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Report of the Secretary-General

Addendum

Environmentally sound management of solid wastes and sewage-related issues*

(Chapter 21 of Agenda 21)

CONTENTS

* The report was prepared by the United Nations Centre for Human Settlements (Habitat), as task manager for chapter 19 of Agenda 21 in accordance with arrangements agreed to by the Inter-Agency Committee on Sustainable Development (IACSD). It is the result of consultation and information exchange between United Nations agencies, international and national science organizations, interested government agencies and a range of other institutions and individuals.

INTRODUCTION

1. This report reviews progress made in the implementation of the objectives set out in chapter 21 of Agenda 21 (Solid wastes and sewage),[1] taking into account the decisions taken by the Commission on Sustainable Development on this subject at its second session in 1994. Domestic and industrial waste production continues to increase in both absolute and per capita terms, worldwide. In the developed world, per capita waste generation has increased threefold over the past 20 years and is now approximately five to six times higher than in the developing world. In the developing world, there is every indication that waste production will double during the next decade. Some predictions estimate a five-fold increase in global waste generation by 2025.

2. The provision of waste management services currently consumes a large proportion of the budgets of local authorities in many developing country cities. Yet, most city authorities are unable to keep pace with the growing demand. The impact of inadequate waste management services is greatest on the urban poor, living in informal settlements which often remain outside the reach of municipal services. Inevitably, the result is a lowering of the quality of urban life, an increased burden of health care due to waste-related diseases, and the pollution of urban water resources.

I. KEY OBJECTIVES

3. Chapter 21 of Agenda 21 describes four major waste-related programme areas:

(a) Minimizing wastes;

(b) Maximizing waste recycling and reuse;

(c) Promoting environmentally sound waste disposal and treatment;

(d) Extending waste service coverage.

Since the Earth Summit, in the area of solid-waste management, much attention has been devoted to the development of informal sector reuse of waste and to the provision of services in low-income areas through community-based schemes. With regard to wastewater and sanitation, the main objectives have been the promotion of effective waste treatment and disposal, and the development of affordable sanitation. For solid waste management, those schemes in which there is potential for micro-enterprise development and income-generation have proved to be more attractive and sustainable. Within the developed world, more attention has been focused on waste minimization and the use of the life-cycle concept in assessing environmentally sound industrial practices.

II. SUCCESSES

A. Minimizing wastes

4. The development and implementation of waste minimization strategies has improved since the Conference, but mainly in the developed countries. In some cities in Europe, campaigns to encourage communities to separate waste at the household level have been so successful that there is insufficient capacity to recycle all the waste collected by municipal authorities and, because of increased supply, the market price for recycled materials has dropped drastically. The situation with regard to industry is also encouraging. Many developed country industries are now realizing that waste minimization can, in many cases, result in improved operational efficiency and reduced costs (box 1). There is, therefore, a good incentive to increase the awareness of waste minimization practices in the industrial sector. The United Nations Environment Programme (UNEP) is actively promoting minimization of wastes by the industry through its Industry and Environment Programme.

Box 1. Case study on waste minimization in industry in Ontario

The Upper Canada Brewing Company in Toronto, Canada, is an independently owned firm which employs approximately 50 people and operates out of a 30,000-square-foot building. The Company has managed to reduce the amount of waste it generates by no less than 99 per cent. Reduction initiatives primarily targeted suppliers, to whom requests were made to eliminate unnecessary packaging. To those suppliers that were initially uncooperative, the Company returned excess packaging at the suppliers' expense. The Company also arranged for supplies to be shipped using packing material consisting of compostable matter such as popcorn or newspaper. Recycling initiatives focused on fine paper, beverage containers, newsprint, corrugated cardboard, plastics and organic materials. Spent grains generated from the brewing process were distributed for animal feed. In 1990, although no direct revenue was generated through the sale of recyclable materials and nearly 15,000 Canadian dollars were incurred for start-up and capital costs, the Company managed to save a total of Can$ 330,000 in fees associated with landfill and collection costs.

Source: MacRae, paper presented at the R'95 International Congress, Geneva, Switzerland, 1-3 February 1995.

5. In developing countries, attempts to promote waste minimization have been hampered by the lack of data on waste production at source and waste collection and disposal. To facilitate waste minimization in human settlements, the United Nations Centre for Human Settlements (UNCHS) is currently assisting developing countries with data collection on waste production and providing policy options at the municipal level for waste minimization.

B. Maximizing environmentally sound waste recycling and reuse

6. Since the Conference, there have been very significant developments in the area of waste recycling and reuse, both in the developed and developing countries. In developed countries this has been more the result of increased awareness to the environmental benefits of waste recycling, whereas in developing countries the principal motivation has been the opportunity to derive income from waste recycling. The increasing production of waste in urban areas has resulted in the development of waste collection in the informal sector by itinerant waste collectors and in the formation of community group and non-governmental organizations which have, in many cities, developed micro-enterprises for the benefit of income generation (see box 2). Current estimates indicate that in the Asian cities of Calcutta and Manila, some 40,000 and 30,000 persons, respectively, are directly employed in the informal waste economy. The same is true in many Latin American cities like Bogotá, where 30,000-50,000 persons are engaged. Many of these activities have developed in peri-urban areas where illegal settlements are established and also where the vast majority of domestic refuse is dumped. Those engaged in the activity of waste scavenging or "rag-picking" are often women and children. Small-scale industries have developed to reprocess these wastes into a wide variety of both finished goods and intermediates, for further processing by the formal sector industries. UNCHS (Habitat) has recently documented waste recycling practices in Asian cities and has produced training guides for municipal managers and prospective entrepreneurs for recycling and reuse of municipal wastes.

Box 2. The contribution of The Global Action Plan for the Earth

The Global Action Plan for the Earth is a non-profit environmental organization whose purpose is to empower people to live more environmentally sustainable lifestyles. This is done through adult and youth programmes which are part of community-based national sustainable lifestyle campaigns. The campaigns are ongoing in over 15 countries worldwide. Participants have, on average, reduced water usage by 25 per cent and fuel in transport by 16 per cent and produced 42 per cent less garbage.

Source: CSD Update, vol. 3, No. 2 (September 1996).

7. Wastewater reuse, in particular the reuse of sewage effluents, has been practised on a piecemeal basis for many years in many countries with water shortage. However, there has been a reluctance fully to exploit the use of wastewater for food production. This has principally been due to the perceived health risks regarding inadequate treatment of the wastewater. There is also a lack of understanding of environmentally sound technologies that are available and their application. Some isolated examples exist, such as the East Calcutta Fisheries, which effectively combines wastewater treatment with urban food production (see box 3).

Box 3. Reuse of wastewater in Calcutta, India

In Calcutta, a third of the city's sewage ending up in marshes to the east of the city is processed in a most ingenious way. A little over 7,500 acres is taken up by sewage-fed fish ponds or bheris. Each year these fisheries produce 7,500 tons of fish. While some of the sewage goes straight to the bheris, some is held for use by the "garbage farms". Every day, Calcutta gets 150 tons of vegetables from these garbage farms. The effluent from the fishponds is also used, mostly in paddy fields which are dotted around the outer reaches of the marshes.

Source: UNCHS, Global Report on Human Settlements 1996 (New York, Oxford University Press, 1996), and other sources.

C. Promoting environmentally sound waste disposal and treatment

8. The level of awareness of the health and environmental impacts of inadequate waste disposal is still rather low. However, recent outbreaks of cholera in Peru and a "plague scare" in India (see box 4) have clearly demonstrated the human suffering and loss of life that may result from poor waste management and the disastrous effect that waste-related diseases may have on the trade and tourism vital for national economy. In a recently completed study carried out by UNCHS in Africa and Asia, direct epidemiological relationships between inadequate waste management and the incidence of diarrhoea and, respiratory and skin diseases have been established and low-cost, remedial interventions have been recommended, advancing strong health arguments for targeted investments in infrastructure in low-income settlements.

Box 4: The economic cost of inadequate infrastructure: India's 1994 "plague scare"

In September 1994, nearly 30 years after the last plague outbreak in India, an epidemic of pneumonic plague broke out, in Surat, killing 56 people. The disease is transmitted from person to person by exhaled sputum droplets and 100 per cent of its victims die if left untreated. Surat is a city of 2.2 million in which 1,250 tons of waste are produced a day, of which 250 tons are uncollected. It is believed that a combination of poor sanitation and waste management and an earthquake a year earlier put the plague-infested wild rat population in contact with the domestic rat population. The situation was exacerbated by the monsoon floods which dispersed the rubbish, providing an ideal habitat for rodents. In financial terms, the cost was high, in excess of US$ 600 million to the Indian economy. More than 45,000 people cancelled their plans to travel to India. Hotel occupancy dropped to 20-60 per cent, and many countries stopped all air and sea traffic to India altogether. In total, exports from the country suffered a loss of US$ 420 million. A fraction of the cost of the epidemic, invested in waste management infrastructure, would have averted the crisis.

Adapted from World Resources, 1996-97 (New York, Oxford University Press, 1996).

D. Extending waste service coverage

9. To improve service coverage for waste management services, many local authorities are encouraging the private sector to undertake some of the traditional public waste management services. Although service coverage has improved in high-income residential areas and in some cases in commercial and industrial areas, low- and middle-income areas still suffer from extremely poor service coverage.

10. The situation of human waste treatment and disposal is also deteriorating. In 1994, 588 million people in urban areas and 2.28 billion in rural areas lacked adequate sanitation, up from 452 million and 2.15 billion in 1991. Projections show that these numbers could increase to 846 million urban dwellers and 2.5 billion rural dwellers (most of whom will be in Asia) by the year 2000. In total, this will be about half the world's population. Even fewer people have access to a satisfactory method of wastewater disposal.

III. PROMISING CHANGES

11. Perhaps the most promising change in solid-waste management worldwide is the increasing recognition of waste as a resource that can not only contribute to the local and national economies but also provide employment and income to a large section of the population. This recognition has led to a growing range of initiatives in cities in the developed world where the concept is being translated into practice through governmental regulations, stakeholders' cooperation and citizens' initiatives.

12. In cities in the developing countries, community groups, particularly women's groups, and the informal sector are taking steps to integrate waste management with income generation. Certain schemes have concentrated on the collection of municipal solid wastes - both organic, for use in compost production, and inorganic, for small-scale recycling industries. One project in Senegal has successfully made use of waste-derived compost and treated domestic wastewater for urban food production. There have been some attempts to develop guidelines for wastewater reuse, and the future appears to hold promise for integrated reuse schemes. The United Nations Development Programme (UNDP) and the World Bank have recently published guidelines on the reuse of wastewater in agriculture. UNCHS (Habitat) is currently conducting demonstration projects on community-based composting in several cities in developing countries in Africa, Asia and Latin America and plans to produce guidelines on the use of waste-derived compost.

13. Another promising change can be found in the attitude of municipalities and other levels of governments towards waste minimization as an integral part of the strategy for waste management. In the developed countries, municipalities are increasingly encouraging waste minimization in households and commercial enterprises by providing recycling credits and other economic incentives. Governments are also encouraging waste minimization within industries through "take-back" agreements and by charging full cost on waste disposal, including environmental costs. Some promising initiatives are also coming from developing

countries - for example, from India, where national legislation has recently been put in place for mandatory environmental audit of all industries.

IV. UNFULFILLED EXPECTATIONS

A. Promoting environmentally sound waste disposal and treatment

14. There has been little progress in the area of environmentally sound waste disposal in the developing countries. The main method is still open dumping, and little attention is paid to the environmental impact of waste-disposal sites. Experience shows that the failure efficiently to regulate the private sector will lead to increases in the open dumping of wastes and the use of unauthorized sites. The proportion of hazardous waste is also increasing in household clinical wastes, contributing significantly to the environmental risks.

15. In terms of environmental impact, with economic growth, countries are producing increasing quantities of wastewater, often contaminated with heavy metals and water-soluble organic compounds. For example in the United Kingdom, the implementation of the Urban Wastewater Treatment Directive of the European Community will double the volume of waste sludge requiring disposal, from 1.1 million tons per annum in 1991 to 2.2 million tons per annum in 2006. Likewise, in Egypt, the construction of new treatment works for Cairo and Alexandria will generate 0.7-1 million tons per annum of sewage sludge. In both cases there will be increased pressure to dispose of sludge on land. Sea disposal of sewage sludge continues, despite the recommendation that it be phased out by the end of 1995.

16. In many developing countries, there is still a tendency to select inappropriate technologies for both wastes and wastewater. The problem is exacerbated by many examples of "tied" aid whereby donors are unwilling to provide the most appropriate hardware, but also by the failure of donors to match donated equipment with commensurate assistance for capacity-building and institutional development.

B. A hierarchy for waste management and strategic planning

17. The idea of a waste management hierarchy, embodied in chapter 21 of Agenda 21, is still not fully appreciated by many countries, developed or developing. Many national and local governments have insufficient capacity to apply strategic planning to solid waste management. Such issues as divided institutional responsibility, lack of regulatory frameworks etc. are characteristic of many city administrations. Until waste management authorities overcome these institutional shortcomings and develop a more flexible management structure, responsive to the needs of public, private and community sectors, isolated schemes will remain good examples of "best practice demonstrations" and will not be incorporated into the overall waste management system.

C. Awareness of health risks

18. Although isolated examples of waste-related diseases have increased awareness of the risks of poor waste-management practices, there has been little attempt to improve the education of the general public and city officials in general. Poor sanitation and waste-management infrastructure is still one of the principal causes of death and disability for the urban poor.

D. Failure fully to recognize waste as a resource

19. There is still a general reluctance at the municipality level to use waste as a resource for both income generation and in agricultural production. Centralized composting is still in vogue in many cities for biogas production, energy generation etc., but very few units have proved viable and consequently they quickly fall into disrepair. There is need to look at alternative approaches which are labour-intensive, process the waste at source, and require minimal capital investment. Technologies that utilize the waste for the production of recycled products or for energy generation should be promoted.

E. Lack of attention to waste minimization

20. Most countries have yet to incorporate waste minimization into their strategic planning for solid-waste management. Developing countries and countries with economies in transition, whose per capita production of waste is increasing, will find it difficult to continue with economic development if they fail to reduce waste production through appropriate policies. The differences in per capita waste production are evident even within the group of industrialized countries as a whole. Countries such as Sweden and France, for example, produce only 40 per cent of the volume of waste produced in the United States, and less than half that of Canada or Australia. There are already groups of affluent residents of cities in low-income countries whose waste production is equivalent to the highest in the developed world. If the situation remains unchecked, there will be an unprecedented rise in waste production which will be far beyond the capacities of most countries to manage.

F. Poor service coverage in peri-urban areas

21. The peri-urban poor live in the most hazardous environment where their health is at risk from exposure to toxic chemicals and pathogens from domestic solid wastes and human faecal wastes. The peri-urban areas are those where most wastes, both solid and liquid, are disposed of and where industrial zones are most usually sited. If authorities fail to acknowledge the greater environmental and health risks in those areas, waste-related diseases will affect productivity and economic development. Also, as the boundaries of cities expand, they will encroach on waste-disposal sites. Peri-urban areas, therefore, require special attention if they are to be able to support urban development.

G. Recognition of the informal sector

22. In many municipalities, the informal sector undertakes a large proportion of waste collection and disposal, unrecognized by the formal waste-management authority. Many public health officials regard informal waste collectors as unwelcome, and in some cities there is legislation which hinders the operation of the informal sector. This opportunity should be more fully appreciated by city officials, and greater effort should be made to include community-based schemes into the waste-management activities of the public sector.

V. EMERGING PRIORITIES

A. Waste minimization and data collection

23. Waste minimization policies and strategies for decision-making need to be developed, based on current and projected rates of waste generation by sectors. Some information is currently available with different authorities but not in a form that lends itself to use as a management tool. Only when such data are collected systematically and are available to decision makers will it be possible to set national targets and monitor progress. As private-sector operation increases in the cities of developing countries, private companies will require such information in order to set prices and organize their activities. Local authorities will, in turn, need access to such information. The development of specific indicators for waste management which are distinct from other elements of infrastructure is also necessary.

24. Continued and strengthened integration between waste management and other economic sectors is also an emerging priority. The effectiveness of waste-management policies may be enhanced when combined with economic and environmental policies designed to improve, for example, efficiency in production and consumption and with policies targeted at making production processes and consumer choice and behaviour more suitable. It is important to emphasize, in particular, that the strategy for policy formulation and implementation in the context of changing consumption and production patterns also focuses on eco-efficiency.[2] This may have positive effects on both general waste issues and policy implementation in the waste sector.

B. Development of the informal sector and of formal/informal partnerships

25. The informal sector needs to be supported further so that it can actively contribute to waste-management activities. This will require a less restrictive operating environment. This will also need changes in legislation and acceptance by official authorities. Currently, much of the informal sector operates in terms of individuals. There is a need to develop cooperatives and other similar organizations to ensure their formal linkage with industry.

C. Integrated reuse projects

26. Efforts should be made to promote integrated waste-management schemes that utilize both solid waste and liquid waste for agricultural reuse projects. Such schemes can generate income for the urban poor and provide a suitable sink for wastes. The preferred location for such projects would be peri-urban areas where many urban poor reside and where most wastes are disposed of.

D. Areas of special need

27. Small island developing States possess unique characteristics, including fragile ecosystems, small land area and limited natural resources, which make them significantly more vulnerable to environmental degradation and human health problems resulting from inadequate management of wastes. Their freshwater, land, marine and coastal resources are all critical to sustainable development, yet susceptible to degradation as a result of pollution from land-based activities. Special methods therefore need to be developed for such States.

E. System-wide coordination of waste management activities

28. The UNCHS (Habitat)/World Bank/UNDP Urban Management Programme has established an ad hoc group, comprising partner agencies, including WHO, various public and private experts, and non-governmental organizations from developing countries, which are currently active in various aspects of solid-waste management. The International Solid Waste Association (ISWA) has also established a working group to address the issues of waste-management needs in developing countries. Both these groups, however, need more representation from experts in developing countries. Within the organizations of the United Nations system, there is a need for a more concerted approach to the management of solid waste and for a strengthening of coordination of programmes under the aegis of the Inter-agency Committee on Sustainable Development.

Notes

[1] Report of the United Nations Conference on Environment and Development, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

[2] See also chap. 4 of Agenda 21 and E/CN.17/1997/2/Add.3.
