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Policy issues: environment and development

Waste management

Report of the Executive Director

Summary

The present document has been prepared pursuant 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

3Rs	reduce, reuse and recycle
ADB	Asian Development Bank
AfDB	African Development Bank
BCRCs	Basel Convention regional centres
CDM	Clean Development Mechanism
EBRD	European Bank for Reconstruction and Development
FAO	Food and Agriculture Organization
G-8	group of eight leading industrialized nations
GEF	Global Environment Facility
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IMO	International Maritime Organization
IFC	International Finance Corporation
MEAs	multilateral environmental agreements
MPPI	Mobile Phone Partnership Initiative
NCPC	National Cleaner Production Centre
NGO	non-governmental organization
ODS	ozone-depleting substances
OECD	Organization for Economic Cooperation and Development
PACE	Partnership for Action on Computing Equipment
PCB	polychlorinated biphenyl
PCF	Prototype Carbon Fund
POPs	persistent organic pollutants
R&D	research and development
SBC	secretariat of the Basel Convention
UNCRD	United Nations Centre for Regional Development
UNDESA	United Nations Department of Economics and Social Affairs
UNDP	United Nations Development Programme
UNESCs	United Nations economic and social commissions
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UN-Habitat	United Nations Human Settlements Programme
WB	World Bank
WHO	World Health Organization

Waste management

I. Suggested action

1. The Governing Council may wish to consider adopting a decision along the following lines:

The Governing Council,

Recalling its decision 24/5 on waste management,

Reaffirming that waste management is an important issue, especially for developing countries, and that international agencies should undertake more focused and coordinated actions to address current gaps in the support provided to assist developing countries' efforts,

Noting that comprehensive waste management programmes need to be launched at the local level,

Also noting that the United Nations Environment Programme should continue to strengthen its support for the political processes relevant to the realization of a life cycle economy, for the dissemination of best practice on integrated waste management and the scientific knowledge on resource-efficiency through initiatives such as the Marrakech Process on Sustainable Consumption and Production and the United Nations Environment Programme/ Society of Environmental Toxicology and Chemistry Life Cycle Initiative,

Further noting that the United Nations Environment Programme should continue to broaden its activities and support other international initiatives such as the "3Rs" (recovery, reuse, recycle) Initiative and multilateral environmental agreements, particularly the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and the Strategic Approach to International Chemicals Management, which are expected to provide greater clarity and practical strategies to promote waste minimization and resource augmentation through the recovery, reuse and recycling of waste,

Noting that stronger efforts are needed to assist national Governments in developing national policy frameworks to encourage a shift from an "end-of-pipe" approach to waste management to an integrated resource management approach,

1. *Requests* the Executive Director, as an integral part of the United Nations Environment Programme's work on waste management, to provide further assistance to developing countries and countries with economies in transition in their efforts to strengthen national implementation of waste-related multilateral agreements, bearing in mind the impact that waste has on global demand for resources and the role of the "3Rs" approach and the circular or life cycle economy in addressing the issue of resource management at a broader level, and strengthen the synergy between various initiatives;

2. *Also requests* the Executive Director to facilitate international efforts to assist developing countries and countries with economies in transition in developing economic and market-based instruments with a view to raising funds for waste management and making it a financially self-sustainable business opportunity;

3. *Further requests* the Executive Director to strengthen support for capacity-building and technology support, in line with the Bali Strategic Plan for Technology Support and Capacity-building, focusing in particular on:

- (a) Recycling and reduction in the use of materials and energy, and identification and assessment of environmentally sound technologies for treatment and disposal of residual waste;

- (b) Demonstration and pilot projects with extensive replication potential with an emphasis on integrated waste management strategies and action plans, in support of the Basel Convention activities that address the environmentally sound management of special wastes such as e-waste and health care waste, and with a particular focus on recovery and reuse, which will be complemented by the development of technical guidelines, case studies, and training and awareness-raising packages;

- (c) Public-private partnerships and dialogues between Governments and other stakeholders in waste management in order to help generate and disseminate among stakeholders vital information on the appropriate actions to develop infrastructure and secure greater resources from financial institutions for the construction of the necessary waste facilities and infrastructure;

(d) More intensive awareness-raising designed to change the attitude of waste generators, particularly industrial and municipal ones, consumers and the informal sector with respect to the need for proper segregation, reuse, recycle and disposal of waste;

4. *Invites* Governments and relevant organizations to undertake and provide additional financial resources to the United Nations Environment Programme and in support of the Basel Convention in order to facilitate the implementation of the activities outlined above and the provision of technical assistance to developing countries and countries with economies in transition, especially least developed countries, to develop and implement integrated waste management plans.

II. Review of the work

A. Introduction

1. The rapid increase in the volume and types of solid waste and hazardous waste generation mainly due to economic growth, urbanization and industrialization represents a growing problem to both national and local governments, and also to municipal authorities in their endeavours to ensure the 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, international reports indicate that there are still major gaps to be filled in this area.

2. In line with the Plan of Implementation of the World Summit for Sustainable Development, the Marrakech Process and requests made to the Governing Council during its special session in Jeju (Republic of Korea), the United Nations Environment Programme (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 and local levels. In support of the Bali Strategic Plan for Capacity-building and Technology Support, UNEP activities will focus on capacity-building and provide support for technology identification, assessment and implementation at national and local levels.

3. The present report aims to identify the needs and gaps in the field of waste management. It has been prepared through intensive consultation with relevant United Nations and other organizations. A draft copy of the report was circulated and feedback and other information were sought, including through personal interaction wherever possible. In developing the report, the secretariat of the Basel Convention, which is considered to be an important global framework for hazardous and other wastes, provided inputs on its activities. 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 build synergies with Governments, international and national agencies and organizations.

4. This analysis does not include national bilateral developing agencies, nor is it concerned with the activities of non-governmental organizations. The information provided generally refers to the situations in developing countries and may not apply to developed countries. Since special management systems for nuclear wastes, space wastes and wastes linked to chemical weapons have been set up and are strictly controlled by Governments, these types of waste are also outside the scope of this analysis.

B. Waste

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

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

(b) Industrial waste from processes or manufacturing and services, including hazardous waste; and sludge from wastewater treatment plants;

(c) Discarded products and appliances such as computers (and their peripherals and spares), electric appliances, motor vehicles, etc., which constitute the emerging waste streams of e-waste and end-of-life vehicles. Some of these discarded products and appliances may end up in municipal waste;

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 – lie outside the scope of the present paper.

- (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; and post-disaster wastes;
- (f) Agricultural waste, crop residues, manure and chemical wastes such as pesticides, including persistent organic pollutants (POPs), polychlorinated biphenyls (PCBs), ozone-depleting substances; and
- (g) Marine-related wastes, such as marine litter, products dumped at sea dumping, land-based wastes discarded in the marine environment, waste from dismantled ships and ship recycling.

C. Impacts of waste

6. The increase in the amount of wastes and the concomitant rise in the hazards which it poses are having a severe impact on global and local environments, natural resources, public health and local economies and living conditions, and in this way threatening 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 the associated littering, odour, insects and rats. Human scavengers incur 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, lakes and sea has caused damage that threatens agriculture, water supplies and people's livelihoods which depend on these aquatic systems. Wastes choke sewage and irrigation systems, leading in turn to damage to infrastructure and the local economy.

8. Substandard landfills and waste dumps emit, among other gases, methane, a major greenhouse gas of concern for climate change. Promoting modern waste management in countries can contribute in a significant way to greenhouse gas reduction at a global level. Similarly, construction and building waste also represents a lost opportunity for the reduction of greenhouse gas emissions, as the reuse or recycling of some components, such as steel, aluminium and concrete, is more energy-efficient than using virgin materials. Being highly inflammable, methane has also been the cause of repeated accidents involving fires, explosions and collapses at landfills and dumps. For example, more than 200 people died and hundreds were injured when Payatas dumpsite in Philippines collapsed in 2000.²

9. For many components of the waste streams (such as plastics, metals, glass and others), as well as for certain waste streams themselves (such as e-waste), the environmental impacts are not only produced by the waste treatment and disposal processes themselves, but also derive indirectly from the loss of potential resources from the economy loop. This means that these resources have to be produced again from virgin materials (often non-renewable), thus not only depleting the valuable stock of natural resources but also perpetuating the vicious cycle of environmental degradation and resource depletion. The resulting, ever-increasing demand for resources makes waste management a global issue.

D. Waste by volume

10. It is estimated that, in 2004, the total amount of municipal solid waste generated worldwide reached 1.84 billion tons, a 7 per cent increase over the 2003 total (Global Waste Management Market Report 2004).³ It is further estimated that, between 2004 and 2008, worldwide generation of municipal waste will rise by 31.1 per cent, representing an annual rate of increase of some 7 per cent.

11. Analysts at the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal estimated that about 318 and 338 million tons hazardous and other waste were generated for 2000 and 2001 respectively,⁴ based on incomplete reports from the parties to the Convention. Health-care waste is classified as subcategory of hazardous wastes in many countries. The World Health Organization (WHO) estimates that, in most low-income countries, total health-care waste per person per year ranges between 0.5 kg and 3 kg.⁵

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/>

12. There are no estimates of the amounts of industrial wastes generated worldwide. The United States Environmental Protection Agency estimates that American industrial facilities generate and dispose of approximately 7.6 billion tons of non-hazardous industrial solid waste each year.⁶

13. The term “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 areas includes both biomass agricultural residues and hazardous wastes such as spent pesticides. The European Union estimates that its 25 member States annually produce a total of 700 million tons of agricultural waste.⁷

14. As a result of globalization, with the increasing availability of all types of products, there will be an accompanying significant increase in waste generation levels in all parts of the globe. There is a need for improvements to the availability of valid data on waste generation from all sources and to national reporting under the Basel Convention.

E. Waste by cost

15. The World Bank estimates that, in developing countries, it is common for municipalities to spend 20–50 per cent of their available budget on solid waste management, even if only 30–60 per cent of all the urban solid waste is actually collected and less than 50 per cent of the population is served. In most developing countries, open dumping with open burning is the norm.⁸

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

F. Waste management: needs analysis

17. A needs analysis has been carried out in respect of needs at the policy and regulatory, technical, financial, and social and institutional levels. In addition, as the needs could be different at global, regional, national or local levels, the analysis has been differentiated wherever required.

(a) Policy and regulatory:

- (i) Greater conceptual clarity supported by practical application strategies is required to enable synergies between resource augmentation and waste management. Awareness raising and capacity-building is required in such areas as waste prevention, the 3Rs (reduce, reuse and recycle), cleaner production, among others;
- (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 the local level, integrated waste management strategies and action plans for municipalities, especially in developing countries, need to be developed and implemented;
- (iii) Effective implementation of waste-related multilateral agreements and guidelines is needed at the national level. Corresponding laws, regulations and standards need to be developed and their enforcement strengthened at both the national and the local level;

(b) Technical:

- (i) Enhanced access to cutting-edge environmentally sound waste-management technologies and strengthened capacity in technology assessment and selection are required. Simultaneously, research and development work is required to adapt these technologies to suit local conditions (e.g., in respect of locally available skills, resources, climate conditions, culture, etc.);

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

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

⁸ <http://www.worldbank.org/solidwaste/>

- (ii) Technical guidelines, case studies and 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 or strengthened;
- (c) Financial:
 - (i) The resources available for developing, implementing and operating waste-management systems in developing countries need to be enhanced. There is a need to develop and implement appropriate economic instruments to raise funds for waste management and make it economically attractive;
 - (ii) Development and implementation of appropriate economic instruments to raise funds for waste management and make it economically attractive;
 - (iii) Public-private partnerships need to be further explored to enhance the availability of and access to financial resources, in order to meet the growing demand for the construction and operation of waste-management systems;
- (d) Social:
 - (i) There is a need to change attitudes and to raise awareness at all levels and, in particular, among all waste generators, so as to promote waste minimization, source segregation and the proper disposal of waste;
 - (ii) In developing countries, the waste management programmes and policies need to find ways to incorporate and improve employment and working conditions of vulnerable sections of society, notably, scavengers and rag-pickers;
 - (iii) The involvement of private sector and local communities in developing, building and running waste-management systems needs to be strengthened and made more effective.
- (e) Institutional:
 - (i) Institutional strengthening and capacity-building are required at the national level to enable work on policy, technical, financial and social aspects;
 - (ii) At the local level, institutional capacity needs to be built or strengthened, to raise awareness and develop human resources for waste management.

G. Key actors and major initiatives

18. The main actors in international waste management, be it at the global, regional, national or local level, are UNEP and some of the UNEP-administered agreements, namely, the Basel Convention, the Stockholm Convention on Persistent Organic Pollutants, the ozone agreements the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer, together with some of the established UNEP action programmes, such as the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities and the Regional Seas Programme.

19. Other United Nations agencies working on various aspects of waste management include the United Nations Development Programme (UNDP), WHO, the International Maritime Organization (IMO), the United Nations Human Settlements Programme (UN-Habitat), the United Nations Centre for Regional Development (UNCRD) and the United Nations Industrial Development Organization (UNIDO) and, to a lesser extent the economic and social commissions in the various regions. Among other international organizations, the Organization for Economic Cooperation and Development (OECD) is a key actor.

20. In addition, various international financing institutions are engaged in work related to waste management, namely, the World Bank Group (the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC) and the Prototype Carbon Fund (PCF)) and regional development banks such as the Asian Development Bank, the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB) and the African Development Bank. The World Bank, in

particular, has prepared several guidelines and training programs and has carried out a number of studies.

21. The key actors active in different aspects of waste management needs are summarized in table 1 below, based on information from their websites. The work being implemented or planned has been analysed along two lines: first, the pre-generation stage of the waste chain (before resources actually appear as waste) covering waste minimization, cleaner production and the 3Rs, and, second, the post-generation stage of waste (after the waste has been generated), covering waste treatment and disposal. In addition, a distinction has been made between actions at different geographical levels – global, regional or 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, ADB	--	UNEP, SBC, IMO	OECD, SBC, UNDP, UNEP, UNIDO, WB, ADB, EBRD, IADB, AfDB, UN-Habitat, UNCRD	UNEP, UNDP, UN-Habitat, World Bank
Technical	WB	OECD, UNIDO, UNEP	UNIDO, UNEP	SBC, IMO, UNEP, World Bank	OECD, WB, ADB, EBRD, IADB, SBC, UNDP, UNIDO, UNEP, UN-Habitat	UNDP, UNEP, UN-Habitat, World Bank
Financial	--	IADB, ADB	--	--	WB, OECD, EBRD	WB-PCF
Social	UNEP	UNEP, UNCRD, ADB, NGOs	NGOs	UNEP, SBC, World Bank	UNEP, UNDP, UNESCs, ADB, IADB, AfDB	UNEP, NGOs, SBC
Institutional	WB, UNEP, UNIDO	UNEP, UNIDO, UNCRD, ADB	--	UNEP, World Bank	OECD, SBC, GEF, WB, ADB, EBRD, IADB, AfDB, UN-Habitat, UNIDO, UNEP, UNDP,	UNEP, UNDP, UN-Habitat

H. Waste management needs and extent to which these are being met

22. Table 2 below summarizes the extent to which the waste management needs identified earlier in section 17 are being met to by different organizations that have existing and planned activities in the field of waste management. Information was sought from the various organizations and the responses received have been summarized in information document UNEP/GCSS/X/INF/6. The Governing Council also asked the organizations to provide success stories. These success stories, compiled from the information given by different organizations, are reproduced in the same information document. Information available from published sources and web-sites has also been made use of. For the sake of simplicity and for ease of understanding, a broad qualitative assessment as low, medium or high has been made.

Table 2: Needs analysis at the pre-generation stage 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 synergies between resource augmentation through waste management. Awareness-raising and capacity-building are required in areas like waste prevention, the 3Rs (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. 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>Recently, the International Resource Panel has been launched by UNEP. The Government of Japan put forward the 3Rs initiative at the G-8 and is now working to disseminate it at the regional level. SBC has carried out substantive work in the field of hazardous waste and also has achievements in other fields. Level: low</p> <p>Virtually no effort at global level. Level: very low</p> <p>SBC and other 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>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 started work on 3Rs in some countries. Level: medium</p> <p>Sporadic efforts at local level, e.g., Cleaner Production Act in 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>No national-level effort worthy of mention. Level: very low</p> <p>Virtually no effort at local level except for 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-medium</p>
<p>Technical:</p> <p>(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 work is required to adapt these technologies to suit local conditions (e.g., in respect of locally available skills, resources, climatic conditions, culture, etc.).</p>	<p>Little or no effort at global level. Level: very low</p>	<p>SBC and BCRCs, 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 setting up of UNEP 3R knowledge hub at the Asian Institute of Technology. Level: low</p>	<p>No work done at local level. R&D adoption is still very low. Level: very low</p>

Waste management needs	Global assessment	Regional/national assessment	Local assessment
<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>SBC on particular priority waste streams. 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>SBC and UNEP- UNIDO through NCPC Programme have 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>SBC and UNEP have 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>
<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>MPPI and PACE under the Basel Convention. 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 loan and technical assistance projects 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/recycling of waste.</p>	<p>Some effort at global level by UNIDO, UNEP. Level: very low</p>	<p>UNEP-UNIDO through NCPC Programme has done considerable work at national level. Level: high</p>	<p>No concerted effort at local level. Level: very low</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>No concerted effort at global level Level: very low</p>	<p>No concerted effort at regional level Level: very low</p>	<p>Sporadic efforts at local level Level: low</p>

Waste management needs	Global assessment	Regional/national assessment	Local assessment
<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 or 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 NCPC 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 the post-generation stage 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 required in areas like waste prevention, 3Rs, cleaner production etc.</p>	<p>Marrakech Process is the major global initiative to promote sustainable consumption and production, under which waste management is also addressed. The 3Rs initiative from Japan also addresses post generation stage of waste but is so far mostly limited to 6-8 countries. Level: low</p>	<p>No significant effort at regional/national level except those in developed countries like Japan eco-town initiative and EU recycling initiatives. Level: very low</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>

Waste management needs	Global assessment	Regional/national assessment	Local assessment
<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>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>Regional/national efforts (mainly WB, regional development banks) also continue to emphasize end-of-pipe approach. UNEP and UNDESA have started addressing this issue through regional round tables 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 Marrakech Process. Level: high</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 these technologies to suit local conditions (e.g. in respect of locally available skills, resources, climatic conditions, culture etc.).</p>	<p>At global level considerable work done (SBC, IMO, UNEP) for wastes convened under specific MEAs. For other wastes (municipal, industrial, etc.) few guidelines made available (UNEP, WB). Little or no work done for local adoption. Level: low</p>	<p>At regional/national level considerable work done (WB, regional development banks, OECD) to provide technology guidelines. Capacity for technology assessment and selection continues to be low in developing countries. Level: low</p>	<p>Some work done (UNDP, UN-Habitat, UNEP) at a few locations to enhance technology access at local level. Little or no work done for local adoption. Level: low</p>

Waste management needs	Global assessment	Regional/national assessment	Local assessment
<p>(ii) Technical guidelines, case studies, demonstration and pilot projects for integrated waste management especially in developing countries are needed.</p> <p>(iii) Build or strengthen capacity at local level to implement and operate waste management technologies.</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>No work done at regional/national level. Level: very low</p> <p>No work done at regional/national level. Level: very 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. Level: very low</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 put in at local level, e.g., Bangladesh, Brazil, India and Kenya. Level: low</p>

Waste management needs	Global assessment	Regional/national assessment	Local assessment
<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>(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>(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>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>Some concerted effort at global level. Level: very low</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 Governments. Level: very low</p>	<p>No concerted effort at regional/national level. Level: very low</p> <p>Sporadic efforts by organizations like UNEP, UNCRD and NGOs. Level: low</p> <p>No effort at regional/national level. Level: very low</p>	<p>No concerted effort at local level. Level: very low</p> <p>A number of NGOs active at local level. Level: medium</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>(ii) At local level, institutional capacity needs to be built or strengthened to raise awareness and develop human resources for waste management.</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>No global effort in institutional strengthening at local level. Level: very 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>Considerable effort at regional/national level by academia to build and develop human resources. Level: high</p>	<p>Not applicable</p> <p>No local level initiatives to develop human resources. Level: very low</p>

I. Tangible recommendations

23. From tables 2 and 3 above, it will be clear that several areas still remain to be tackled in the field of waste management. A review of the two tables shows that, although considerable efforts have been made in the environmentally sound management of waste over past years, gaps remain to be filled if the needs of countries are to be met. The main recommendations in this regard are set out below.

- (a) Policy and regulatory:
 - (i) Greater conceptual clarity, supported by practical application strategies to promote resource augmentation through waste recovery, reuse and recycling, is required, particularly at the local level;
 - (ii) National policy frameworks need to be strengthened and expanded to shift the emphasis from an end-of-pipe approach to an integrated resource management approach, including implementation of standards on waste management;
 - (iii) At the local level, integrated waste management strategies and action plans for municipalities, especially in developing countries, need 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 United Nations” approach;
- (b) Technical:
 - (i) Access to cutting-edge waste-management technologies needs to be enhanced and development and use of best practices should be encouraged concurrently;
 - (ii) There is a need for greater South-South cooperation.;
 - (iii) Strengthened capacity is required for technology assessment and selection;
 - (iv) Simultaneously, research and development work is required to adapt these technologies to suit local conditions;
 - (v) Technical guidelines, case studies, demonstration and pilot projects for integrated waste management, especially in developing countries, need to be prepared and disseminated;
 - (vi) Capacity needs to be built or strengthened at the local level to implement and operate waste-management technologies;
- (c) Financial:
 - (i) Availability of resources for developing, implementing and operating waste-management systems (both preventive and those at the post-generation stage), particularly at the local level in developing countries, needs to be enhanced. Millennium Development Goals on water and sanitation and poverty reduction for Africa cannot be met without adequate waste management; accordingly, donors should intensify support to waste management projects;
 - (ii) Appropriate economic instruments to raise funds for waste management and to make it economically attractive need to be developed and implemented;
 - (iii) Public-private partnerships need to be established to increase the availability of and to improve access to financial resources, to meet the growing demand for the construction and operation of waste management systems;
- (d) Social:
 - (i) Awareness-raising is required to change the attitude of waste generators, particularly municipal and industrial waste generators, to raise their awareness of the need for proper segregation and disposal of waste;
 - (ii) In developing countries, employment-generation schemes are required and working conditions of vulnerable sections of society, e.g., scavengers and rag-pickers, need to be improved;
 - (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:
 - (i) Institutional strengthening and capacity-building at the national level is required to enable work on policy, technical, financial and social aspects of the post-generation stage of waste management. The experience gained through projects in developing countries should be factored into the capacity-building activities, thus strengthening the normative function of this work;
 - (ii) Institutional capacity needs to be built or strengthened at the local level, to raise awareness and develop human resources for waste management.

III. Outcome of the process of cooperation with other organizations

24. The outcomes of the process of cooperation with other organizations is set out below.

- (a) Policy and regulatory:
 - (i) UNEP, in cooperation with the secretariat of the Basel Convention, will promote resource augmentation through waste recovery, reuse and recycling, supported by practical application strategies, particularly at the local level. UNEP will take the lead in strengthening and expanding national policy frameworks to shift the emphasis from an end-of-pipe approach to an integrated resource management approach;
 - (ii) UNEP will take the lead at the local level in developing and implementing integrated waste management strategies and action plans for municipalities, especially in developing countries. It will work towards getting integrated waste management recognized as a key priority area in the current "One United Nations" approach;
 - (iii) The secretariats of the multilateral environmental agreements, particularly the Basel Convention, the Stockholm Convention through its Article 6 and the Montreal Protocol, will strengthen their implementation of preventive aspects of waste-related multilateral agreements, particularly at the local level.
- (b) Technical:
 - (i) OECD, the World Bank, UNIDO, the Asian Development Bank, IADB and the African Development Bank are invited to enhance access to cutting-edge, waste-management technologies. This includes the strengthening of capacity in developing countries for technology assessment and selection, towards which UNEP is willing to work in close cooperation with OECD and UNIDO. Research and development institutions may enhance the necessary efforts on research and development required to adapt these technologies to suit local conditions;
 - (ii) The secretariat of the Basel Convention will continue its efforts and UNEP would initiate appropriate programmes for preparation of technical guidelines, case studies, demonstration and pilot projects for integrated waste management, especially in developing countries;
 - (iii) UNDP, UNIDO, development banks and the Basel Convention regional centres could consider initiating programmes to build or strengthen capacity at local level to implement and operate waste management technologies;
- (c) Financial:
 - (i) The World Bank and the development banks are invited to enhance availability of resources 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);
 - (ii) The secretariat of the Basel Convention, with support from UNEP, is developing a framework for assessing costs and benefits through the implementation of the convention for use by developing countries. OECD, the World Bank and development banks are invited to support developing countries in framing appropriate economic instruments to raise funds for waste management and make it economically attractive;

- (iii) Public-private partnerships are a means to raise awareness on issues and a potential source of financial resources, to meet growing demand for construction and operation of waste management systems;
- (d) Social:
- (i) UNEP is willing to cooperate with UNCRD, UN-Habitat and UNDP to launch awareness-raising programmes to change the attitude of waste generators, particularly municipal and industrial waste generators, where the proper segregation and disposal of waste;
 - (ii) UNDP, UNCRD and UN-Habitat could consider working towards improving working conditions of vulnerable sectors of society, e.g., scavengers and rag-pickers in developing countries;
 - (iii) World Bank and development banks could consider strengthening the involvement of private sector and local communities in developing, building and running of waste management systems;
- (e) Institutional: UNEP would like to strengthen its cooperation and collaboration with UNIDO, the multilateral environmental agreement secretariats and the Basel Convention regional centres to launch programmes on institutional strengthening and capacity-building at the national level, to enable work on policy, technical, financial and social aspects of the post-generation stage of waste management. The experience gained through projects in developing countries should be factored into the capacity-building activities, thus strengthening the normative function. Institutional capacity-building or strengthening at the local level could be initiated by UNDP, UNIDO, UNCRD, and the Basel Convention regional centres.
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