The Growing Complexities and Challenges of Solid Waste Management in Developing Countries

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The World Bank
Loans, Grants, and Capacity Building to Alleviate Poverty and its Conditions

- 185 member countries
- 100 offices
- 10,000 staff
- Total portfolio ~1800 active projects
  - $23.6 billion for 279 new projects (in 2006)
- Solid waste portfolio ~ 90 active projects
  - $126 million for 14 new projects (in 2006)
Highlights for this talk

- Global urban growth and wastes arisings.
- Growing MSW, not keeping up.
- Hazardous wastes, still unaddressed.
- Livestock wastes, not a pastoral view.
- Governance versus private investment.
- Gender action and youth employment.
- Economic instruments and policies.

Population Growth

- It took human history over 3 million years to reach 1 BB people in the early 1800’s.
- Today, we gain 1 BB people every 12-14 years.
- World population grows by more than 200,000 each day.

Solid Waste – An Urban Issue

- This year, for the first time in history, the world’s urban population equals the world’s rural population.
- One third of urban population lives below the poverty of $2/day.
- By 2030, the world’s urban population is expected to reach 5 Billion.
- Industry and industrialized (landless) livestock production is moving to the peri-urban areas, adding to the urban concentration of wastes and pollution.

Urban Solid Wastes

- Developed Countries – High Income
  - Population – 1.0 BB
  - Waste – 1.4 MM tonnes/day (1.4 kg/capita/day)
- Developing Countries – Middle Income
  - Population – 3.0 BB (~30% of city dwellers live in slums)
  - Waste – 2.4 MM tonnes/day (0.8 kg/capita/day)
- Developing Countries – Low Income
  - Population – 2.4 BB (~65% of city dwellers live in slums)
  - Waste – 1.4 MM tonnes/day (0.6 kg/capita/day)

Cointreau estimates, 2007
Municipal Waste Character

- **Developed Countries - High Income**
  - 45% recyclable
  - 35% compostable
  - 25% moisture
  - Most hazardous wastes excluded.
- **Developing Countries – Middle Income**
  - 25% recyclable
  - 50% compostable
  - 50% moisture
  - Some hazardous wastes excluded.
- **Developing Countries – Low Income**
  - 15% recyclable
  - 60% compostable
  - 60% moisture
  - Few hazardous wastes excluded.

Cointreau estimates, based on global data, 2007

Urban Waste Collection and Disposal (% of waste tonnes handled)

- **Developed Countries – High Income**
  - Collection – 100%
  - Safe Disposal – 100%
- **Developing Countries – Middle Income**
  - Collection – 60%
  - Safe Disposal - 30%
- **Developing Countries – Low Income**
  - Collection – 40%
  - Safe Disposal – 5%

Cointreau estimates, 2007
Livestock Wastes

- 75% of all emerging human diseases in the past decade have come from animals (e.g., SARS, High Path Avian Influenza, Mad Cow, Lyme, West Nile, Ebola).
- Excreta is a priority means of transmission for some livestock diseases (e.g., High Path Avian Influenza, Foot-and-Mouth).
- Feed additives pass into excreta and compromise treatment and land application options.

Animal Production Growth

- Demand for meat increases after income is above $2/day.
- Meat production growth in developing countries is 4 times growth in high income countries.
- Industrialized (landless) livestock production is growing 6 times faster than pastoral production.
- Industrialized poultry production growing by ~ 80% from 2001-2020.
- Industrialized pork and ruminate production growing by ~ 50% from 2001-2020.
- China is the largest meat producer in the world...74 MM tonnes in 2004.

World Bank, Managing the Livestock Revolution, 2005
Industrialized Animal Production

- Lack of land carrying capacity for wastes.
- Non-therapeutic use of antimicrobials to increase livestock yields (e.g., 70% of all antimicrobials in US are used for livestock production).
- Arsenic-based growth promoters are used in most poultry and swine production, resulting in significantly growing and cumulative arsenic emissions (only banned in EU and New Zealand).
- Arsenic from manure application to soils is available for crop uptake and can pollute water supplies.
- Many livestock antimicrobials are also used by humans. Their use increases antibiotic resistant pathogens in human food and in the environment.

Fish Production Growth

- Fish provide 16% of global animal protein.
- Fish production grew 500% in last 3 decades, compared to meat growth of 60%.
- Share of aquaculture in food fish increased from 3.9% in 1970 to over 40% in 2004.
- China is the largest aquaculture producer in the world, and obtains over 75% of its food fish from aquaculture…49 MM tonnes in 2004.

World Bank, Aquaculture: Changing the Face of the Waters, 2006
Aquaculture

- Livestock manures are used in some fish ponds to stimulate algal growth, and these manures include livestock antimicrobials and arsenic-based growth promoter residuals.
- Non-therapeutic use of antimicrobials to increase fish yields.
- Feed residue and fish excreta pass directly into water.
- Many fish antimicrobials are also used by humans. Their use increases antibiotic resistant pathogens in human food and in the environment.

Available Local Finances

- Developed Countries – High Income
  - 34.5 $BB GDP (34,500 $/capita/year)
  - 18% to government expenditures (6,210 $/capita/yr)
- Developing Countries – Middle Income
  - 8.5 $BB GDP (2,833 $/capita/year)
  - 14% to government expenditures (397 $/capita/yr)
- Developing Countries – Low Income
  - 1.4 $BB GDP (583 $/capita/year)
  - 11% to government expenditures (64 $/capita/yr)

World Bank, 2006 World Development Report
Governance Indicators

- Governance indicators have been monitored by the World Bank since 1996.
- Only about 8% of countries have shown significant improvement in voice, accountability, or rule of law.
- There is a proven relationship between lower levels of income and higher corruption.
- No significant improvement in control of corruption over 1996-2006.

World Bank, Governance Matters: 1996-2006

Private Sector Participation

- Private sector participation is active in solid waste collection in nearly all developing countries:
  - Informal sector waste picking and recycling;
  - Community-based primary collection;
  - Truck-owner based secondary collection.
- Because of lack of contractual security, private investment is minimal. Old multi-purpose equipment is used to avoid investment risk.
Corruption

- Corruption is one of the greatest obstacles to doing business in developing countries.
- Bidding prices must consider the corruption costs of registering for business, getting contracts, importing goods, obtaining utility services, and being paid.
- Investors must consider the risk of political intervention, including premature and arbitrary contract termination.

Social Inclusion

- Majority of the urban poor work in the informal sector.*
- Informal sector employment ranges from 30-70% of GDP in developing countries.*
- Some collection of wastes and nearly all recycling of wastes in developing countries is done by the informal sector.

*Judy Baker, World Bank, poverty expert
Gender Issues

• 2/3 of illiterate adults are women ~ over 300 million illiterate women.*
• Children of illiterate women are twice as likely to die before their fifth birthday.*
• Women usually over 30% of informal waste pickers, and most bring their children to work.
• Gender action to upgrade their livelihood status, security and income involves special study, empowerment, and training.


Youth Issues

• Unemployment for urban youth is 2-3 times higher than for others, needing priority investment.*
• Community-based waste collection and recycling provides opportunity for youth entrepreneurship.
• Training, networking, and empowerment are needed.

*Judy Baker, World Bank, poverty expert
Policy and Economic Instruments for Consideration

• **Hazardous wastes**
  - Encourage public investment in treatment/disposal through DBO’s with global support.

• **Livestock Wastes**
  - Ban non-therapeutic feeding of arsenic and priority human antibiotics to fish, poultry and animal livestock.
  - Regulate land application sites for metals and antibiotic residues.

• **Finance**
  - Carbon funds provide hard currency annually for operations that reduce and avoid green house gas emissions, major means of motivating waste treatment improvements - extend 2012 deadline.
  - Recognize use of inter-governmental transfers to address the public good externalities of waste treatment.
  - National policies that encourage municipalities to implement cost recovery through user charges and tipping fees.
Policy and Economic Instruments for Consideration

- **Governance**
  - Address corruption and rule of law to improve private sector investment climate.

- **Social Inclusion**
  - National policies that encourage municipalities to address the special empowerment and capacity needs of women and youths, and to support informal sector involvement in waste recycling.

Project and Guidance Materials

- [http://carbonfinance.org](http://carbonfinance.org)

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