



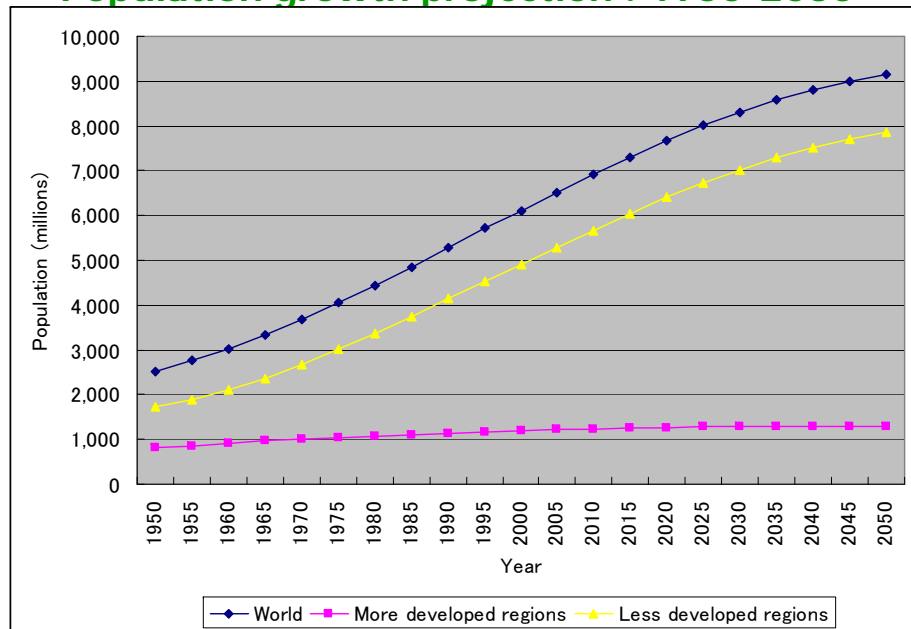
Shanghai Manual

**A Guide for Sustainable
Urban Development in the 21st Century**

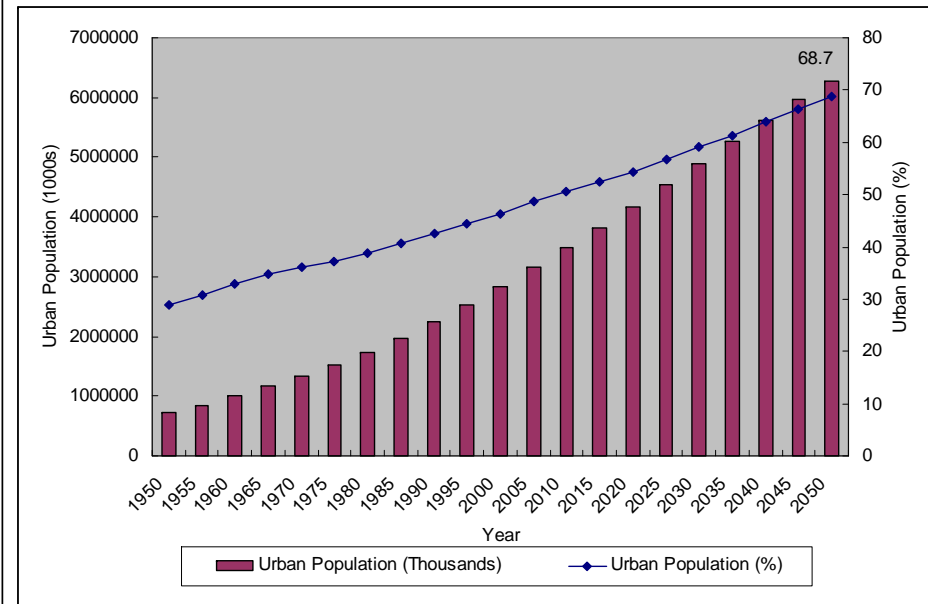
I. Issues and Challenges - Population growth & urbanization will continue to compound the waste management issues..

- By 2050, world population is projected to reach 9.1 billion with 99 percent of global population growth is projected to occur in developing nations.
- By 2050, around 70% of the world population is projected to live in urban areas.
- Cities now account for 75% of energy consumption and 75% of carbon emissions (Clinton Foundation, 2009)
- For Asia, the urban population will grow to 2.21 billion by 2020

Population growth projection : 1950-2050



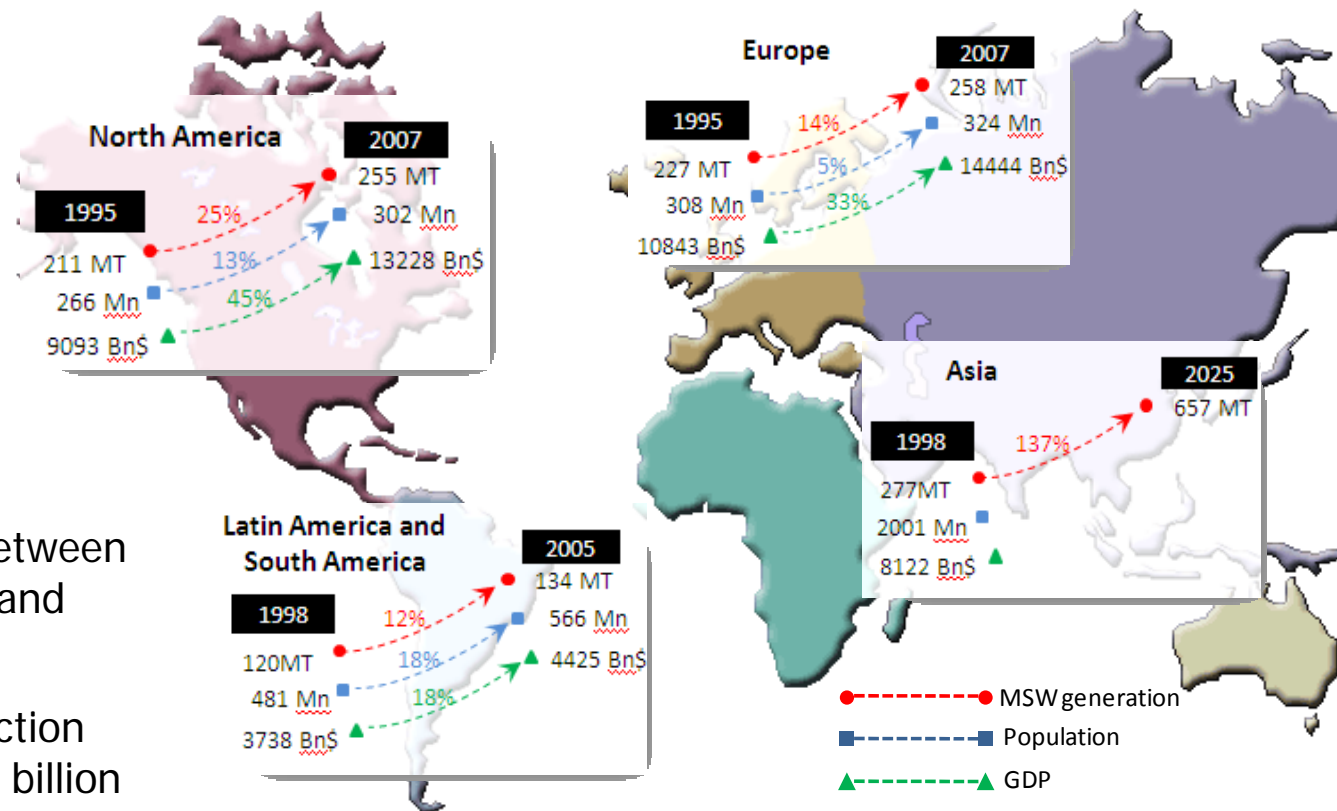
Projected urbanization : 1950-2050



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision, <http://esa.un.org/unpp>

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision and World Urbanization Prospects: The 2009 Revision, <http://esa.un.org/wup2009/unup/>

Rapid increase in Volumes and Changing Characteristics of MSW – A Global Trend



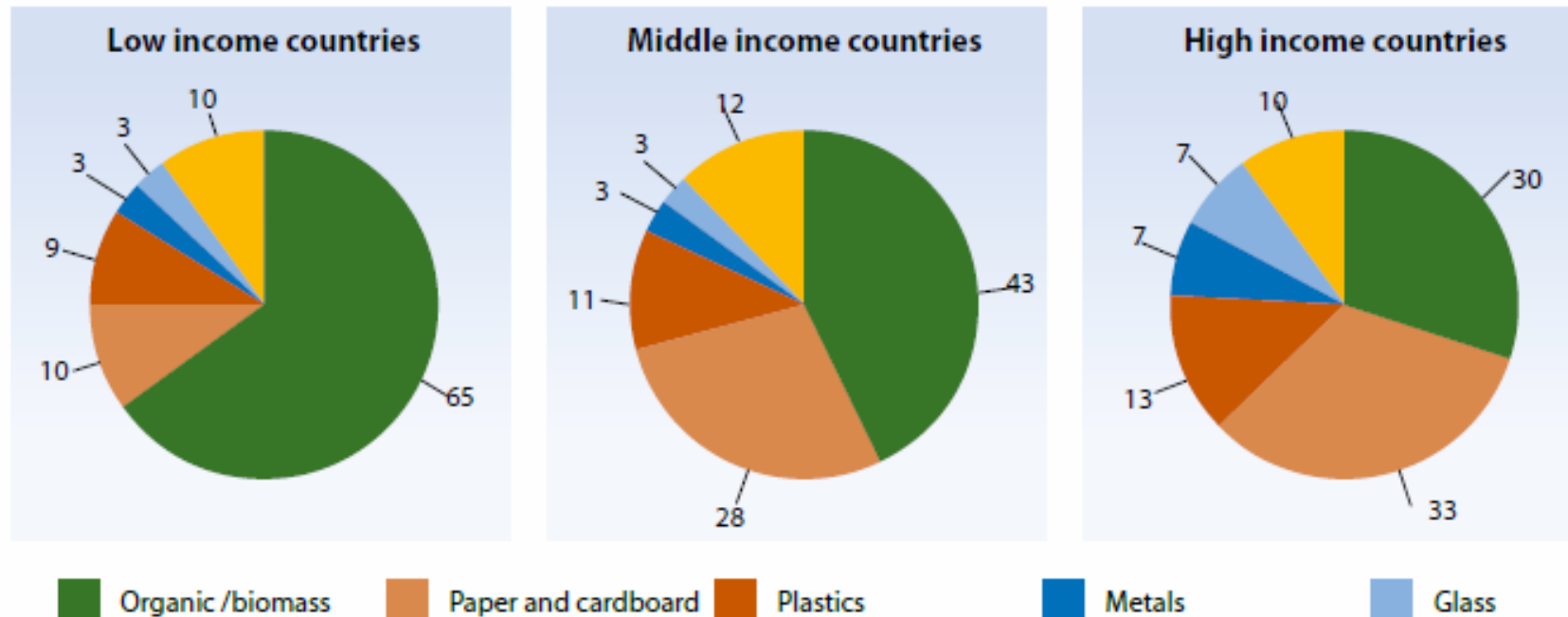
- Overall correlation between MSW, wealth (GDP) and urbanization
- World's waste production could reach up to 27 billion tons by 2050, a third of which may be generated in Asia - significant portion being produced in large economies such as China and India.

Source: Veolia Environmental Services (2006). From Waste to Resource. An Abstract of "2006 World Waste Survey

World Bank (2005). Waste Management in China: Issues and Recommendations, May 2005. www.go.worldbank.org/2H0VMO7ZGO

Trend in waste composition

Wastes generated in low- and middle- income cities have a large proportion of organic waste, whereas the wastes in high-income cities are more diversified with relatively larger shares of plastics and paper

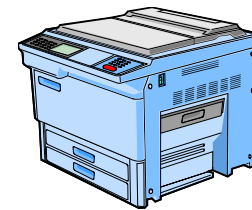


Diversification of wastes – emerging new waste stream adds another critical dimension to waste management issues & pose the fastest growing challenge for both developed and developing countries

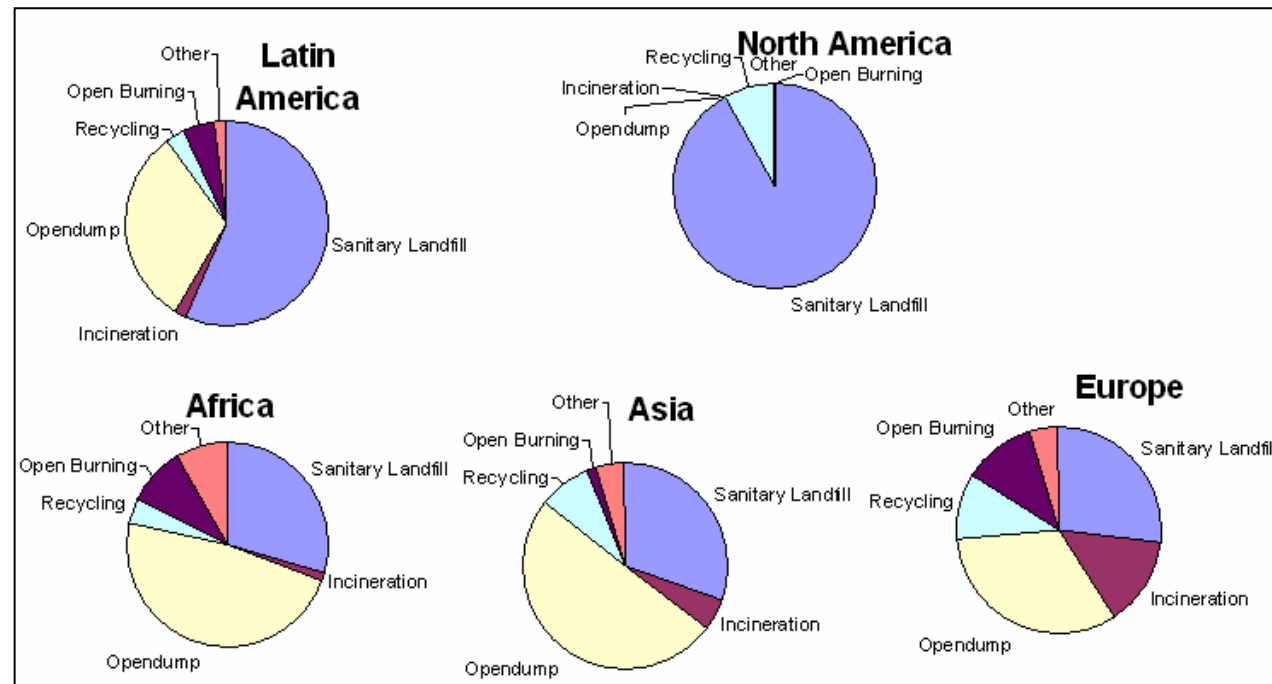
- Every year 20 to 50 million tonnes of e-waste are generated worldwide
- About 53 millions tons were produced worldwide in 2009 and only 13% of it was recycled
- By 2020 e-waste from old computers in South Africa and China will have jumped by 200-400% and by 500% in India from 2007 levels
- One billion PCs will be in use by the end of 2008 - two billion by 2015 with most growth in emerging Brazil, Russia, India, and China

Source: adapted from Sunil Herat (2010), Presented at the International Consultative Meeting on Expanding Waste Management Services in Developing Countries, 18-19 March 2010, Tokyo, Japan.

- Dangerous chemicals and metals, such as mercury, cadmium, lead, are included in e-wastes and may leach into the environment and local ecosystem.



Limited capability of municipalities compounds the problem



- 20-50% of recurring budget of municipalities is often spent on solid waste management although only 50% of urban population is covered.
- In low-income countries collection alone drains 80-90% of total waste management budget.
- Open dumps and open burning continue to be the primary method of waste disposal in most developing countries.

Conventional waste management and the consequences we face

What we see...

- Limited efforts on reducing wastes at source, resource recovery and recycling
- Low collection rates and poor collection services
- Illegal dumping, open dumping and burning
- Limited involvement of private sector and communities
- Lack of integrated approach, and conventionally waste being thought of having no value
- Slums are deprived of municipal services



Photo courtesy: C. F. Kura, ITC38 Training Course Participant, UNCRD.



Photo courtesy: B. Paudel, ITC38 Training Course Participant, UNCRD.



Photo courtesy: C. Viengsan, ITC38 Training Course Participant, UNCRD.

Widespread open dumping has paralyzed many cities ...



Waste dumps potentially serve as breeding ground for Malaria, thus having implications in achieving MDGs.

People living in a place 20 times above safe level of lead, arsenic, nitrogen.....



Matthew Westfall

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Source: ADB (2004)

Many children waste pickers at the highly polluted dumping site...



Health risks of informal waste pickers: hospital waste (HIV), jagged metal (tetanus), smoke (PCBs), lead (neural damage), violence (knife cuts), adult behaviour (premature drinking), stress, skin, gastric, respiratory problems

Conventional waste management and the consequences



Source: ADB (2004)

Eric Sates

*Highly contaminated
leachate seeps
untreated into
groundwater,
a source of
drinking water....*

*Water availability is an
emerging issue in many
countries and some are
already heading towards
water stress, but water
quality deterioration
because of industrial
discharges and municipal
sewage, agrochemicals will
further accelerate the
issue!*

The consequences: HEALTH RISKS (contd.)

Health risks for informal sector workers, local communities living near dumpsites, etc.

How serious is the health risks to communities living around the dumps?

- Significant increase in the incidence of sickness among children
- Water-borne diseases due to clogging of drains and resultant flooding
- Respiratory diseases due to open burning
- Ground water pollution due to contaminated liquids or leachate, leaking from dumpsite
- Dumps serving as breeding ground for malaria, thus having implications in achieving Millennium Development Goals (MDGs)



Source:

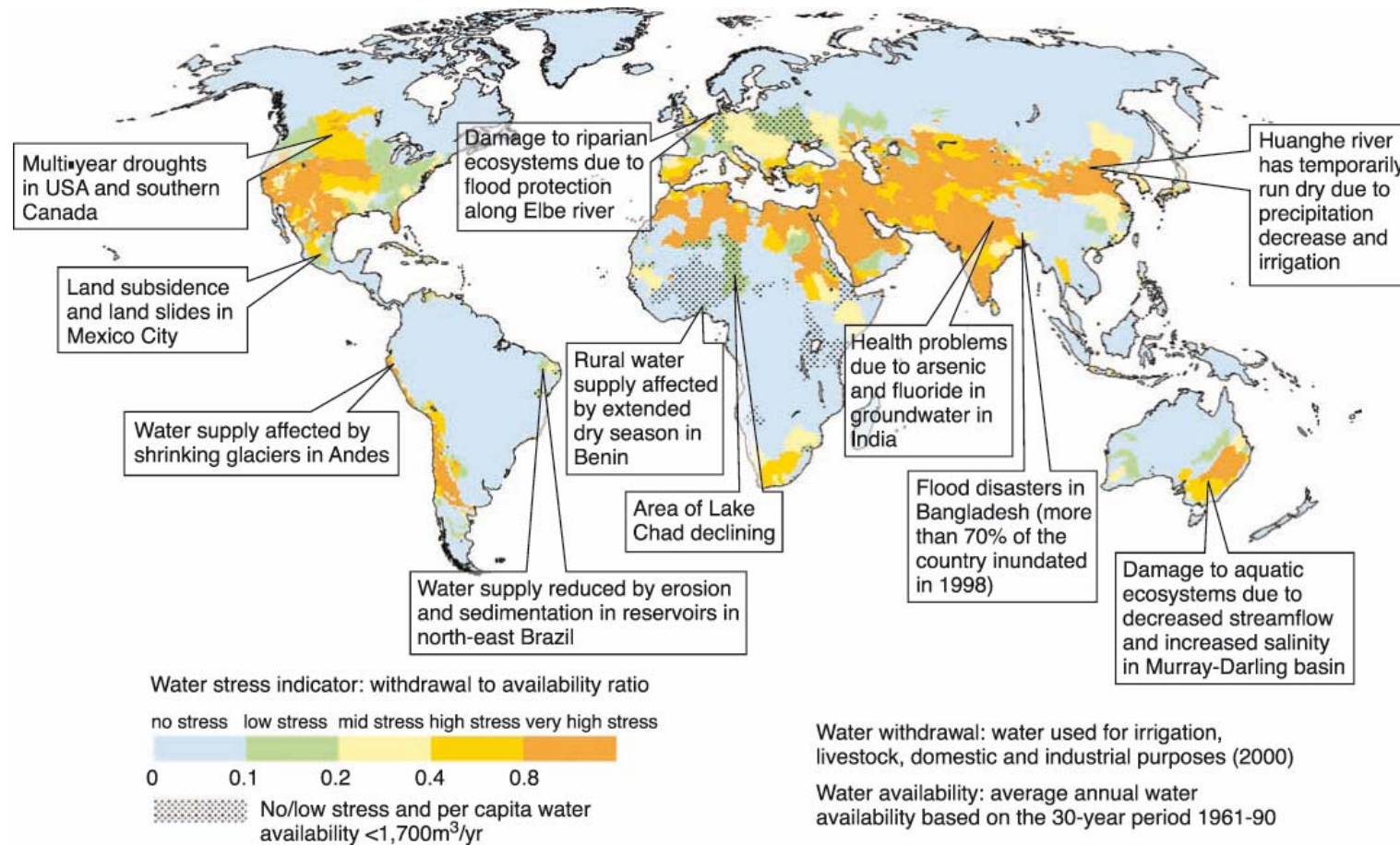
Gunn, S. (2009). Health and Labour Considerations are an Integral Part of 3R Promotion! presented at the Inaugural Meeting of the Regional 3R Forum in Asia in November 2009 in Tokyo, Japan

UN-HABITAT (2009). Solid Waste Management in the World's Cities: Pre-Publication Series. UN-HABITAT, Nairobi

Selected World Trends on Human activities

- Degradation of water resources

By the year 2025, as much as two-thirds of the world population may be subject to moderate to high water stress.



Source: Water Stress Map generated by World Meteorological Organization 2008 based on data available at Alcamo *et al.* (2003)

Wastes Not Being Viewed as "Resources"

Need for fundamental change in our mindset and attitudes

Link between "waste" and "resource" is not well understood

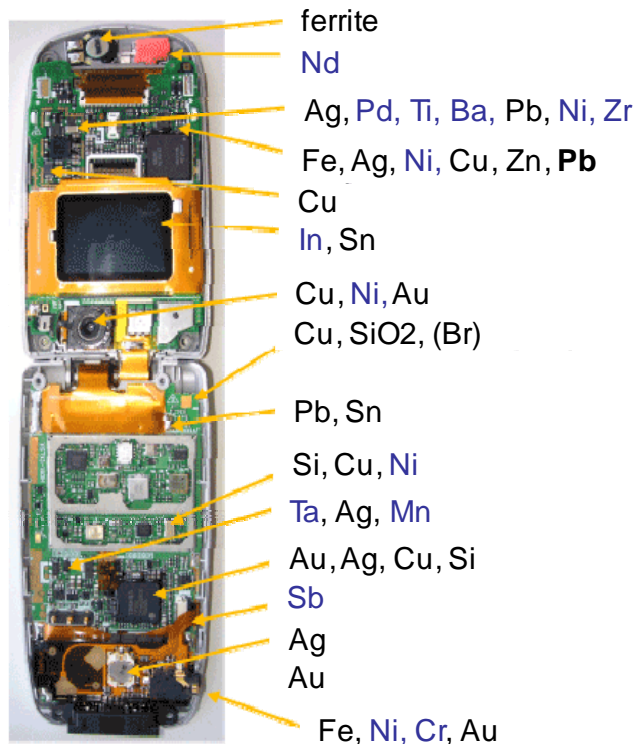
Type of waste	Recycled products	Recycling potential
Biomass	Composts	Future of compost depends on its environmental and agronomic quality and the dynamism of its market.
Paper and cardboard	Recovered paper (recycled paper)	Increasing demand in Asia, particularly in PRC.
Plastics	Recovered plastics	Increasingly stringent regulations and growing demand for recovered plastics in Asia, favoring development and internationalization of this market. Cost of collection system and volatile prices are limiting factors.
Ferrous Metals	Steel	In 2004, world production of scrap metal rose to 450Mt and consumption reached 405.5Mt. Can be recovered from MSW, construction waste, etc.
E-wastes	Recoverable materials	Estimated that 10million computers contain 135,000 metric tons of recoverable materials, such as base metals, silicon, glass, plastic, and precious metals.

Source: Adapted from ADB and IGES (2008). Toward Resource-Efficient Economics in Asia and the Pacific: Reduce Reuse Recycle, Asian Development Bank, Manila

Wastes Not Being Viewed as "Resources"

Need for fundamental change in our mindset and attitudes

Valuable Metals That Could be Recovered from a Mobile Phone



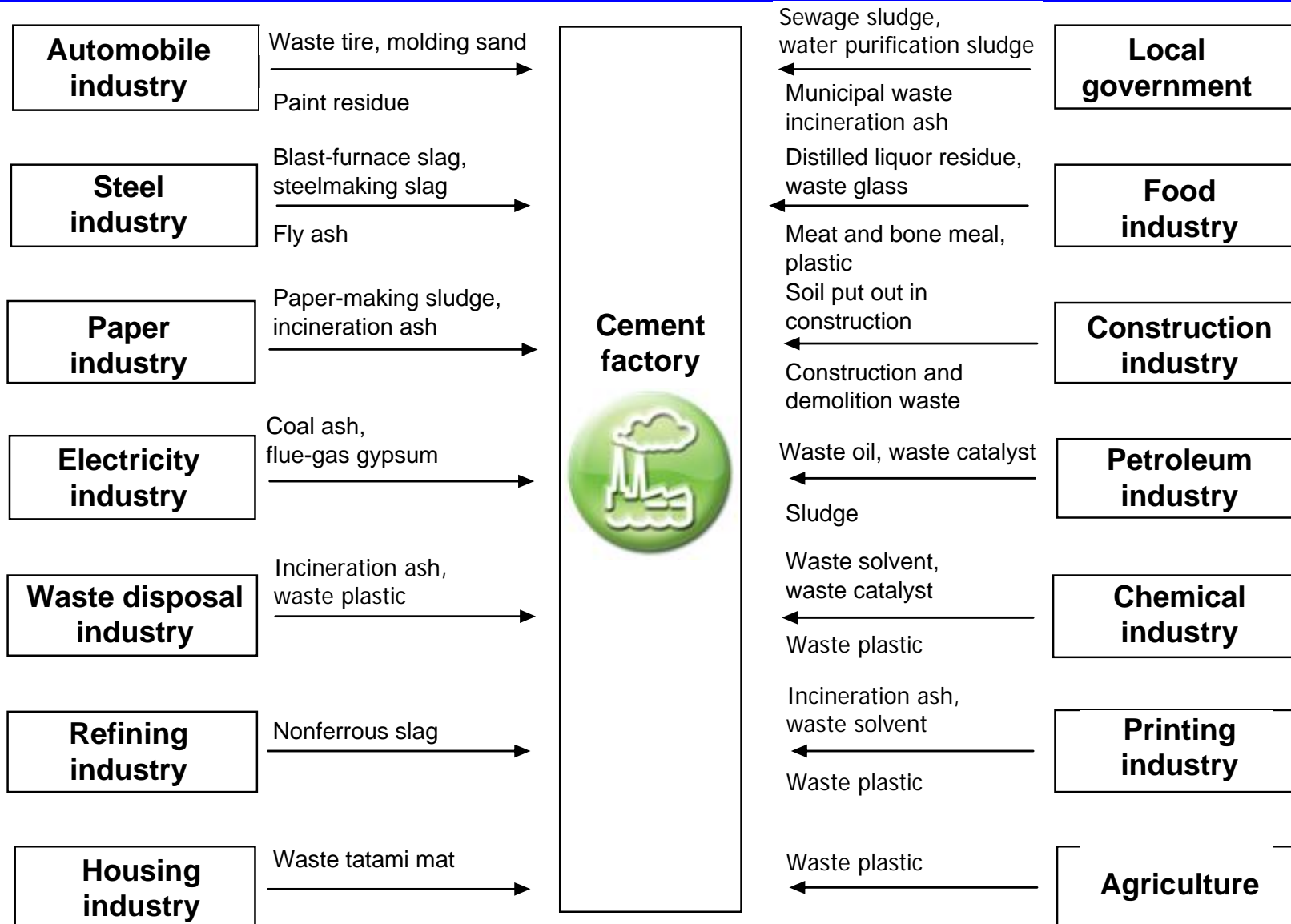
Quantity of Non-ferrous Metals Included in One Mobile Phone (Unit: g)

Gold	0.028
Silver	0.189
Copper	13.71
Palladium	0.014

Source:
<http://www.rieti.go.jp/jp/events/bbl/05060701.html>

Source: <http://www.coden.jp/rare-metal/use.html>,
DOWA Eco-System Co., Ltd.

Example of effective utilization of waste and byproduct leveraging a cement factory



Source: Adapted from Sameshima (2009), presented at the Inaugural Meeting of the Regional 3R Forum in Asia in November 2009 in Tokyo.

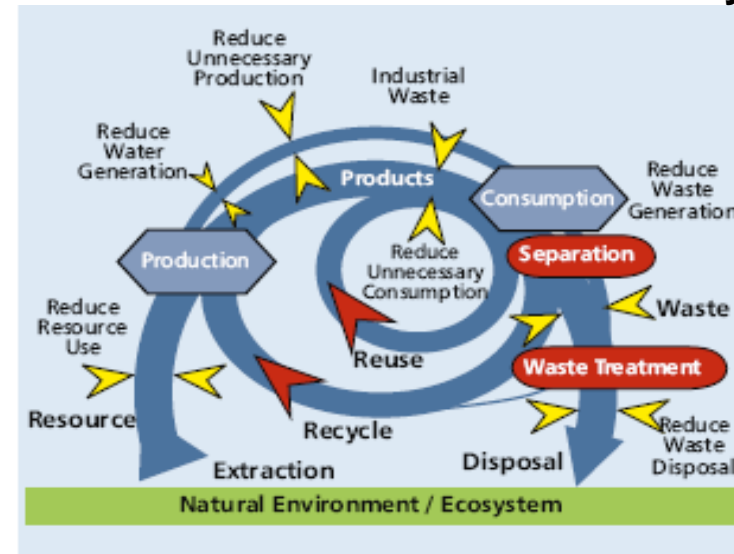
Need to transition to more resource efficient economy

1. One-way Economy



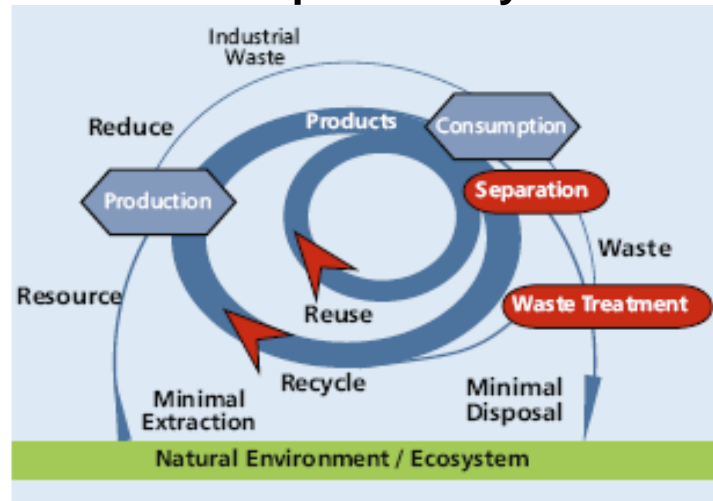
Source: ADB.

2. More resource efficient economy



Source: ADB.

3. Closed Loop Economy



Source: ADB.

1. **one way economy** -> a little effort is made to reduce the amount of materials consumed in production and hence the wastes are produced. Also little effort is made to reuse or recycle those wastes which mainly go for landfill.
2. **greater resource efficiency** -> by reducing consumption and waste of materials, and by reusing and recycling by products. By implementing measures on both the production and consumption sides, countries may be able to reduce (per unit of product) both the quantity of the resource extraction stream and the quantity and environmental impact of the residual materials flow that ultimately reaches disposal sites.
3. **closed-loop economy** -> nearly all outputs either become inputs to other manufacturing processes or are returned to natural systems as benign emissions rather than as pollutants, e.g. a closed-cycle processing plant takes in freshwater and does not discharge any liquid effluents. Rather, the water is constantly recycled and possibly utilized in the final product itself

Why should national and local authorities care about Resource Efficiency?

1. Minimizing **local environmental problems**

- **Efficient use of resources can lessen environmental burdens**, such as urban air/water pollution, floods induced by solid waste clogging drainage canals, reduced availability and quality of freshwater supplies, and land degradation.
- High pollution levels put **public health at risk**, which translates into **economic costs**.

2. Taking benefit of win-win solutions to meet international obligations on **climate change**

- **For example, Asia's global share of GHG emission** grew from 8.7% in 1973 to 24.4% in 2003 and is expected to increase to 30% by 2030.
- **Efficiency measures can greatly reduce GHG emissions** from energy generation and use, materials extraction and processing, transportation, and waste disposal.

3. Ensuring **energy security**

- Dependence on fossil fuel and inefficient use of energy supplies make countries more exposed to price and supply fluctuations.
- Countries can dampen their demand for oil, electricity and natural gas by renewing emphases on **energy efficiency measures**.

Why should national and local authorities care about Resource Efficiency?

4. Preserving **natural capital**

- Future economic development depends on conservation of natural capital assets and the services they provide to the economy.

5. Improving **economic competitiveness**

- In view of the long-term upward trend and volatility of oil prices as well as other commodity prices, resource efficiency has become a major determining factor in the competitiveness of firms and nations.

6. **Minimizing disposal costs**

- Over-reliance on simple waste disposal is unsustainable. Waste disposal must be viewed as just one part of IWM.

7. Developing **new business opportunities**

- Many profitable business opportunities are available both in **input-efficient production** and in **environmentally responsible recycling and waste disposal**.

8. Pursuing **social benefits**

- Developing countries can benefit from viewing the **environment industry as a potential source of employment** and long-term asset protection.

9. Avoiding **resource conflicts**

- Improved resource efficiency could lessen potential pressures and avoid root causes of social conflicts that could arise from resource competition.

II. POLICY OPTIONS

Goal 1. Developing meaningful partnerships with private sector, informal workers and communities for effective implementation of ISWM and 3Rs

- Centralized vs. decentralized options could be considered depending on circumstances
- Consider “**Public Private Partnerships**” (PPPs) for infrastructure projects that cannot be financed wholly by the city leaders
- Critical to engage with the **communities** from the beginning
- **Secure capital investments**, ensure future **financial sustainability** and **institutional mechanisms**
- Establish “**resource management infrastructure**” such as product **disassembly and recycling depots**
- Formalize and organize waste pickers and involve existing **waste recycling cooperatives** and **waste-picker associations** (Refer Case Study 1 and 2)
- Businesses can come together to set up “**Eco Industrial Park**”
- Bring together all stakeholders such as waste generators, industry, financing institutions, national governments and regulators, waste technology providers, academia, NGOs, CBOs, international finance institutions and United Nations entities

Partnership is key to expand waste management services of local authorities that lack resources, institutional capacity, and technological know-how...

- **Partnerships** offer alternatives in which governments and private companies assume co-responsibility and co-ownership for the delivery of solid waste management services.
- **Partnerships** combine the advantages of the private sector (dynamism, access to financial resources and latest technologies, managerial efficiency, and entrepreneurial spirit, etc.) with social concerns and responsibility of the public sector (public health and better life, environmental awareness, local knowledge and job creation, etc.)
- **Partnerships** provides win-win solutions both for the public utilities and private sector—if duly supported by appropriate policy frameworks. Such partnerships could lead to savings in municipal budgets where waste management usually consumes a large portion. The private sector, on the other hand, may use this opportunity to convert waste into environmentally friendly products and energy that could also serve as income generating opportunities.



International Partnership for Expanding Waste Management Services of Local Authorities (IPLA)

- "Partnership to foster Partnerships" -

KEY FEATURES OF IPLA:

- **Endorsed at the CSD-19 Intersessional Conference on Building Partnerships for Moving Towards Zero Waste held on 16-18 Feb 2011 in Tokyo, Japan; Launched at CSD-19 in May'2011; More than 130 partners and members.**
- **IPLA's** core objective is to address "partnerships" as the basis for sustainable waste management, in particular **fostering partnerships** between Local Authorities (LAs), private sectors and other key stakeholders in local level waste management.
- It aims to create a **dynamic interface** between the local authorities and private sector, thereby facilitating public-private partnerships and creating conducive investment climate for expanding waste management services of local/municipal authorities.
- **IPLA's** operational modalities will rely on **decentralized network** of activities addressing municipal waste management. For example, regional/sub-regional/national secretariats will take the lead role in operations.
- **IPLA's** knowledge management component exclusively targets **empowerment/capacity development of LAs and municipalities** by facilitating better access to tools, technologies, investment opportunities, and international financial mechanisms in the area of municipal waste management.
- **IPLA** activities provides an opportunity to further complement city/municipality level efforts for **improved urban management** towards realizing liveable cities (beautiful, clean, safe, efficient).
- **In summary, IPLA is a partnership with an objective to foster partnerships with an ultimate purpose of expanding waste management services of local authorities. From knowledge sharing to more practice oriented network (i.e., operational focus).**



Official Partners around the world

(Approximately 120 members as of September 2011)

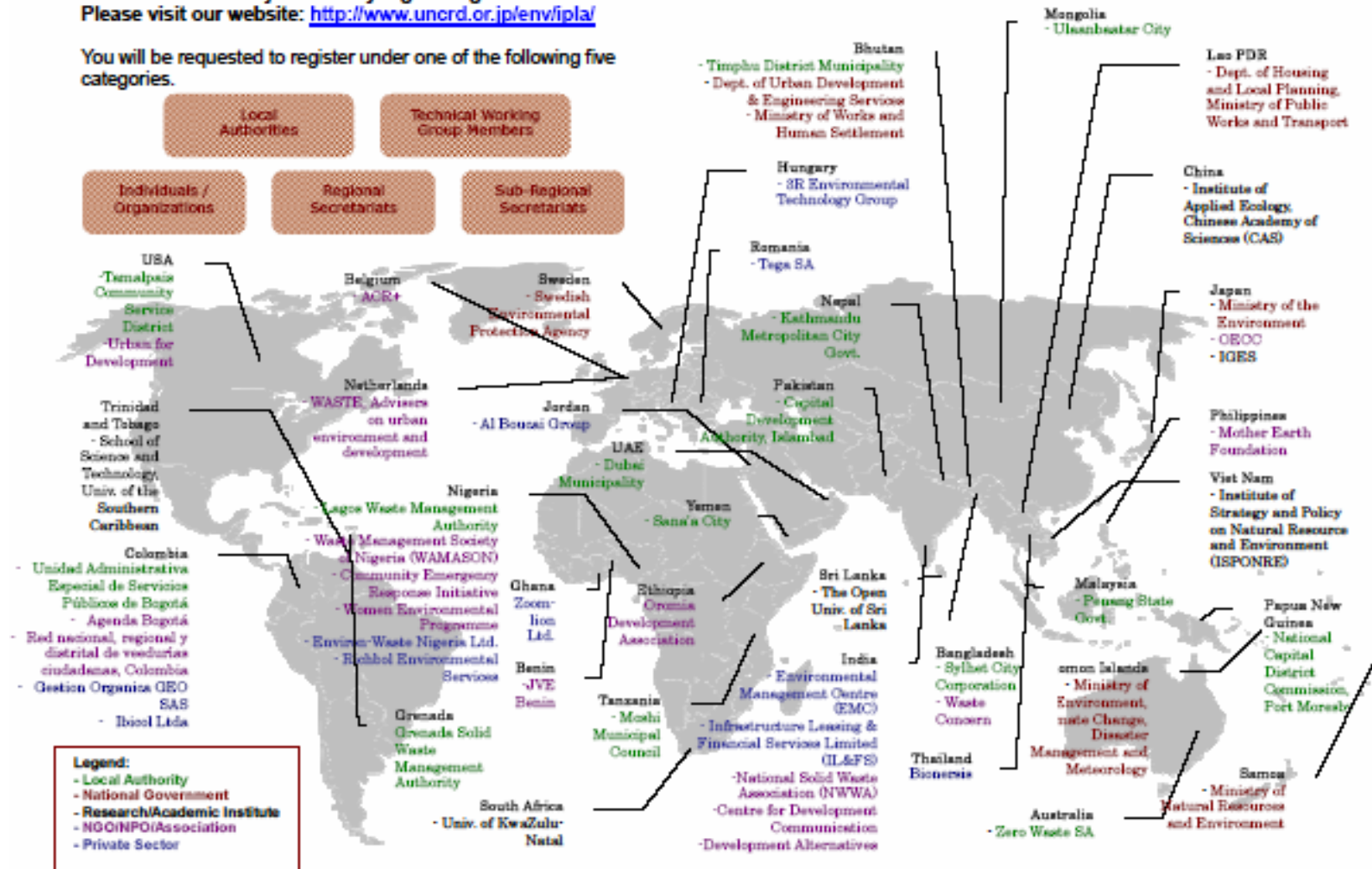
Registration for IPLA Membership

You are welcome to join IPLA by registering on-line.
Please visit our website: <http://www.uncrd.or.jp/env/ipla/>

You will be requested to register under one of the following five categories.



Note: National governments, local authorities (LAs), research/academic institutions, NGOs/NPOs/Associations, and private sector are indicated in the map below.



II. POLICY OPTIONS

Goal 2. Reducing MSW and aiming for “Zero Waste”

- Policy instruments such as “volume based fees” for solid waste collection lead to reduction of MSW generation
- For example, effective implementation of volume based fees in Korea led to a 21.5% reduction of MSW generation from 1994 to 2009
- Cities should set clear indicators or quantifiable measurements that reflect the performance of their areas with regard to solid waste management
- Indicators should be compared against targets in order to gain a reference point for whether the action being assessed was successfully implemented and to what degree.
- Some examples of indicators include resource efficiency, recycling rates and amount of waste landfilled.



Photo and table: www.parkenglish.com

III. POLICY OPTIONS

Goal 3. Increase reuse and recycle of resources

- **Businesses and infrastructure should be reconfigured** to deliver better returns on natural, human and economic capital investments, while at the same time reducing GHGs, extracting and using less natural resources
- Promoting reuse and recycling of resources to displace virgin inputs for manufacture of a product, leads to **resource savings** (see **Case Study 3**)
- Citizens need to separate waste at the source in order to facilitate separate collection of waste streams
- **Recycling businesses should be promoted** as it is a substantial job provider to various sections of society and **helps reducing social disparities**.
- **Private sector** can be involved to establish recycling facilities.
- Enforce market instruments such **Extended Producer Responsibility (EPR)** (highlighted in **Case Study 3**) to ensure that producers take responsibility for recycling products

II. POLICY OPTIONS

Goal 4. Effectively managing specific types of waste streams such as organic waste, e-waste, C&D waste and EoLV

- Policies should address special waste streams such as **organic waste, C&D waste, e-waste and EoLV** - specific acts and regulations with strong enforcement mechanisms to govern end-use should be adopted
- Urgent attention to be given to waste such as non-biodegradable waste to put the appropriate technology in place to manage them and derive economic value. **Subsidies** may be offered **for adopting proven locally available technologies** (see **Case Study 4**).
- **Special attention** should be given to **waste management in slums and other low-income areas and disaster-prone regions**.
- Policies should address upstream challenges that can help support effective management downstream. For example, **new improved forms of technology** will be required to allow for **sustainable design**.
- Design for Sustainability (**DfS**), Eco-Design, Design for Environment (**DfE**) and Design for Disassembly (**DfD**) are approach to design, manufacture, use and disassembly that allows for easy recyclability of used products.

II. POLICY OPTIONS

Goal 5. Exploring risks and opportunities due to climate change and the Clean Development Mechanism

- City leaders should start **recognizing risks to the waste sector from climate change** and also capitalize on opportunities arising from climate change for the sector.
- Important to implement mitigation and adaptation measures to **combat risks due to floods and proliferation of disease vectors**
- Waste sector accountable for **5% of global GHG budget with total emissions of 1,300 metric tonnes of CO₂-equivalent**
- Dumpsites are the largest GHG emitters. Several **methane gas capture projects** in dumpsites have been initiated and proved successful.
- Waste sector offers opportunities to avoid GHG emissions that could be monetized in the form of **carbon credits or Certified Emission Reductions (CERs)**.
- Although waste minimization, recycling and re-use are not eligible activities under the **CDM**, they provide opportunities to reduce GHG emissions through the conservation of raw materials, improved energy and resource efficiency and fossil fuel avoidance approaches. However, the overall landscape is changing and innovative business models are emerging (see **Case Study 4**).

III. Case Studies



01

Empowering and Formalizing the Informal Sector through a Trade Union and a Ragpicker Cooperative, Pune, India

Growing Pressures on the City of Pune

- Pune is the 2nd largest city in the state of Maharashtra in India with population of 3 million
- City's population increased by 40% during the first decade of this century
- Fifty percent of the population increase has been attributed to immigration
- City houses 564 slums and with the growing economic activity – population in slums is expected to increase at the rate of 6%
- Waste picking and selling activities rampant amongst the slum dwellers as a means of earning livelihood
- Increase in population is putting tremendous pressure on the city's infrastructure services



Formation of Kagad Kach Patra Kashtakari Panchayat (KKPKP) A Trade Union for Informal Workers

- Two individuals, Poornima Chikarmane and Laxmi Narayan, deeply affected by the dismal condition of the child waste-pickers in Mumbai, wanted to address discrimination and labour right issues
- Also, recognized the value of picking and recycling activity that had the potential of resulting substantial savings to city authorities
- Organized a “Convention of waste-pickers” called Kagad Kach Patra Kashtakari Panchayat (KKPKP) in May 1993 – attended by 800 rag pickers
- KKPKP - Platform for rag pickers to voice their grievances and received an overwhelming response from rag picking communities
- KKPKP formed as a registered trade union to represent the collective identity and interests of scrap collectors
- The news about the success of the convention spread fast across networks of waste pickers
- KKPKP was formally registered in the year 1997
- The trade union fought for the rights of rag pickers to a safe workplace and systematically built support for rag pickers among citizens



Kagad Kach Patra Kashtakari Panchayat

Main Features of KKPKP

- 5025 members to date, a slate of officers, a Governing Board and a Representatives Council
- Membership of the Union drawn from among scrap collectors living in slums geographically spread across the City of Pune.
- Representatives Council, consisting of 80 elected Representatives (75 women and 5 men), and the officers govern the Union.
- Council follows a consensus approach and meets every month to deliberate, review, plan and take decisions on current issues.
- Since 1996, Representatives have been selected through an election process
- Representatives are not entitled to any remuneration or benefits from the Union other than those applicable to other members.



Financial Features of KKPKP



- The payment of the annual premium to the New India Insurance Company is part of the annual municipal budget.
- Hospitalization costs of up to US\$ 108 are reimbursed by the insurance company and claims are processed through KKPKP.

- KKPKP functions as a savings-linked credit programme for the poor.
- Financial operations centrally managed to minimise administrative costs
- Credit co-operative did not receive any external financial assistance for provision of credit in the first 15 months of operation ending March 31, 1999.
- Entire loan requirement of members met through savings collected by group leaders and disbursed centrally
- From May 1999, a sum of US\$ 6522 was collected from citizens who were willing to pay as interest free deposits
- Lending is to the extent of 3 times the amount saved and 2 other members of the co-operative should to be guarantors
- Lending limit is US\$ 543 and rate of interest is 12 % per annum with an additional 12% charge towards social security schemes for members

How KKPKP Overcame Challenges?

- Formation of a trade union type organization faced strong opposition from retail scrap traders
- Attempt to resurrect an otherwise defunct “Association of Scrap Traders” by scrap traders failed because of intense competition within the retail segment of the scrap trade
- KKPKP organized and mobilized scrap collectors through public rallies and demonstrations in order to convince the city authorities and the state government to recognize scrap collectors as “workers”.
- They put forth a demand for the municipal endorsement of photo-identity cards issued by the Union in 1993 through several public demonstrations in which thousands of members participated.
- The Pune city government accepted the demand in 1995-1996 and became the first city authority in the country to officially register waste-pickers in recognition of their contribution to the management of urban solid waste.



Lessons Learned

Important to Involve Communities and Informal Workers to establish credibility

- Community mobilization can comprehensively and effectively succeed in uplifting the livelihoods of waste pickers by integrating the most vulnerable workers into a legally recognizable, structured and protective system.
- City authorities can work together with the informal sector to create a mutually beneficial relationship towards the realization of an integrated waste management plan
- Through a combination of consensual, methodical and mature approaches to organizing waste pickers, and through the use of peaceful and disciplined methods of social agitation (rallies, demonstrations, sit ins, etc.), it was possible to establish credibility with the government, private sector and citizens.
- Other than work-related economic issues, focusing on social development activities such as credit provision, education and child labour helped build KKP's credibility.

Major Impact

Upliftment of poor rag pickers

- In 2002-03 the Pune Municipal Corporation became the first municipality in the country to institutionalize a "Scheme for Medical Insurance" for all Registered Waste-pickers in its jurisdiction.

Other Related Examples from the World

Bolsa Familia in Brazil

- A national campaign launched in Brazil had great success in reducing child labour in waste picking
- Campaign launched "*Bolsa Familia*" - A conditional cash transfer program that had parents of child waste pickers enrolled
- *Bolsa Familia* gives parents a monthly stipend as long as they send their children to school, get them vaccinated, and obtain prenatal care
- Stipend compensates families for the loss of income from child labour
- Program supported by World Bank credits
- More than 40,000 children left waste picking and are now attending school



COOPAMARE in Brazil

- COOPAMARE (Cooperativa de Catadores Autonomos de Papel, Aparas e Materiais Reprovitaveis) - founded in Sao Paulo in 1989
- Has 80 members along with about 200 independent waste pickers who sell its materials
- Collects and sells about 100 tons of recyclables a month, at a lower cost than the city recycling program
- Members earn \$300 a month, twice the minimum wage

MSW Management in Bogotá , Fast-Growing Capital City of Columbia

- Population of 7 million inhabitants including the metropolitan areas.
- On an average, the city generates 6000 metric tonnes of MSW every day.
- Initially, MSW management services such as collection, transport, recycling and disposal were wholly taken care by the city authority with poor results.
- The first attempt to streamline MSW management services in the city was initiated by the Asociacion de Recicladores de Bogotá (ARB), formed in 1990.
- ARB was formed by the coming together of 4 recycling cooperatives
- Currently, 24 recycling cooperatives are members



How Bogotá's City Authority Handled Conflicts?

- Waste management services initially the responsibility of the city's department for public cleansing, EDIS
- Employees of EDIS went on strike in 1994 against privatization of waste management services
- At the request of the city authority, members of ARB stepped in during this period to offer their services to clean up the waste that was accumulating in the streets of Bogotá
- ARB collected about 700 tons of waste every day during this period
- City authority did not meet the demands of EDIS and went ahead with the privatization process
- Between 1994 and 1996 various private entities provided public waste services in Bogotá. The services were shared jointly by EDIS (45%), private entities (45%) and a foundation (Fundacion Social), and provided support to recycling organizations across Colombia. ARB was contracted to provide 10% of the waste management services of the city
- EDIS was completely shut down in 1996 and services were 100% privatized
- Later, the city authority did modification in the bidding requirements to allow inclusion of rag picker associations like ARB in the tendering process



Lessons Learned

Inclusion of social and livelihood aspects while privatizing municipal services

- It is important to include social and livelihood aspects when considering full-scale privatization of waste management services.
- Terms of contracts offered by the city authorities should ensure equal opportunity for recycling cooperatives to bid along with private entities, particularly in services such as collection and recycling where the recycling cooperatives have rich experience.
- Privatization of waste management services should not be encouraged at the cost of depriving rag-pickers of their livelihoods.

Major Impact

Streamlining of waste management services

- Successful initial streamlining of solid waste management services in the city with the involvement of private entities.
- Apart from ensuring better living and working conditions for the rag-pickers, the initiative safeguarded the labour rights and successfully addressed the issue of child labour in waste-picking activities



Other Related Examples from the World

- Private sector involvement has reduced the waste service cost by at least 25% in countries such as UK, USA and Canada and at least 20% in Malaysia
- A World Bank project in Mauritius tested and proved that involving different private players for each stage such as design, construction and operation may lead to legal disputes over the adequacy of the construction in case of a leakage
- In Stockholm, Sweden, 5 different private companies have been contracted to deliver 85% of collection services while the remaining 15% is taken care by the government
- Dakar, Senegal developed experience with a public/private joint venture which, at first, was a monopoly but later transitioned to a more competitive privatization arrangement of multiple service contracts
- In Surat, India, contracting of selected services such as night sweeping, waste collection and transportation to private companies increased the collection coverage to more than 90% and reduced the number of road side garbage containers by 36%

Ecologically Sensitive Island of Mauritius

- Mauritius is an ecologically sensitive Small Island Developing State (SIDS)
- Faces inherent challenges in management of rising volumes of MSW due to scarcity of appropriate space for disposal and treatment facilities, financial constraints and lack of capacity.
- Due to the growth of tourism establishments and inflow of tourists, generation of solid waste is expected to rise in the island
- Recovery and recycling of Poly Ethylene Terephthalate (PET) bottles in Mauritius is a good example of enforcement of government regulation on **Extended Producer Responsibility (EPR)** leading to stimulation of recycling

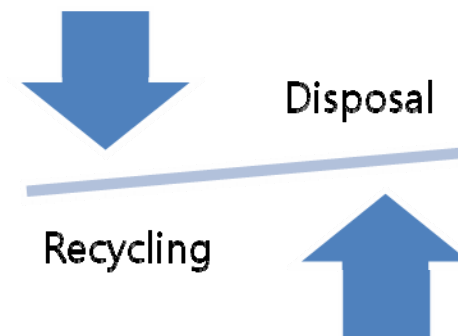


Benefits of Recycling PET Bottles

- Plastic containers of beverages are abundant in modern society
- Reuse and recycling of plastic bottles not only reduces virgin material input but also reduces wastes that land in final disposal sites
- For example, a glass refillable bottle can be refilled and circulated over 50 times before it goes into recycling
- A PET refillable bottle is refilled and circulated around 13 times before going into recycling, thereby reducing the material used in packaging
- Recycling of PET bottles is practiced widely in developed countries
- Recycled PET flakes find a second life when being used as material inputs for fibre/textiles (42%), sheets (50%), bottles (5%) and moulded products and others (4%)

Concern

- While recycling is certainly an option, there are concerns that the amount of energy used for recycling could be considerably high, and whether these costs might be borne by city authorities



Policy and Institutional Aspects that Favour PET Recycling

- **Environment Protection Regulation** (2001) established “**deposit-refund system**”
- In response to the regulation, the 4 big producers of soft drinks in Mauritius, Phoenix Camp Mineral, Quality Beverages Ltd and Compagnie Industrielle des Pailles, regrouped themselves into the **Mauritius Bottlers’ Association**
- **Steel Scrap Ltd., a private firm** was hired to initially set up a collection mechanism for used PET bottles based on a voluntary take-back system
- **59 special bins were placed at strategic spots** (beaches, market places, hypermarkets, etc.) throughout the island
- **Sensitization campaigns** were organized to invite consumers to dispose their used PET bottles in these bins



Privatization of Processing and Recycling

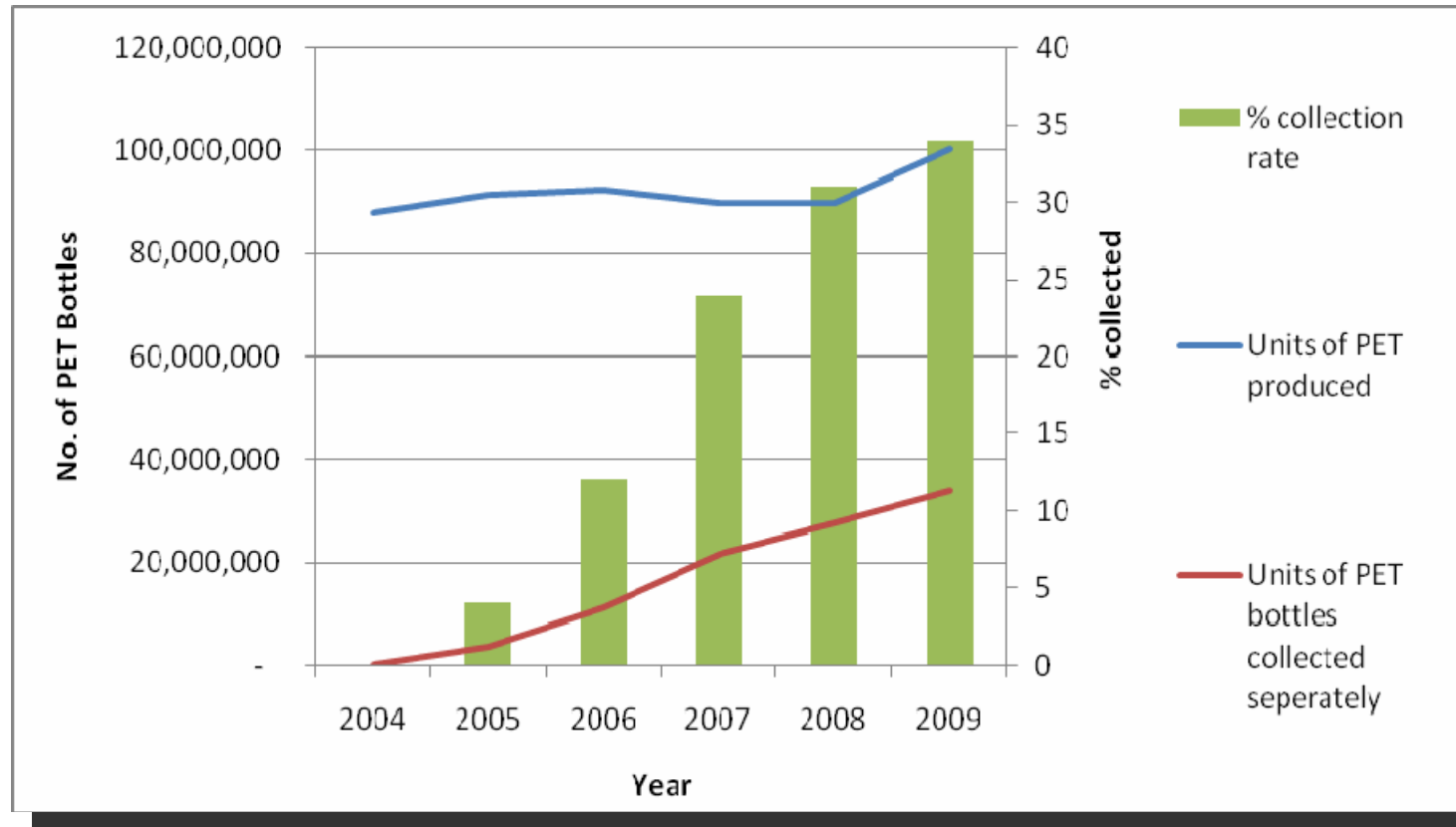
- With the voluntary take back system in place, the collection rate was low - 4% in 2005
- In 2005 the Bottlers' Association contracted the collection, processing and recycling of PET bottles to a private company called Polypet Recyclers (recycling capacity of 1200 TPD)
- Own and operate 6 trucks
- Charge the bottling companies @ US\$ 396 per ton of PET (depending on the market share)

The logo for Polypet Recyclers, featuring the word "POLYPET" in a bold, sans-serif font. The letters "POLY" are blue and "PET" are red, with a red underline beneath the entire word.

Involving NGOs, Local Residents and Schools

- Bottlers' Association promotes community initiatives with NGOs to create an opportunity for local residents to get additional revenue obtained from reselling PET waste
- Private company purchases PET bottles from such collectors @ US\$ 155 per ton
- Even housewives of low income families organized themselves and went from house to house to nearby communities to collect used PET bottles, since this gave them a fair source of income in return.
- Initiative was supported by the Ministry of Environment which further promoted separation of waste in all primary and secondary schools. Four different bins were distributed and the school community was encouraged to separate their wastes into plastic bottles, paper, biodegradable waste and other wastes. The schools entered into an agreement with the private company for collection of used PET bottles

Increased PET Recycling Rates in 4 years



City authority could increase the collection rate of PET bottles from 4% in 2005 to 34% in 2009

Lessons Learned

“Deposit Refund Systems” is an effective instrument for PET recycling

- City leaders can promote reuse and recycling of beverage containers by establishing deposit systems and/or imposing fees on one-way bottles
- Viability of a reuse and recycling industry depends on the size of the local economy. A study estimates that an industry could become profitable if there are more than 200,000 consumers in the city
- Privatization of recycling activity put into place systems, collection and recycling infrastructure. The private company also collaborated and networked with other recycling initiatives and the initiative led to a 30% increase in recycling rate in the island in a period of 4 years
- For recycling to be successfully implemented in cities, the process should be economically attractive

Major Impact

Increased Recycling and Jobs

- Up to 34% of the 3000 metric tonnes of PET used on the island (or about 80 million bottles) are being successfully recycled
- The initiative created about 100 indirect jobs on the collection side and also hired more than 30 workers directly in the recycling company.

Other Related Examples from the World

- Many countries in Europe, such as Finland, Germany, Sweden, Austria, Denmark, and Netherlands, have active “reuse” systems, through which beverage containers are collected and reused
- Scandinavian countries are world leaders in reusing beverage bottles, with the rate exceeding 90%
- In Germany, deposit for non-refillable beverage containers is mandatory (at a deposit value of 0.25 Euro regardless of the volume) and regulated in the Green Packaging Ordinance, as means to promote the reuse/refillable system. Further, 161,000 jobs are directly connected to the manufacture, filling, distribution and selling of packaged beverages in Germany and 73% of the jobs are associated with refillable containers. The initiative dramatically increased the bottle return rate to 95-98% by imposing mandatory deposit on one-way bottles. PET bottles that end up in final disposal have been reduced to a minimal amount
- In Japan, the recycling rate of PET bottles reached 87.7 per cent in 2007.

Common MSW Practices in Dhaka

- Due to rapid economic development, population growth and increasingly urbanized lifestyles, city authorities of Bangladesh are confronted with the issue of managing rising quantities and diverse streams of MSW with limited urban infrastructure and capability
- Capital city of Dhaka generates 3500 metric tonnes of MSW every day
- City's waste is transported to a sanitary landfill at the Matuail site in Dhaka
- Uncontrolled landfilling a common practice in the city
- City lacks adequate facilities for treatment, recycling and disposal of hazardous waste

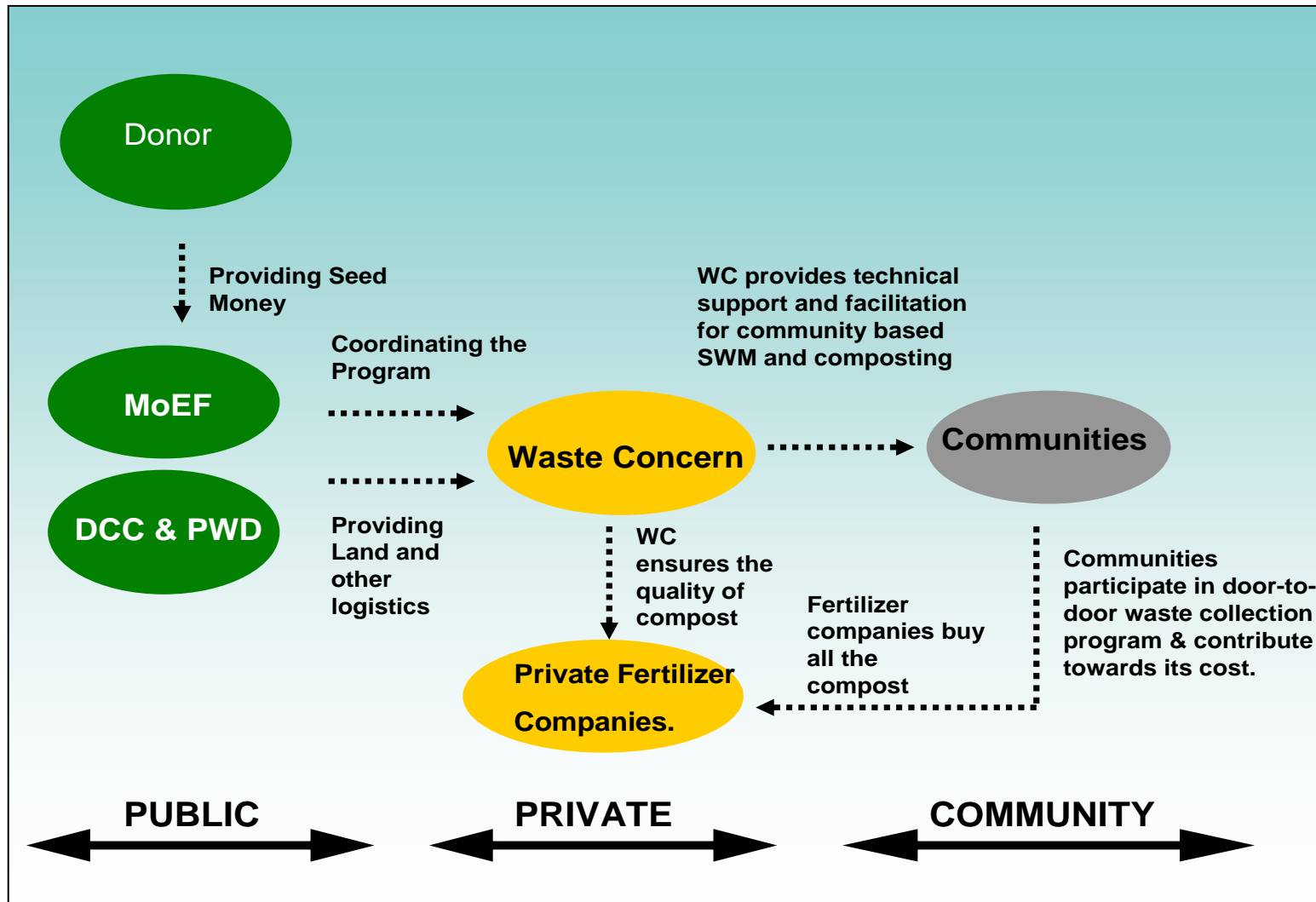


Centralized Composting in Dhaka



- Major portion (about 80%) of MSW generated in the city is organic in nature with a moisture content ideal for recycling into compost
- Waste Concern, a local research organization and non-governmental organization, works in close partnership with the government, private sector, international agencies and local communities to implement community-based composting
- Successfully replicated the community based model of composting across several cities and towns in Bangladesh
- Since its launch of SWM projects in September 1998, Waste Concern has served 30,000 people in Dhaka city and 100,000 people in 14 other cities and towns in Bangladesh, including slums and low and middle-income communities
- Services include waste collection, separation and composting
- Centralized composting project in the city of Dhaka has a capacity of 700 TPD
- Processes organic waste from the city of Dhaka in 3 phases
- Project has led to many economic, social and environmental benefits such as new job opportunities to the communities and better livelihoods in the region

PPP Model for Centralized Community Based Composting in Dhaka



Financial Features of the Composting Project

- Community involvement and public private cooperation
- Communities received door-to-door collection service and shared the cost of waste collection by paying a monthly fee based on their affordability
- Private stakeholder had joint venture partners that included Waste Concern and its financial partners (banking institutions).
- Total investment required for the project was Euro 12 million
- Mode of finance was 38% equity, 45% soft loan and 17% loan from a local bank in Bangladesh
- Private fertilizer company was involved to ensure the sale of compost by carrying out enrichment of the compost with nutrients and its subsequent distribution in the market
- 75% of the total revenue of the project came from sale of compost
- Project was successfully registered as a Clean Development Mechanism (CDM) project under UNFCCC
- New methodology for accounting emission reduction was developed by Waste Concern and its partners and was subsequently approved by UNFCCC
- Remaining 25% of the project revenue came from community contributions in the form of user fee and sale of carbon credits



Image Courtesy:
<http://www.wasteconcern.org/PictureGallery/bulta.htm>

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Lessons Learned

Semi-mechanized composting is a cost-effective method

- Partnerships among local communities, private sector and civil sectors can lead to the successful implementation of 3Rs.
- Centralized organic waste composting can be a cost-effective method to manage biodegradable organic waste that otherwise releases undesirable greenhouse gases such as methane when disposed in a landfill
- The success of composting projects rests on the extent of involvement of the communities and their cooperation with the city authority
- An important aspect of the project was that it was not fully mechanized, due to which it could employ people from the informal sector. Avoiding mechanization led to savings in capital cost. Consequently, workers could be provided with better salary rates, good working conditions, health insurance, day-care facility and free meals.

Major Impact

Increased Recycling and Jobs

- Reduced the landfilling budget of the city
- Created assured revenue for 10 years through sale of compost and CERs
- Created 800 jobs poor urban residents
- 50,000 metric tonnes compost is produced every year for more sustainable farming
- Avoid GHG emissions of upto 89,000 tonnes of CO2-equivalent per year.
- Behavioural changes in urban communities

Other Related Examples from the World

Methane Capture in Gorai Dump, Mumbai

- Closure of 25-year-old dumping ground and development of landfill gas recovery at the Gorai creek in Borivli has earned the BMC, the city authority of Mumbai, India US\$ 5.7 million by trading of an estimated 31,000 CERs a year
- The Asian Development Bank (ADB) has been purchasing the carbon credits from the civic body as per market prices when the trading takes place
- City's Gorai dumping ground closure and landfill gas project can be seen as a forerunner in dumpsite methane capture projects.



IV. Better City, Better Life: Policy Options and Measures for Urban Waste Management



Goals and Policy Options for realizing "Better Cities, Better Life"

Goal 1: Develop meaningful partnerships with private sector, informal workers and communities for effective implementation of ISWM and 3Rs	
Policy Option 1	Promote PPPs to implement infrastructure projects in different stages of waste management in a city such as collection, transport, recycling, composting, waste to energy, etc.
Policy Option 2	Organize informal waste collectors and recyclers into recycling cooperatives and associations and integrate them into the formal solid waste management programmes.
Goal 2: Reduce municipal solid waste and aim for Zero Waste	
Policy Option 1	Create policy instruments such as "volume based fee collection" to make the polluter pay for the amount of waste generated
Policy Option 2	Set targets to achieve "Zero Waste" by using relevant indicators such as resource efficiency, recycling rate and waste landfilled in order to track the city's performance over time

Goals and Policy Options for realizing "Better Cities, Better Life"

Goal 3: Increase reuse and recycle of "resources"	
Policy Option 1	Enforce "separation of wastes at source" by creating incentives for efficient separation and disincentives for mixing
Policy Option 2	Introduce market instruments such as Extended Producer Responsibility and establish recycling facilities
Goal 4: Effectively manage specific types of waste streams such as organic waste, e-waste, construction waste and end-of-life vehicles	
Policy Option 1	Support/ subsidize proven local technologies for management of special waste streams that need immediate attention such as composting for organic waste management
Policy Option 2	Promote state-of-the-art technologies to facilitate sustainable design principles in manufacturing that could help improve recycling of special waste streams such as e-waste and scrapped vehicles
Goal 5: Explore risks and opportunities due to climate change and clean development mechanism	
Policy Option 1	Take mitigation and adaptation measures to combat threats to waste sector from climate change
Policy Option 2	Explore opportunities such as CDM to monetize GHG emission reduction in waste management projects such as composting, landfill gas recovery and recycling.

Acknowledgement

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For details about the Forum and its SEG members, please see: <http://www.uncrd.or.jp/env>.