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Policy issues: Environment and development

Waste Management

Report of the Executive Director

Summary

The present document has been prepared in pursuance to paragraph 1 of Governing Council decision 24/5, requesting the Executive Director to prepare a report which should (a) contain a review of the work being carried out or planned by relevant organizations, institutions, forums and processes in the field of waste management; (b) identify successful examples and possible gaps, taking into account the possible need for further work, such as guidelines, on integrated waste management, the need for a compilation of best practices related to integrated waste management, in particular at the local level and in developing countries and countries with economies in transition, and the need to strengthen south-south cooperation; (c) provide tangible recommendations on how to bridge any gaps, on who should be responsible for taking the necessary action and on how to assist developing countries and countries with economies in transition to develop their own waste management strategies. The report also contains information on the outcome of the process to work with relevant United Nations bodies in the area of waste management.

* UNEP/GCSS/X/1.

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ACRONYMS

3R	Reduce, Reuse and Recycle
ADB	Asian Development Bank
AfDB	African Development Bank
APO	Asian Productivity Organization
BCRCs	Basel Convention Regional Centres
CDM	Cleaner Development Mechanism
CP	Cleaner Production
DTIE	Division of Technology, Industry and Economics (UNEP)
EBRD	European Bank for Reconstruction and Development
EPA	Environmental Protection Agency
E-waste	Electrical & Electronics Waste
FAO	Food and Agriculture Organization
G-8	Group of Eight Leading Industrialized Nations
GC	General Council (of UNEP)
GEF	Global Environment Facility
GEO	Global Environmental Outlook
GHG	Green House Gas
GPA	Global Programme of Actions
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IETC	International Environmental Technology Centre (DTIE-UNEP)
IMO	International Maritime Organization
IFC	International Finance Corporation
MDGs	Millennium Development Goals
MEA	Multilateral Environmental Agreement
NCPC	National Cleaner Production Centre
NGO	Non-Governmental Organization
ODS	Ozone-Depleting Substances
OECD	Organization for Economic Cooperation and Development
PCB	Polychlorinated Biphenyl
PCF	Prototype Carbon Fund
POPs	Persistent Organic Pollutants
PR China	People's Republic of China
R&D	Research and Development
SBC	Secretariat for Basel Convention
SETAC	Society of Environmental Toxicology and Chemistry
SC&P	Sustainable Consumption and Production Branch (DTIE-UNEP)
UNCRD	United Nations Centre for Regional Development
UNDESA	United Nations Department of Economics and Social Affairs
UNDP	United Nations Development Programme
UNESC	United Nations Economic and Social Commission
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UN Habitat	United Nations Human Settlement Programme
US	United States of America
WB	World Bank
WHO	World Health Organization
WSSD	World Summit on Sustainable Development

Waste Management

SECTION I: SUGGESTED ACTION [TO BE DEVELOPED]

SECTION II: REVIEW OF THE WORK

I. INTRODUCTION

1. Rapid increase in volume and types of solid waste and hazardous waste generation mainly due to economic growth, urbanization, industrialization and globalization is becoming a burgeoning problem to national/local governments as well as municipal authorities for effective and sustainable management of waste. Notwithstanding the considerable efforts made by many Governments, international and national organizations and agencies in tackling waste-related problems, the international reports indicate that there are still major gaps to be filled in this area.

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2. In-line with WSSD Plan of Implementation, Marrakech Process and requests made to GC during its Special Session in Jeju (Republic of Korea), UNEP, in collaboration with partners, intends to intensify and strengthen its activities in the field of waste management focusing on concrete delivery at the national/local level. In support of the Bali Strategic Plan for Capacity Building and Technology Support, UNEP's activities will especially highlight capacity building and provide support for technology identification, assessment and implementation at national/local level.

3. This Waste Report is aimed to identify the needs and gaps in the field of waste management. An Assessment has been made of the activities and programmes of various international organizations to identify areas which require further work and strengthening to assist member countries in improving their waste management systems. The report will also help UNEP to build synergies with the Governments, international and national agencies and organizations.

4. In this analysis national bilateral developing agencies are not included and NGOs' activities not specified. Since special management systems for nuclear wastes, space wastes and wastes linked to chemical weapons have been set up and strictly controlled by the governments, these types of waste are not covered by this analysis either.

II. THE WASTE

5. There are a number of waste categories according to various definitions and criteria¹. For the purpose of this paper, wastes are broadly classified as follows:

(a) Municipal waste from households and commercial centers, including hazardous wastes such as batteries, paint containers, oil mixtures, glass bottles;

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(b) Industrial waste from process or manufacturing and services operations, including hazardous waste; Sludge from wastewater treatment plants;

(c) Discarded products/appliances such as computers (and their peripherals and spares), electric appliances, automobiles, etc. which have become emerging waste streams such as e-waste and end-of-life vehicles. Some of the discarded products/appliances may end up in municipal waste or abandoned open-air dumping mainly in developing countries;

(d) Healthcare and laboratory waste from hospitals and clinics, medical and nursing facilities and offices, and laboratories;

(e) Construction and demolition waste from construction activities or renovation of buildings; After-disaster wastes;

(f) Agricultural waste, crop residues, manure and chemical wastes such as pesticides (POPs), PCBs, ODS, etc; and

¹ In most of the categories, there are waste types that affect different media (air, water and soil). At the present stage, the strategy focuses on solid waste and hazardous waste. Specific waste streams –such as nuclear waste, mining waste, munitions waste, space waste and litter, are not addressed in the present paper.

(g) Marine related wastes, such as marine littering, sea dumping, land-based wastes into marine environment, ship dismantling and recycling.

III. IMPACTS OF WASTE

6. Increase in amount and hazard of wastes has severe impacts on global and local environment, natural resources, public health, local economy and living conditions, thus threatens the attainment of relevant millennium development goals. Various diseases including cancers result from exposure to hazardous emissions mainly from open burning and substandard incineration of wastes. Communities living near dumps are suffering from littering, odor, insects and rats. Scavengers are at even greater health risks.

7. Wastes accumulated over decades and leachate from unmanaged landfills and wastes dumps have contaminated groundwater and soil across the world. Waste dumping into rivers, drains, lakes and sea has caused damages threatening agriculture, water supply, animals and fishes, and people's livelihood depending on the specificity of these aquatic systems. Wastes choke sewage and irrigation systems, which leads to damage on infrastructure and local economy.

8. Substandard landfills and waste dumps emit primarily methane, a major greenhouse gas of concern for climate change. Promoting modern waste management worldwide can contribute in a significant way to GHG reduction on the global level. Similarly, construction and building waste also represent a lost opportunity for GHG emission reduction as reusing/recycling some components such as steel, aluminium, concrete is more energy efficient than using virgin materials. Being inflammable, methane emission has also caused repeated accidents of fires, explosion and collapses at landfill and dumps. For example, more than 200 people died and hundreds were injured when Payatas dumpsite in Philippines collapsed in 2000².

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9. For many fractions of the waste streams (like plastics, metals, glass etc.) as well as for certain waste streams themselves (like e-waste) the environmental impacts do not only come from the waste treatment and disposal itself but also from the indirect impacts due to resources getting lost from the economy loop and new consumption habits in developing countries. This means that these resources have to be produced again from virgin materials (often non-renewable) thus not only depleting the valuable natural resources but also resulting in the whole environmental rucksack once again. The resultant ever-increasing demand of resources makes waste management a global issue.

IV. WASTE BY VOLUME

10. It is estimated that in 2004, the total amount of municipal solid waste (MSW) generated globally reached 1.84 billion tones, 7% increase over 2003 (Global Waste Management Market Report 2004)³. It is further estimated that between 2004 and 2008, global generation of municipal waste will rise by 31.1%, roughly 7% increase annually.

11. The Basel Convention estimated that about 318 and 338 million tons hazardous and other waste were generated for 2000 and 2001 respectively⁴, based on incomplete reports from the parties to the Convention. Healthcare waste is classified as sub-category of hazardous wastes in many countries. WHO estimates that in most low-income countries, total health-care waste per person per year is anywhere from 0.5 to 3 kg⁵.

12. There is no estimate about global industrial wastes generation. The US EPA estimates that American industrial facilities generate and dispose of approximately 7.6 billion tons of non-hazardous industrial solid waste each year⁶.

13. Special waste refers to waste streams that present particular problems needing specific policies and regulation for their management. These include e-wastes and end-of-life motor vehicles, to name a few. Waste from agriculture and rural area include both biomass agricultural residues and hazardous

² <http://www.iges.or.jp/en/pub/pdf/asia2000/e-12.pdf>

³ http://www.researchandmarkets.com/reportinfo.asp?report_id=72031

⁴ <http://maps.grida.no/go/collection/collectionid/17F46277-1AFD-4090-A6BB-86C7D31FD7E7>

⁵ <http://www.who.int/mediacentre/factsheets/fs253/en/>

⁶ <http://www.epa.gov/osw/non-haz.htm>

wastes such as spent pesticides. The EU estimated that its 25 member states produce 700 million tons of agricultural waste⁷.

14. As a result of globalization with more availability of all types of products, there will be significant increase in waste generation levels in all parts of the globe, mostly in developing countries.

V. WASTE BY COST

15. The World Bank estimates that in developing countries, it is common for municipalities to spend 20-50 percent of their available budget on solid waste management, even if only 30-60 percent of all the urban solid waste is uncollected and less than 50 percent of the population is served. In most developing countries, uncontrolled waste disposal in the street, open dumping with open burning is the norm⁸.

16. In low-income countries, collection alone drains up 80-90 percent of municipal solid waste management budget. In mid-income countries, collection costs 50-80 percent of total budget. In high-income countries, collection only accounts for less than 10 percent of the budget, which allows large funds to be allocated to waste treatment facilities. Upfront community participation in these advanced countries reduces the collection cost and facilitates waste recycling and recovery.

VI. WASTE MANAGEMENT: NEED ANALYSIS

17. A needs analysis has been carried out with respect to needs at policy and regulatory, technical, financial, social and institutional levels. Further, as the needs could be different at global, regional, national or local levels, the same has been differentiated wherever required. Deleted: &

(a) Policy and regulatory

(i) Greater conceptual clarity supported by practical application-strategies is required to enable synergy between resource augmentation and waste management. Awareness raising and capacity building is required in areas like waste prevention, 3R (reduce, reuse and recycle), cleaner production etc.

(ii) National policy frameworks and omnibus educational campaigns need to be strengthened and expanded to shift the emphasis from end-of-pipe approach to an integrated resource management approach. At local level integrated waste management strategy and action plan for local communities and municipalities, especially in developing countries needs to be developed and implemented.

(iii) Effective implementation of waste-related multilateral agreements and guidelines is needed at national level. Corresponding laws, regulations and standards need to be developed and their enforcement strengthened both at national level as well as at local level.

(b) Technical

(i) Enhanced access to cutting edge, waste management technologies and strengthening capacity for technology assessment and selection is required. Simultaneously, research and development is required to adapt these technologies to suit local conditions (e.g. with respect to locally available skills, resources, climatic conditions, culture etc.).

(ii) Technical guidelines, case studies, demonstration and pilot projects for integrated waste management especially in developing countries are needed

(iii) Local level capacity to implement and operate waste management technologies needs to be built / strengthened.

(c) Financial

(i) Availability of resource for developing, implementing and operating waste management systems in developing countries needs to be enhanced. Need to develop and implement appropriate economic instruments to raise funds for waste management and make it economically attractive.

⁷ <http://ec.europa.eu/environment/waste/index.htm>

⁸ <http://www.worldbank.org/urban/>

(ii) Public-private partnership needs to be further explored to raise availability and access to financial resources, to meet growing demand for construction and operation of waste management systems.

(d) Social

(i) Need to change the attitude and raise awareness at all levels and among all waste generators to promote waste minimization, source segregation, proper disposal of waste.

(ii) In developing countries, waste management needs to find ways to incorporate and improve employment and working conditions of vulnerable sections of society, e.g. scavengers and rag-pickers;

(iii) Involvement of private sector and local communities in developing, building and running of appropriate waste management system needs to be strengthened and made more effective.

(e) Institutional

(i) Institutional strengthening and capacity building required at national level to enable work at policy, technical, financial and social aspects.

(ii) At local level, institutional capacity needs to be built / strengthened to raise awareness and develop human resources for waste management.

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VII. KEY ACTORS AND MAJOR INITIATIVES

18. The main actors in international waste management, be it at the global, regional, national and local level, are UNEP and some of the UNEP administered conventions, namely the Basel convention, the Stockholm convention on Persistent Organic Pollutants (POPs), Vienna convention/Montreal Protocol on Ozone Depleting Substances as well as some of the established UNEP action programmes, like Global Programme of Actions (GPA) and the Regional Seas Programme.

19. Other UN agencies working on various aspects of waste management include: UNDP, WHO, IMO, UN Habitat, UN Centre for Regional Development (UNCRD) and UNIDO, and to a lesser extent UN Economic and Social Commissions (UNESCO) for regions. Among other international organizations, the OECD is a key actor.

20. Further, various international financing institutions have work related to waste management, namely The World Bank Group (IBRD, IDA, IFC and the Prototype Carbon Fund (PCF)) and regional development banks like Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), Inter- American Development Bank (IADB) and Africa Development Bank (AfDB).

21. The key actors that are active on different aspects of waste management needs are summarized in the following table (Table 1) based on information from their web-sites. We have analyzed the work being implemented or planned along two lines: 1) Pre-generation stage of waste chain (before resources actually appear as waste) covering waste minimization, CP and 3R, and 2) Post-generation stage of waste (after the waste has been generated) covering waste treatment and disposal. Further a distinction has been made of actions at different geographical scale – global, regional/national and local.

Table 1: Agencies having existing and planned activities in waste management

Level Aspects of needs	Pre-generation stage of waste			Post-generation stage of waste		
	Global	Regional / National	Local	Global	Regional / National	Local
Policy & regulatory	UNEP, SBC	OECD, UNEP, UNIDO, UNCRD	--	UNEP, SBC, IMO	OECD, SBC, UNDP, UNEP, UNIDO, WB, ADB, EBRD, IADB, AfDB, UN-Habitat, UNCRD	UNEP, UNDP, UN- Habitat
Technical	WB	OECD, UNIDO,	UNIDO, UNEP	SBC, IMO, UNEP	OECD, WB, ADB, EBRD,	UNDP, UNEP,

		UNEP			IADB, UNDP, UNIDO, UNEP, UN-Habitat	UN-Habitat,
Financial	--	IADB	--	--	WB, OECD, EBRD	WB-PCF
Social	UNEP	UNEP, UNCRD, NGOs	NGOs	UNEP, SBC	UNEP, UNDP, UNESCs, ADB, IADB, AfDB	UNEP, NGOs,
Institutional	WB, UNEP, UNIDO	UNEP, UNIDO, UNCRD	--	UNEP	OECD, SBC, GEF, WB, ADB, EBRD, IADB, AfDB, UN-Habitat, UNIDO, UNEP, UNDP,	UNEP, UNDP, UN-Habitat

VIII. WASTE MANAGEMENT NEEDS AND EXTENT TO WHICH THESE ARE BEING ADDRESSED

22. The table below summarizes the extent to which the waste management needs identified earlier in section 17 are being addressed to by different organizations that have existing and planned activities in the field of waste management. Information was solicited from different organizations and the responses received have been summarized in the [Information Document UNEP/GCSS/X/INF/6](#). The Governing Council also asked for success stories and the organizations were requested to provide information on this aspect as well. These success stories, compiled from the information given by different organizations are given at the same [Information Document UNEP/GCSS/X/INF/6](#). Information available from published sources and web-sites has also been made use of. For the sake of simplicity and easy understandability, a broad qualitative assessment as Low/medium/high has been made.

Table 2: Needs analysis at **pre-generation** stage of waste

Waste management needs	Global assessment	Regional/National assessment	Local assessment
Policy and regulatory: (i) Greater conceptual clarity supported by practical application-strategies is required to enable synergy between resource augmentation through waste management. Awareness raising and capacity building is required in areas like waste prevention, 3R (reduce, reuse and recycle), cleaner production etc.	Only recently, International Resource Panel has been launched by UNEP. Govt. of Japan brought 3R at G-8 and is now working to disseminate it at regional level. SBC has done substantive work in the field of Hazardous Waste and has also achievements in other fields. LEVEL: Low	OECD has done considerable work but mostly limited to OECD countries. UNEP-UNIDO through the NCPC programme has addressed the need in some developing countries. Recently UNCRD has taken up work on 3R in some countries. LEVEL: Medium	There is no worth mentioning effort at local level. LEVEL: Very Low
(ii) National policy frameworks need to be strengthened and expanded to shift the emphasis from end-of-pipe	Virtually no effort at global level. LEVEL: Very Low	Sporadic efforts at local level e.g. Cleaner Production	Virtually no effort at local level except for

<p>approach to a an integrated resource management approach. Integrated resource management strategy and action plan, especially in developing countries needs to be developed and implemented.</p> <p>(iii) Effective implementation of multilateral waste-related agreements and guidelines is needed at national level. Corresponding laws, regulations and standards need to be developed and their enforcement strengthened both at national level as well as at local level.</p>	<p>Secretariats of corresponding MEAs doing good work in this direction although effectiveness of implementation at national level needs to be improved. LEVEL: High</p>	<p>Act in PR China. LEVEL: Low</p> <p>Few regional set-ups, e.g. BCRCs are active in this area however resources are limited. LEVEL: Medium</p>	<p>a few pilot projects by UNEP. LEVEL: Very Low</p> <p>Local level implementation on preventive aspects may be low depending on regions. LEVEL: Low to Medium</p>
<p>Technical: (i) Enhanced access to cutting edge, cleaner and resource efficient technologies and strengthening capacity for technology assessment and selection is required. Simultaneously, research and development is required to adapt these technologies to suit local conditions (e.g. with respect to locally available skills, resources, climatic conditions, culture etc.).</p> <p>(ii) Technical guidelines, case studies, demonstration and pilot projects for preventive aspects of integrated waste management especially in developing countries are needed.</p> <p>(iii) Build / strengthen capacity at local level to implement and operate cleaner and resource efficient technologies.</p>	<p>Little or no effort at global level. LEVEL: Very Low</p> <p>Little effort at global level on preventive aspects of an integrated waste management in developing countries. World Bank has brought out some guidelines. LEVEL: Low</p> <p>No effort at global level. LEVEL: Very Low</p>	<p>OECD has worked to enhance the access but mostly applicable to OECD countries. UNIDO has technology databases for preventive technologies but the information is not cutting edge and not regularly updated. Recent efforts include UNEP's 3R knowledge hub being set up at ATT. LEVEL: Low</p> <p>UNEP- UNIDO through NCPC Programme has developed a number of guidelines, case studies, etc. on preventive aspects. LEVEL: High</p> <p>UNEP-UNIDO through NCPC Programme has built and strengthened capacity at national level on preventive waste management technologies. LEVEL: Medium</p>	<p>No work done at local level. R&D adoption is still very little. LEVEL: Very Low</p> <p>UNEP has started a few pilot demonstration projects. UNEP-UNIDO through NCPC Programme has done quite a good work at local level. LEVEL: High</p> <p>No concerted work carried out at local level. LEVEL: Very Low</p>

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<p>Financial:</p> <p>(i) Availability of resource for developing, implementing and operating waste prevention systems in developing countries needs to be enhanced. Need to develop and implement appropriate economic instruments to raise funds for waste prevention and make it economically attractive.</p> <p>(ii) Public-private partnership needs to be further explored to raise availability and access to financial resources, to meet growing demand for construction and operation of waste prevention systems.</p>	<p>No effort at global level to enhance availability of financial resources for waste prevention. LEVEL: Very Low</p> <p>No concerted effort at global level to establish such partnerships, except MPPI under BC. LEVEL: Very Low</p>	<p>Regional development banks, particularly ADB has set up country specific credit lines in their respective regions. Here again the number of beneficiaries is rather low. LEVEL: Low</p> <p>No concerted effort at regional level to establish such partnerships. LEVEL: Very Low</p>	<p>No concerted effort at local level except sporadic cases, e.g., in India, Bangladesh, Brazil. LEVEL: Very Low</p> <p>No concerted effort at local level to establish such partnerships. LEVEL: Very Low</p>
<p>Social:</p> <p>(i) Need to change the attitude and raise awareness at all levels and among all waste generators to promote waste minimization, source segregation, reuse/recycle of waste.</p> <p>(ii) In developing countries, waste recycling sector needs to find ways to incorporate and improve employment and working conditions of vulnerable sections of society, e.g. informal sector, scavengers and rag-pickers.</p>	<p>Some effort at global level by UNIDO, UNEP. LEVEL: Very Low</p> <p>No concerted effort at global level LEVEL: Very Low</p>	<p>UNEP-UNIDO through NCP Program has done considerable work at national level. LEVEL: High</p> <p>No concerted effort at regional level LEVEL: Very Low</p>	<p>No concerted effort at local level. LEVEL: Very Low</p> <p>Sporadic efforts at local level LEVEL: Low</p>
<p>Institutional:</p> <p>(i) Institutional strengthening and capacity building required at national level to enable work at policy, technical, financial and social aspects.</p> <p>(ii) At local level, institutional capacity needs to be built / strengthened to raise awareness and develop human resources for waste prevention.</p>	<p>Organizations like WB, UNEP and UNIDO have done considerable work in building and strengthening capacity in countries. However, the pedagogical impacts are mostly based on experience in developed countries. LEVEL: High</p> <p>No global effort for building local institutional capacity except BCRCs LEVEL: Low</p>	<p>The NCP Programme of UNEP and UNIDO has been very effective in building preventive waste management capacity at national level. LEVEL: High</p> <p>Considerable efforts at regional/national level by academia, to build and develop human resources. LEVEL: High</p>	<p>Not applicable</p> <p>No local level initiative to develop human resources. LEVEL: Low</p>

Table 3: Needs analysis at **post-generation** of waste

Waste management needs	Global assessment	Regional/National assessment	Local assessment
<p>Policy and regulatory:</p> <p>(i) Greater conceptual clarity supported by practical application-strategies is required to enable synergy between resource augmentation through waste management. Awareness raising and capacity building is required in areas like waste prevention, 3R (reduce, reuse and recycle), cleaner production etc.</p> <p>(ii) National policy frameworks need to be strengthened and expanded to shift the emphasis from end-of-pipe approach to an integrated resource management approach. At local level integrated waste management strategy and action plan for municipalities, especially in developing countries needs to be developed and implemented.</p> <p>(iii) Effective implementation of multilateral waste-related agreements and guidelines is needed at national level. Corresponding laws, regulations and standards need to be developed and their enforcement strengthened both at national level as well as at local level.</p>	<p>Marrakech Process is the major global initiative to promote sustainable consumption and production, under which waste management is also addressed. The 3R initiative from Japan also addresses post generation stage of waste but is so far mostly limited to 6-8 countries. LEVEL: Low</p> <p>Global efforts (mainly WB, SBC, IMO) predominantly continue to lay emphasis on end-of-pipe approach. No global effort on integrated waste management. LEVEL: Very Low</p> <p>Secretariats of corresponding MEAs doing good work in this direction although effectiveness of implementation needs to be improved. LEVEL: High</p>	<p>No significant effort at regional/national level except those in developed countries like Japan eco-town initiative and EU's recycling initiatives. LEVEL: Very Low</p> <p>Regional/national efforts (mainly WB, regional development banks) also continue to emphasize end-of-pipe approach. UNEP and UN DESA have started addressing this issue through Regional Roundtables on Sustainable Consumption and Production. LEVEL: Low</p> <p>Regional and national setups exists particularly for MEAs like Basel Convention, work picking up for Stockholm Convention and Rotterdam convention, also under Marrakesh Process. LEVEL: High</p>	<p>In developing countries only a few sporadic initiatives like organic waste composting in Bangladesh. Most other initiatives are market driven. LEVEL: Low</p> <p>No significant effort at local level. LEVEL: Very Low</p> <p>Local level implementation gradually strengthening specifically for hazardous waste, ozone depleting substances, POPs, etc. LEVEL: High</p>
<p>Technical:</p> <p>(i) Enhanced access to cutting edge, waste management technologies and strengthening capacity for technology assessment and selection is required. Simultaneously, research and development is required to adapt</p>	<p>At global level considerable work done (SBC, IMO, UNEP) for wastes convened under specific MEAs. For</p>	<p>At regional/national level considerable work done (WB, regional development banks, OECD) to provide technology</p>	<p>Some work done (UNDP, UN-HABITAT, UNEP) at a few locations to enhance</p>

<p>these technologies to suit local conditions (e.g. with respect to locally available skills, resources, climatic conditions, culture etc.).</p> <p>(ii) Technical guidelines, case studies, demonstration and pilot projects for integrated waste management especially in developing countries are needed.</p> <p>(iii) Build / strengthen capacity at local level to implement and operate waste management technologies.</p>	<p>other wastes (municipal, industrial, etc.) few guidelines made available (UNEP, WB). Little or no work done for local adoption. LEVEL: Low</p> <p>Little effort at global level on integrated waste management except a few guidelines by UNEP. LEVEL: Very Low</p> <p>No work done at global level. LEVEL: Very Low</p>	<p>guidelines. Capacity for technology assessment and selection continues to be low in developing countries. LEVEL: Low</p> <p>No work done at regional/national level. LEVEL: Very Low</p> <p>No work done at regional/national level. LEVEL: Very Low</p>	<p>technology access at local level. Little or no work done for local adoption. LEVEL: Low</p> <p>Except for a few pilot projects by UNEP, no work done. LEVEL: Very Low</p> <p>Except for local capacity building as part of locally implemented projects by development banks, no work done. LEVEL: Low</p>
<p>Financial:</p> <p>(i) Availability of resource for developing, implementing and operating waste management systems in developing countries needs to be enhanced. Need to develop and implement appropriate economic instruments to raise funds for waste management and make it economically attractive.</p> <p>(ii) Public-private partnership needs to be further explored to raise availability and access to financial resources, to meet growing demand for construction and operation of waste management systems.</p>	<p>At global level WB has set up country specific credit lines to provide financial resources. However, the number of beneficiary countries is rather low in view of the demand for resources. Development of economic instruments is rather absent. Financial resources from institutions like GEF and mechanisms like CDM do not support integrated waste management projects but isolated aspects like POPs and landfill gas. LEVEL: Low</p> <p>No concerted effort at global level to establish such partnerships except under Basel Convention.</p>	<p>Regional development banks have made significant financial resources available for implementation of end-of-pipe waste management system. However, not much work done towards development of economic instruments. LEVEL: High</p> <p>No concerted effort at regional/national level to establish such partnerships. LEVEL: Very Low</p>	<p>No concerted effort to increase availability of financial resources at local level. LEVEL: Very Low</p> <p>Limited efforts have being put in at local level, e.g., India, Bangladesh, Kenya and</p>

	LEVEL: Very Low		Brazil. LEVEL: Low
<p>Social:</p> <p>(i) Need to change the attitude and raise awareness at all levels and among all waste generators to promote waste minimization, source segregation, proper disposal of waste.</p>	<p>SBC has contributed towards raising awareness on proper waste disposal although mainly on hazardous waste and some other specific waste types. UNEP has worked in the area for ODS and POPs. Little work done for municipal and industrial waste in developing countries. LEVEL: Low</p>	<p>No concerted effort at regional/national level. LEVEL: Very Low</p>	<p>No concerted effort at local level. LEVEL: Very Low</p>
<p>(ii) In developing countries, waste management needs to find ways to incorporate and improve employment and working conditions of vulnerable sections of society, e.g. scavengers and rag-pickers.</p>	<p>Some concerted effort at global level. LEVEL: Very Low</p>	<p>Sporadic efforts by organizations like UNEP, UNCRD and NGOs. LEVEL: Low</p>	<p>A number of NGOs active at local level. LEVEL: Medium</p>
<p>(iii) Involvement of private sector and local communities in developing, building and running of waste management system needs to be strengthened and made more effective.</p>	<p>No efforts at global level to involve private sector and local communities. Preventive waste management continues to be perceived as an area requiring intervention from government. LEVEL: Very Low</p>	<p>No effort at regional/national level. LEVEL: Very Low</p>	<p>Sporadic efforts by organizations like UNEP and UNCRD. LEVEL: Low</p>
<p>Institutional:</p> <p>(i) Institutional strengthening and capacity building required at national level to enable work at policy, technical, financial and social aspects.</p>	<p>Global efforts (mainly WB) are based on experience in developed countries and experience from developing countries has not been made use of to strengthen the normative function. LEVEL: Low</p>	<p>Regional/national efforts (mainly regional development banks) are county specific and experience sharing in similar countries is missing. LEVEL: Low</p>	<p>Not applicable</p>
<p>(ii) At local level, institutional capacity needs to be built / strengthened to raise awareness and develop human resources for waste management.</p>	<p>No global effort in institutional strengthening at local level.</p>	<p>Considerable effort at regional/national level by academia to build and develop</p>	<p>No local level initiatives to develop human resources.</p>

	LEVEL: Very Low	human resources. LEVEL: High	LEVEL: Very Low
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IX. TANGIBLE RECOMMENDATIONS

23. From Tables 2 & 3 above it will be clear that several areas still remain to be addressed in the field of waste management. A review of the two tables above shows that, although considerable efforts have been made in waste management over years, gaps remain to be filled in order to address the needs of countries. Major tangible recommendations are given below.

(a) Policy and regulatory

(i) Greater conceptual clarity supported by practical application-strategies to promote resource augmentation through waste recovery/reuse/recycle is required, particularly at local level.

(ii) National policy frameworks need to be strengthened and expanded to shift the emphasis from end-of-pipe approach to an integrated resource management approach.

(iii) At local level integrated waste management strategy and action plan for municipalities, especially in developing countries needs to be developed and implemented.

(iv) Implementation of preventive aspects of waste related multilateral agreements needs to be strengthened at local level.

(v) Integrated waste management should be recognized as a key priority area in the current one UN approach.

(b) Technical

(i) Access to cutting edge, waste management technologies needs to be enhanced.

(ii) Strengthening capacity for technology assessment and selection is required.

(iii) Simultaneously, research and development is required to adapt these technologies to suit local conditions.

(iv) Technical guidelines, case studies, demonstration and pilot projects for integrated waste management especially in developing countries need to be prepared and disseminated.

(v) Capacity at local level to implement and operate waste management technologies needs to be built/strengthened.

(c) Financial

(i) Availability of resource for developing, implementing and operating waste management systems (both preventive as well as post-generation stage of waste, particularly at local level in developing countries needs to be enhanced. MDGs on water and sanitation and poverty reduction for Africa cannot be met without adequate waste management, therefore donors should intensify support to waste management projects emanating from local municipalities, NGOs and/or local associations.

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(ii) Appropriate economic instruments to raise funds for waste management and make it economically attractive need to be developed and implemented.

(iii) Public-private partnerships need to be established to raise availability and access to financial resources, to meet growing demand for construction and operation of waste management systems.

(d) Social

(i) Awareness raising to change the attitude of waste generators, particularly municipal and industrial waste generators, for proper segregation and disposal of waste is required.

(ii) In developing countries, generating employment and improving working conditions of vulnerable sections of society, e.g. scavengers and rag-pickers needs to be strengthened.

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(iii) Involvement of private sector and local communities in developing, building and running of waste management system needs to be strengthened and made more effective.

(e) Institutional

(a) Institutional strengthening and capacity building at national level is required to enable work at policy, technical, financial and social aspects of post-generation of waste management. The experience gained through projects in developing countries should be factored in the capacity building activities thus strengthening the normative function.

(b) Institutional capacity needs to be built, strengthened at local level to raise awareness and develop human resources for waste management.

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SECTION III: OUTCOME OF THE PROCESS TO COOPERATE WITH OTHER ORGANISATIONS

1. Policy and regulatory

(a) UNEP in cooperation with SBC will promote resource augmentation through waste recovery/reuse/recycle supported by practical application-strategies, particularly at local level. UNEP will take the lead in strengthening and expanding national policy frameworks to shift the emphasis from end-of-pipe approach to an integrated resource management approach.

(b) UNEP will take the lead at local level for developing and implementing integrated waste management strategy and action plan for municipalities, especially in developing countries. It will work towards getting Integrated waste management be recognized as a key priority area in the current one UN approach.

(c) The MEA Secretariats will strengthen implementation of preventive aspects of waste related multilateral agreements particularly at local level.

2. Technical

(a) OECD, WB, UNIDO, ADB, IADB, AfDB will enhance access to cutting edge, waste management technologies. This will include strengthening of capacity in developing countries for technology assessment and selection towards which UNEP will work in close cooperation with OECD and UNIDO. R&D Institutions will be encouraged to enhance efforts on research and development required to adapt these technologies to suit local conditions.

(b) UNEP and SBC will specially initiate programmes for preparation of technical guidelines, case studies, demonstration and pilot projects for integrated waste management especially in developing countries

(c) UNDP, UNIDO, Development Banks, BCRCs will initiate programmes to build/ strengthen capacity at local level to implement and operate waste management technologies

3. Financial

(a) WB and development banks will work towards enhancing availability of resource for developing, implementing and operating waste management systems (both preventive as well as post-generation stage of waste, particularly at local level in developing countries needs to be enhanced.

(b) OECD and UNEP will support developing countries in framing appropriate economic instruments to raise funds for waste management and make it economically attractive.

(c) UNEP, UNIDO, UNDP, SBC will towards forging Public-private partnerships to raise availability and access to financial resources, to meet growing demand for construction and operation of waste management systems.

4. Social

(a) UNEP, UNCRD, UN-Habitat, UNDP will launch programmes for awareness raising to change the attitude of waste generators, particularly municipal and industrial waste generators, for proper segregation and disposal of waste is required.

(b) UNDP, UNCRD, UN-Habitat will work towards improving working conditions of vulnerable sections of society, e.g. scavengers and rag-pickers in developing countries

(c) WB and development banks will strengthen involvement of private sector and local communities in developing, building and running of waste management system

5. Institutional

(a) UNEP, UNIDO, MEA Secretariats, BCRCs will launch programmes for Institutional strengthening and capacity building at national level to enable work at policy, technical, financial and social aspects of post-generation of waste management. The experience gained through projects in developing countries should be factored in the capacity building activities thus strengthening the normative function. Institutional capacity building/strengthening at local level will be taken up by UNDP, UNIDO, UNCRD, and BCRCs.