

3rd BOKU Waste Conference – Prosperity, Waste and Waste Resources

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Management of Waste Resources – High Technology versus Low Technology

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Content

- Key considerations
- High versus low-technology
 - Industrialized countries
 - Developing countries
- Priorities for cities in developing countries
- Application of inappropriate technology
- Summary

Key considerations

- Debate over which is best: high or low-technology ongoing for several years
- Usually limited to municipalities in developing countries but point often raised in industrialized countries
- Here we focus on urban wastes

Main steps for proper waste management

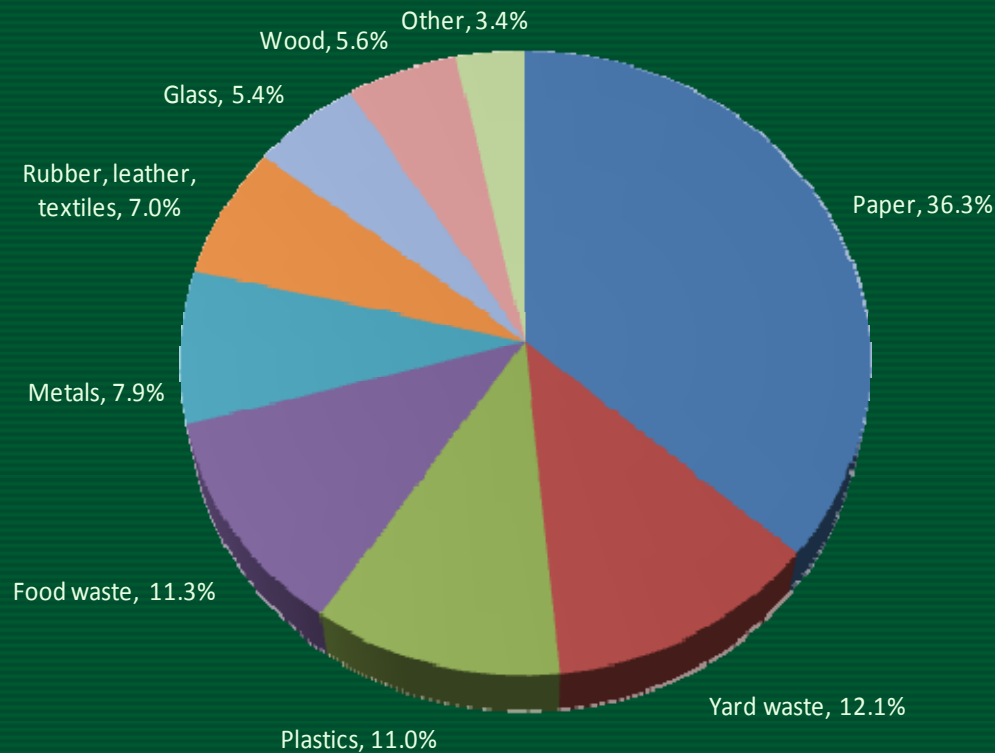
- Accurately determine composition of material
- Ascertain quantity and availability of material
- Determine economic and labor conditions
- Identify markets for recyclables
- Other: social, cultural, financial, etc.

Quantity and Composition of Municipal Solid Waste in some Developing Countries (% wet wt)

Material	Ulaanbaatar, Mongolia	Quezon City, Philippines	Olongapo City, Philippines	Lima, Peru	Buenos Aires, Argentina
Putrescibles	24.0	52.0	44.4	34.3	30.5
Paper	12.9	17.1	17.5	24.3	22.9
Metals	2.5	3.2	3.1	3.4	5.1
Glass	6.4	3.1	2.0	1.7	2.8
Plastics, rubber, leather	13.1	22.0	8.7	2.9	14.6
Textiles	4.4	0.3	2.9	1.7	2.5
Ceramics, dust, stones	36.7	2.3	21.4	31.7	21.6
Weight/cap/day (kg)	0.33	0.55	0.44	0.96	0.3 to 1.0

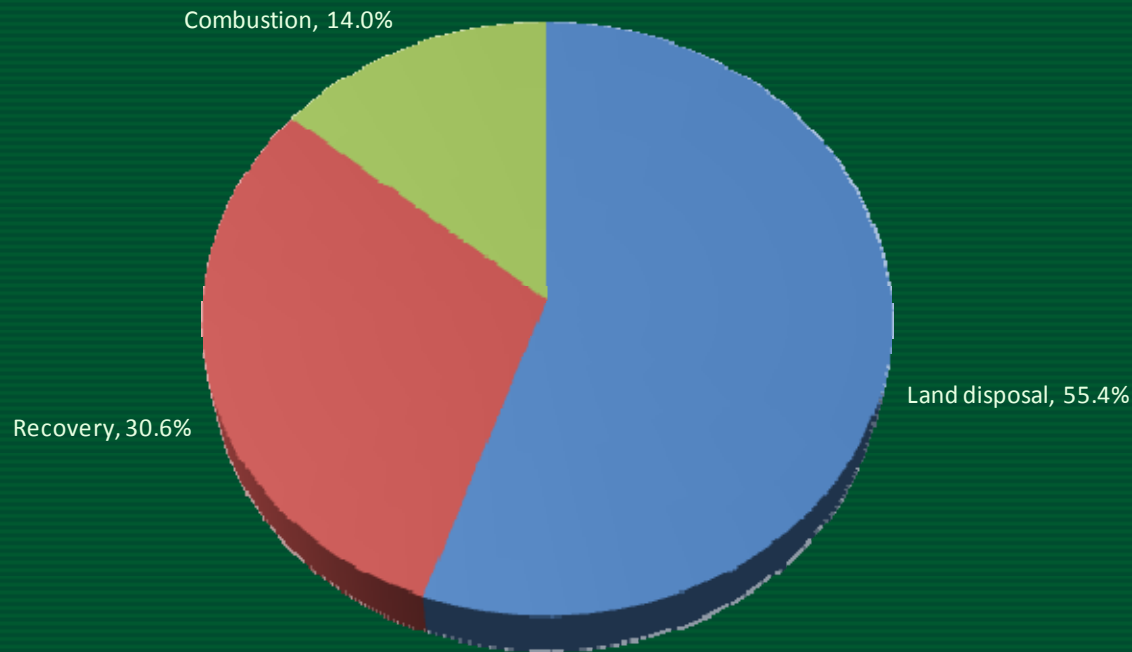
Source: CalRecovery and UNEP, 2005.

Composition of Generated MSW in the USA prior to Recycling (2003)



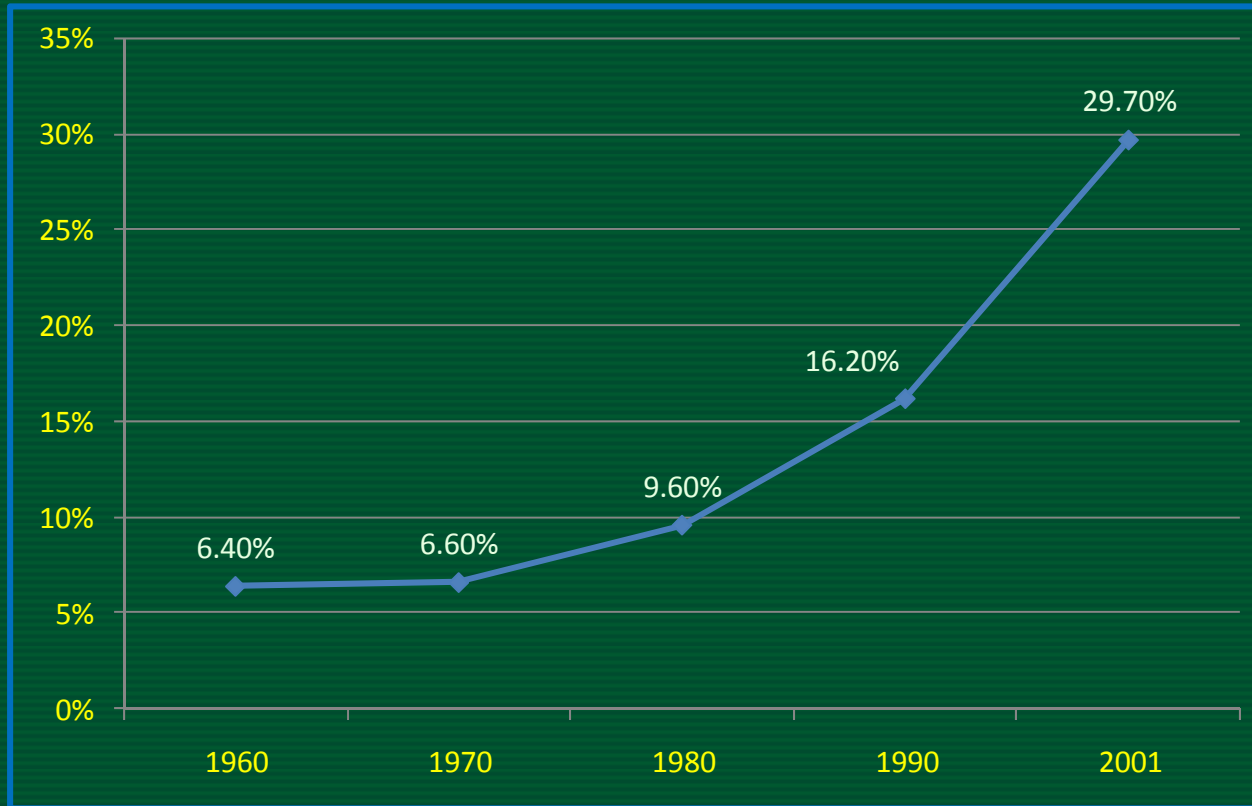
Source: United States Environmental Protection Agency, 2003.

Management of MSW in the US, (2003)



Source: United States Environmental Protection Agency, 2003.

Recycling Rates in the United States (1960 to 2003)

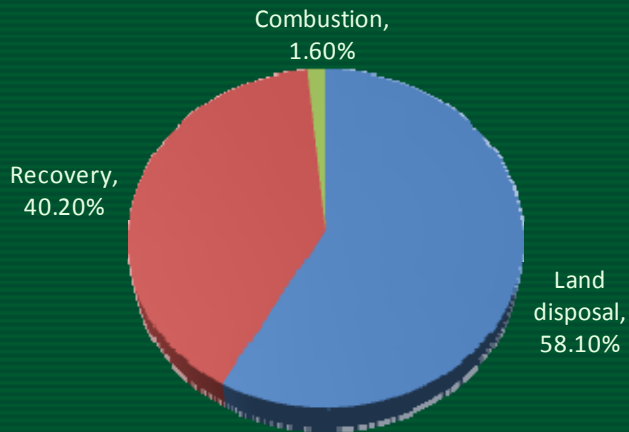


Recycling rate was
63.3% in 2007

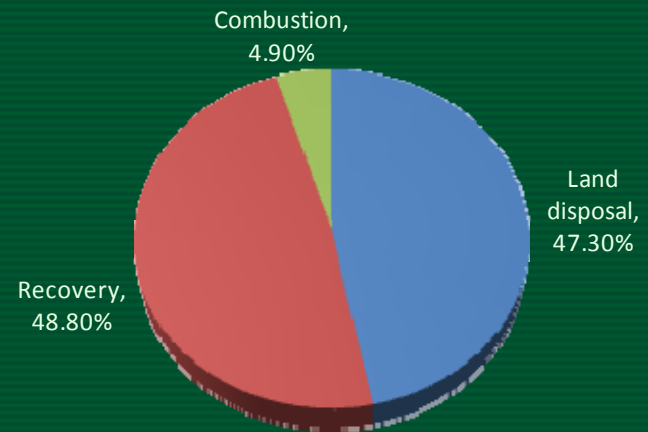
Source: United States Environmental Protection Agency, 2003.

MSW Management in California and Oregon (2002)

MSW Management in California



MSW Management in Oregon



Source: Kaufman, et al., 2004.

Average Bulk Density of Residential Refuse

Location	Density (kg/m ³)
Metro Manila, Philippines	209
Lima, Peru	176
Caracas, Venezuela	220
Asuncion, Paraguay	390
California, USA ^{a)}	130

^{a)} Excludes food residuals.

High versus Low Technology

- To design something within certain limitations means “to achieve more with less”
- In general, inability or unwillingness to impose limits is a very serious error
- In waste management – large infusions of cash and equipment alone cannot solve problems
- Need to determine economic and labor resources

High versus Low Technology

- Proper management of SW is a complex, expensive undertaking that need not be made more complex by seeking costly, complex solutions
- To the uninformed person burying or burning seems to be the simplest options

Industrialized countries

- Major differences between industrialized and developing countries: waste reduction and materials recovery
- Reduction of markets for used materials
- Reduction of materials collected and deposited in landfills
- Established frameworks for waste reduction
- Public or consumer financing of several initiatives for waste reduction

Developing countries

- Waste reduction has traditionally been practiced
- Waste reduction not legislated
- Major amount of waste reduction achieved through network of itinerant buyers, dealers, brokers
- Large practice of repair and reuse

Priorities for cities in DCs

- Hierarchy embraced by most cities in industrialized countries may not be appropriate for communities in DCs
- First priority maybe to divert organic (putrescible) materials entering the MSW stream
- Organic matter usually largest component of waste stream
- Still these countries should be alert to the growth of wasteful practices (i.e., some plastic bags)

Use of inappropriate technologies

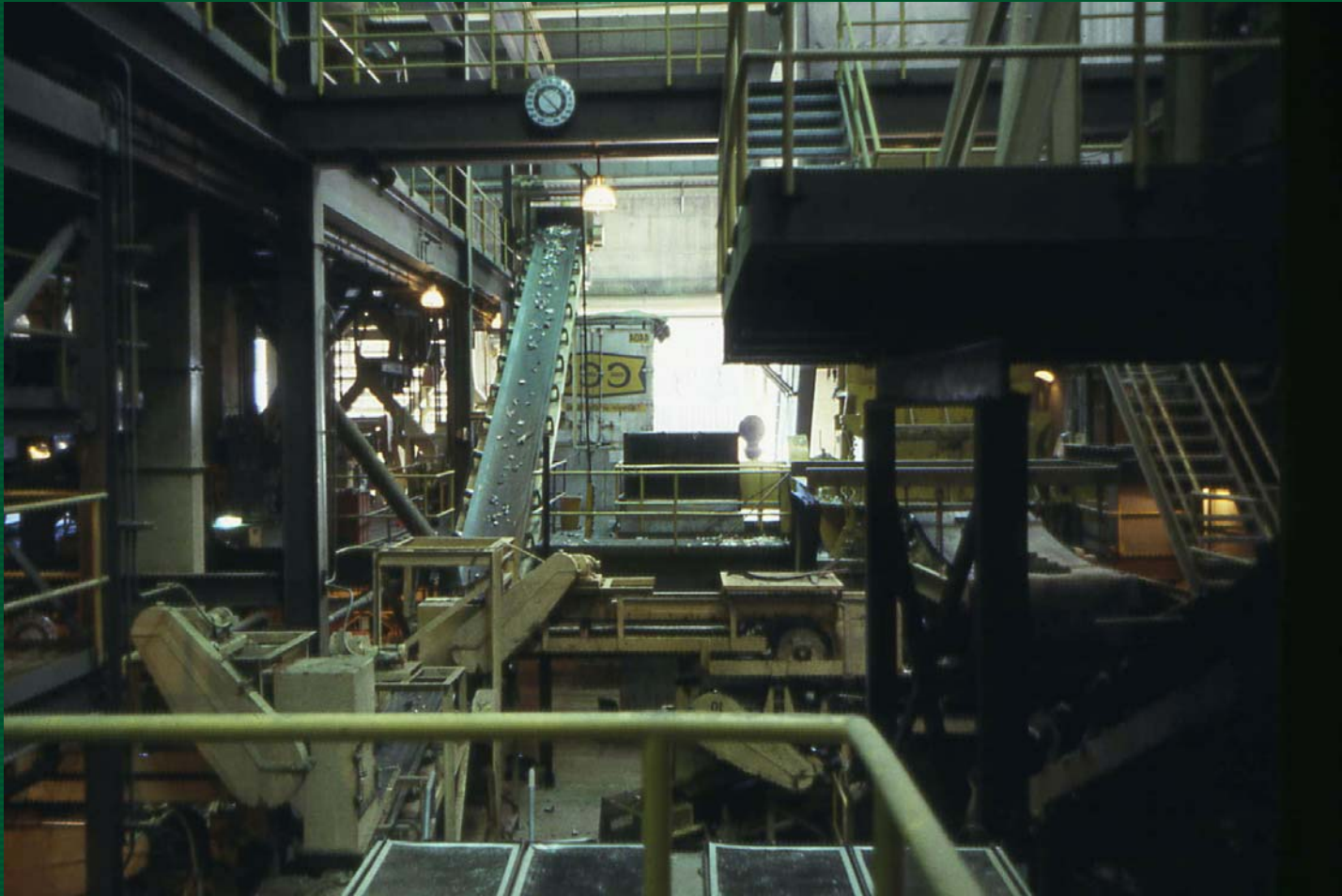
- Inappropriate selection of collection vehicles
- Vehicles kept or purchased beyond their useful life
- Lack of consideration of:
 - cultural and socioeconomic conditions and
 - consultation with the public



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Summary

- Understanding that “low technology” does not mean “low **quality** technology”
- Industrialized countries: waste reduction, recycling
- Developing countries: improve basic phases of service first

Summary

- Responsible planning of integrated SWM requires thorough knowledge of: waste characteristics, equipment, processes (and their limitations)
- Non-technical factors: degree of economic development, regulatory framework, participation of civil society, training programs
- And

Innovation!!!



1st International Solid Waste Conference in Latin America GRAL 2009



- To be held in Quito, Ecuador from June 23 to 25, 2009
- Expect to have more 300 participants from the public and private sectors
- Great opportunity to exchange ideas and look for new markets for a variety of equipment

