

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

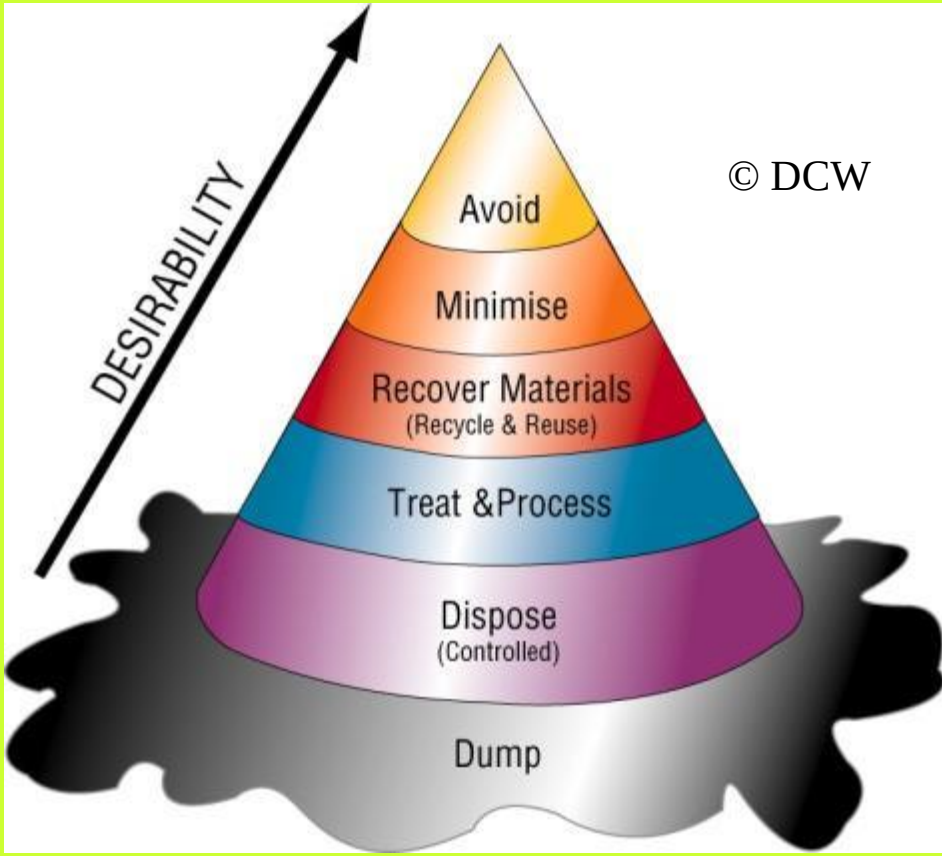
This is simply UNACCEPTABLE!

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

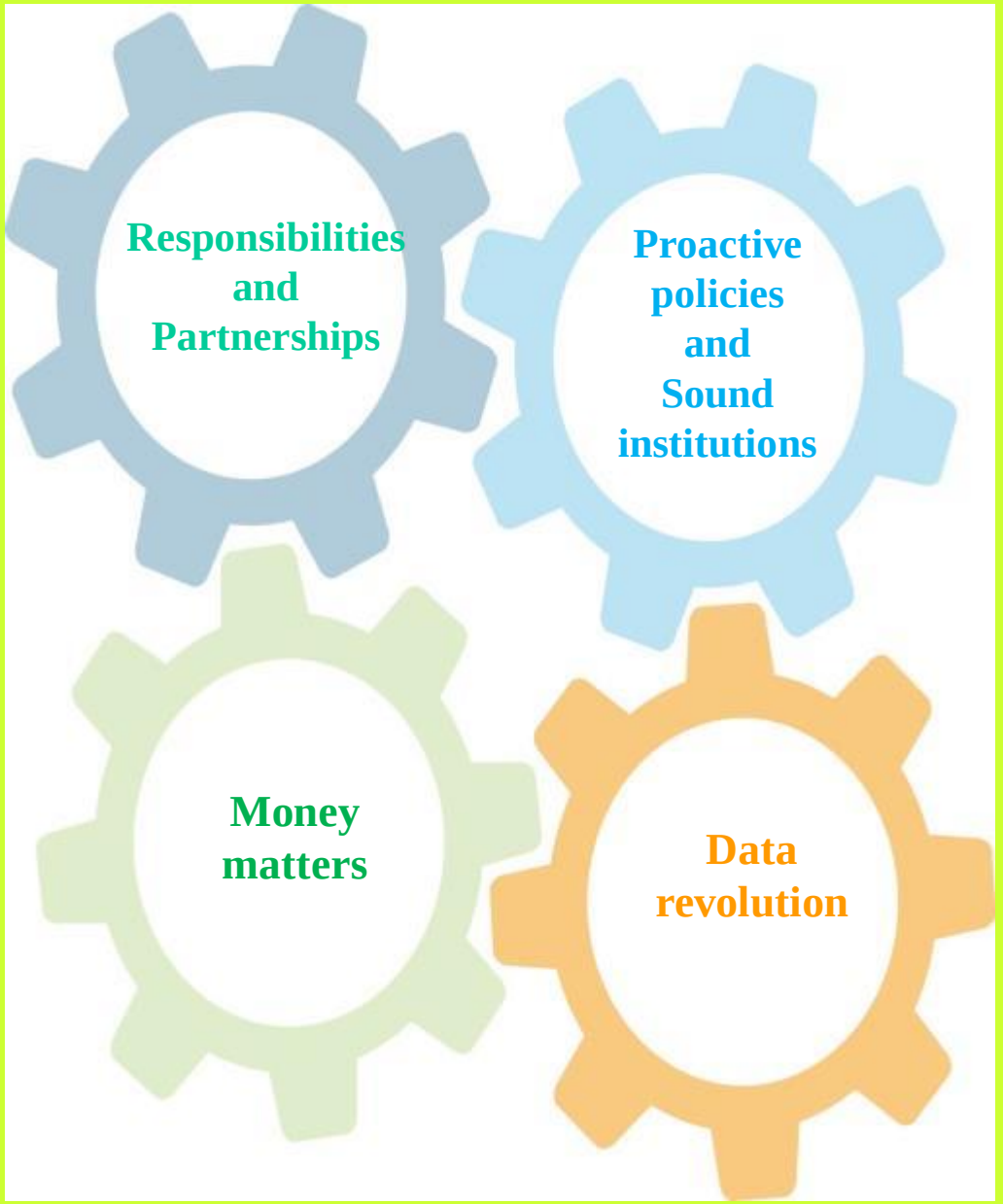


DCW's version of the waste hierarchy

DCW

.. 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

GLOBAL WASTE MANAGEMENT GOALS		
Ensure by 2020	W.1	Access for all to adequate, safe and affordable solid waste collection services
	W.2	Stop uncontrolled dumping, open burning
Ensure by 2030	W.3	Achieve sustainable and environmentally sound management of all waste, particularly hazardous waste
	W.4	Substantially reduce waste generation through prevention and the 3Rs (reduce, reuse, recycle) and thereby create green jobs
	W.5	Halve per capita global food waste at the retail and consumer levels and reduce food losses in the supply chain

DcW

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

DcW

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

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Thank you for your attention!

Discussion Session

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