

Waste Management: An Environmental and Legal Framework

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Abstract: The aim of this paper is to outlines the growing waste management problem in Sudan. Rapid urbanization and changing consumption patterns, solid waste management (SWM) has become a major challenge in most urban centres in Sudan, particularly the larger ones. Therefore it is critical to adopt a holistic approach in developing a working framework for SWM which matches the waste hierarchy. The paper argues that the current focus of waste management in Sudan is still on collection and disposal of waste and therefore modern techniques and proper waste management strategies are needed. The paper concludes with different recommendations for future policy directions in the Sudan.

1 Introduction

The growing waste management problem in the Sudan can be seen as a symptom of many factors. Some enterprises producing commercial and industrial waste have been established in areas where appropriate waste management infrastructure has not been provided. Recycling is an issue closely linked to all waste streams and sectors. The Waste Regulations allows an area to be declared as a “Final dumping area”, however the cities have no defined areas within the physical planning of the cities. With that many sectors have laws and a bylaw dealing with waste.

Most local governments and urban agencies have, time and again, identified solid waste as a major problem that has reached propor-

Box 1 Pressing trends in waste generation

Cities are facing an increasing growth in population, and shares in GDP growth, resulting in – among other things – increasing quantities of waste being generated.

Due to varied lifestyles and consumption patterns, the quality and composition of waste has been more varied and changing.

Industrialization and economic growth has produced more amounts of waste, including hazardous and toxic wastes.

Types of waste	Time needd for biodegradation if left untreated
Litter paper	2-4 weeks
Cotton rags	1-5 months
Orange peels	6 months
Woolen socks	12 months
Filter- tip cigarette buts	10-12 years
Plastic bags	10-20 years
Leather shoes	25-40 years
Aluminum cans	200-500 years

Source: Hari Srinivas, 1998

There is a growing realization of the negative impacts that wastes have had on the local environment (air, water, land, human health etc.) Complexity, costs and coordination of waste management has necessitated multi-stakeholder involvement in every stage of the waste stream. This calls for an integrated approach to waste management.

Local Governments are now looking at waste as a business opportunity, (a) to extract valuable resources contained within it that can still be used and (b) to safely process and dispose wastes with a minimum impact on the environment.

tions requiring drastic measures. Three key trends can observe with respect to the hierarchy of solid waste - increase in **volume** of waste generated by urban residents; change in the **quality** or make-up of waste generated; and the **disposal** method of waste collected, by land-fill or other methods.

It is critical to adopt a holistic approach in developing a working framework for solid waste management (SWM) which matches the waste hierarchy. This covers the social, economic, technology, political and administrative dimensions. For example the social dimension of SWM involves waste minimization; the economic dimension of SWM involves waste recycling; the technology dimension of SWM involves waste disposal; and the political and administrative dimensions cuts across all the three issues of minimization, recycling and disposal.

However, SWM is not an isolated incidence that can be easily compartmentalized and solved with innovative technology or engineering. It is particularly an urban issue that is closely related, directly or indirectly, to a number of issues such as urban resource consumption patterns, life-styles, income levels, and other socio-economic and cultural issues. All these issues have to be brought together on a common platform in order to ensure a long-term solution to urban waste.

There is a whole culture of waste management that needs to be inaugurating – from the micro-level of household and neighborhood to the macro levels of locality, state and nation.

The general assumption is that SWM should be done at the locality-level, and as a result, solutions tried out have been essentially end-of-pipe (i.e. finding solutions to a problem at the final stage of its cycle of causes and effects. In the case of urban waste, it means focusing on waste disposal rather than waste recycling or waste minimization).

In reality there are a number of critical actions the need to be taken at each of the levels of household, neighborhood, locality and nation. Action to be taken can have social, technology, economic, political or administrative dimensions.

It is important that the right decision/action be taken/carried out at the right level. Thus, action at the household level are predominantly social, technology and economic in nature. Similarly actions to be taken at the state and nation level are predominantly economic, political and administrative in nature. Action at the neighborhood and locality levels cuts across all five themes.

Box 2



The matrix that links the *dimensions* of decision-making (social, technology, economic, political and administrative) with the *levels* of decision-making (household, neighborhood, city, and nation) - helps in categorizing the decisions, action and related activities to be undertaken. The could be illustrated in Matrix is below:

Solid Waste Management Matrix

Dimensions and Levels of decision-making	Household	Neighborhood	Locality	Nation
Social	*	*	*	
Technology	*	*	*	
Economic	*	*	*	*
Political		*	*	*
Administrative		*	*	*

* Focal areas for action

2 Waste Management and Multilateral Environmental Agreements (MEAs)

Waste is an underlying theme in many multilateral environmental agreements, seeking justification for concerted local action, or broad global consensus. As in the ‘mother-of-all- MEAs’ - Agenda 21 , Annex 1 - MEAs seek to tackle the issue of waste either directly, through the Basel, Rotterdam or Stockholm conventions, or by integrating into larger environmental issues such as Local Agenda 21 or decision-making processes.

In practice however, waste is in fact a local issue that has to be dealt with on a daily basis, and this is where many of the local environmental agreements that are functioning at the local level are also relevant to waste management. Of particular relevance are three such tools: Local Agenda 21, Environmental Management Systems (EMS) (laws and bylaws) and Life Cycle Assessment (LCA). However none of these agreements actually deal with waste directly - indeed these agreements will have to be adopted to deal with issues related to Waste Management.

3 Waste management (The first step in waste management is to *stop* calling it ‘waste’)

Waste management is the collection, transport, processing (waste treatment), recycling or disposal of waste materials, usually ones produced by human activity, in an effort to reduce their effect on human health or local aesthetic or amenity. A sub focus in recent decades has been to reduce waste materials’ effect on the natural environment and to recover resources from them.

Waste management can involve solid, liquid or gaseous substances with different methods.

Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential, industrial, and commercial producers.

Box 3

Waste management for non-hazardous residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator

3.1 Concept of waste management

There are a number of concepts about waste management, which vary in their usage between countries or regions.

3.2 The waste hierarchy

- Reduce
- Reuse
- Recycle

Classifies waste management strategies according to their desirability. The waste hierarchy has taken many forms over the past decade, but the basic concept has remained the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste (Impact management and remediation) (Hari Srinivas, 1998).

Through the application of this hierarchical approach and the process of elimination, the best practical environmental and locally feasible solution with the least negative impact on the environment for any particular waste stream will be selected.

Some waste management experts have recently incorporated a ‘**fourth R**’: ‘**Re-think**’, with the implied meaning that the present system may have fundamental flaws, and that a thoroughly effective system of waste management may need an entirely new way of looking at waste. Some “re-think” solutions may be counter-intuitive, such as cutting fabric patterns with slightly *more* “waste material” left — the now larger scraps are then used for cutting small parts of the pattern, *resulting in a decrease in net waste*. This type of solution is by no means limited to the clothing industry.

3.2.1 Source reduction involves efforts to reduce hazardous waste and other materials by modifying industrial production. Source reduction methods involve changes in manufacturing technology, raw material inputs, and product formulation. At times, the term “pollution prevention” may refer to source reduction.

Another method of source reduction is to increase incentives for recycling. Source reduction is typically measured by efficiencies and cutbacks in waste. **Toxics use reduction** is a more controversial approach to source reduction that targets and measures reductions in the upstream use of toxic materials. Toxics use

Box 4

The waste hierarchy is a hierarchical structure, where the highest priority must be given to the prevention/minimization of waste. If the prevention/ minimization option is neither practical nor technically or socio-economically feasible, then other solutions have to be considered, for example the re-use or recovery of the waste. If re-use or recycling is not feasible, different treatment alternatives must be considered.

Box 5

Many communities in the United States are implementing variable rate pricing for waste disposal (also known as Pay As You Throw - PAYT) which has been effective in reducing the size of the municipal waste stream.

reduction emphasizes the more preventive aspects of source reduction but, due to its emphasis on toxic chemical inputs, has been opposed more vigorously by chemical manufacturers. Toxics use reduction programs have been set up by legislation in some countries.

3.2.2 Resource recovery

A relatively recent idea in waste management has been to treat the waste material as a resource to be exploited, instead of simply a challenge to be managed and disposed of. There are a number of different methods by which resources may be extracted from waste: the materials may be extracted and recycled, or the calorific content of the waste may be converted to electricity. There are a number of methods of recovering resources from waste materials, with new technologies and methods being developed continuously.

3.2.3 Recycling

Recycling means to recover for other use, a material that would otherwise be considered waste. The popular meaning of ‘recycling’ in most developed countries has come to refer to the widespread collection and reuse of various everyday waste materials. They are collected and sorted into common groups, so that the raw materials from these items can be used again (recycled). The recycling of obsolete comput-

ers and electronic equipment is important, but more costly due to the separation and extraction problems. Much electronic waste is sent to Asia, where recovery of the gold and copper can cause environmental problems (monitors contain lead and various “heavy metals”, such as selenium and cadmium; both are commonly found in electronic items).

The economics of recycling junked depends on the scrap market except where recycling is mandated by legislation (as in Germany). However, most economic systems do not account for the benefits to the environment of recycling these materials, compared with extracting virgin materials. It usually requires significantly less energy, water and other resources to recycle materials than to produce new materials.

Box 6

For example, recycling 1000 kg of aluminum cans saves approximately 5000 kg of bauxite ore being mined (source: ALCOA Australia) and prevents the generation of 15.17 tonnes CO_{2eq} greenhouse gases; recycling steel saves about 95% of the energy used to refine virgin ore (source: U.S. Bureau of Mines).

4 Waste Management Tools

For any waste management system to work, three critical strategic management tools must be implemented. The Waste Management Planning System is a management tool by which national and local authorities can identify plan and co-ordinate investments into waste management. The Waste Information System (WIS) is an information system, whereby information on general and hazardous waste is captured. All of these tools have been included in the formulation of the strategy and initiatives. Central to the WIS and the RSSW, is the Waste Categorizations System. The Waste Categorizations system is used to define and categories different waste types to enable officials to manage the waste effectively. The system is based on two divisions, namely Source of Waste and Impact on the Environment (DANIDA 2003).

5 Current Practices within Localities

At the local level, the localities are the main institutions responsible for urban environmental management. So far, however, the involvement of municipalities in this sector has been limited to solid waste management, whereby most municipalities are employing sweepers to sweep the streets and dump the waste at convenient locations, now they are using. Although most localities have very limited resources, several have taken initiatives in resource mobilization and introducing programmes such as reuse, composting and involvement of private sector in waste management to address the needs.

Khartoum state, and community participation programmes in some of the states in a limited scale.

5.1 Current Waste Management Framework

With rapid urbanization and changing consumption patterns, solid waste management has become a major challenge in most urban centres in Sudan, particularly the larger ones. Open waste piles are a common site and the work of municipalities' is often limited to planned areas (not all planned areas). Modern waste management techniques, such as source separated door-to door collection, recycling facilities and sanitary land filling, is very limited to some the state capital in most municipalities and the municipalities generally do not have the necessary skills or resources to manage the waste in the proper manner. Some municipalities, however, have introduced innovative approaches such as private sector participation in Household solid waste generation rate was estimated as **0.78 kg/capital/day** (1986-1992) (Elsayed, 2005). The composition varies from season to season and by socio-economic situation, industrial structure, waste management regulations and life style.

Most of the studies in Sudan show that dust and soil is the most dominant HSW which account for approximately to 51% -food was account for 35 % while papers and card boards is 9%plastic 1.9% wood 2 % (table below) (studies done in 1986 and 1992).

Average households waste in kg

1992	1984	Waste stream components
33.6	44.7	Organic Matters
50.6	37.5	Dust and Ashes
4.43	4.9	Papers
2.67	2.6	Plastic
2.22	1.8	Metals and Tins
1.22	1.0	Glass
1.49	2.6	Wood
0.72	0.6	Bones
0.25	0.3	Natural and Artificial Leather
1.2	1.2	Rubber
1.4	1.9	Miscellaneous

Source: Elsayed, 2005

Sudan has a population of approx. 34 million as in 2004 development report, Sudan generation rate was estimated by 0.789kg/capital /day, waste management is very poor in most urban and rural areas of Sudan.

Khartoum states where Khartoum capital of Sudan is located, has a population of about seven million and generates approximately, 6300 tons of municipality waste (MW) per day (Khartoum state unpublished monthly and annual reports 2006-2008).

Poor-quality collection services and improper disposal at open dump sites characterize current waste management practices in the Khartoum State. All types of hospital, hazardous, and household waste are mixed together at sites that are only marginally controlled and which feature open- air burning. Most recoverable metals, plastics, paper, and glass are destroyed rather than being separated and recycled for economic use.

There is only one company which serve the population within the urban Khartoum state; Khartoum **Project for cleaning Khartoum**. The project provide waste collection and disposal since 1998, it benefited the population of the urban part of Khartoum state including, Khartoum city, Omdurman and Khartoum North. Waste collection is irregular, the mechanisms is inadequate and unsuitable for working in Sudan.

A transfer station for waste storage was developed to easy the transfer of waste from the city centre to the final disposal area, the station is well designed with a very sophisticated system which not appropriate to the type of waste we have. The final dumping area is the main problem since there is no proper final dumping site. This have been aggravated by the expansion of Khartoum due to many factors on of the major factors is the increase on the number of population of Khartoum (growth rate app. 4.1% according to UN population projection 2005).

However, according to some of survey done the Potential for using solid waste as a resource and improving waste management systems in Khartoum municipalities is high. As about one thirds of the waste that is generated is organic, composting of this waste could significantly reduce the cost and environmental impacts of waste management. Composting is a simple and effective way of recycling waste that is already being practiced by many people. There is a need to encourage and support more people to do household composting and establish larger composting facilities in partnership with the private sector. Similarly, most of the inorganic waste such as plastics, metal and paper can be recycled by private sector. The capacity of municipalities and the amount of resources they invest in SWM vary significantly. While some of the smaller municipalities do not have staff within their institution to manage solid waste, some larger municipalities have hundreds of staff and spend a large portion of their budget for waste management.

5.2. Current Legal Framework

The Sudan interim National constitution (INC) 2005 lays the basis for environmental law in the country through the environmental right that is included in the bill of rights. The environmental right states:

- Sudanese people have pure and diverse natural environment the state and people shall ensure the biodiversity of the country and preserve and promote the same.
- State shall not adopt policies or work that affect negatively the existence of fauna, flora or their in-situ or ex –suit habitat, Article 11(1).

- Every Sudanese citizen, shall pay allegiance to republic of the Sudan and shall respect the constitution and the institution established thereby and protect the safety of the homeland .however under paragraph (h) duty is imposed on citizen to conserve the natural environment.
- Schedule (d) 15 provides that the wastes are concurrent powers as well as conservation of the environment.

The Sudan is signed, ratified and member in the three pillars of waste management, Basel, Rotterdam and Stockholm conventions.

Environmental Law, as it is commonly known, provides a framework for the integration of the waste management activities of the various sectors of government. National government departments, relevant provincial departments and local government have been established. However the Environmental Impact Assessment Regulations, that are arguably the most important environmental regulations in the country, have been proposed and are still to be reformed /developed with the other bylaws.

5.2.1 Environmental Protection Act. 2001

Regulations in the area of waste management in Sudan are mostly based on the Environmental Protection Act. 2001, which Is the framework or basic regulation governing the Rules on the Management of Waste. These rules are supplemented by subsidiary regulations.

5.2.2 Summary of the legislation relevant to waste management

Other sectoral laws includes laws that give effect to the objectives of integrated waste management and allow for the establishment of waste management co-operation between organs of state and other organizations. However, this co-operation is very weak or lacking .Sectoral laws include:

5.2.2.1 *Environmental Health Act 1975*

A framework law for the Local authorities to make subsidiary laws for the conservation of water and atmospheric resources .yet, disposal of industrial, sewage waste and recycling have not been addressed by this Act .A new Environmental Health Act(2008) is now under reform where a draft Act is produced and waiting for approval of the ministers council .

5.2.2.2 *Khartoum state Environmental Health Protection Act 1999*

Khartoum state as the national capital of Sudan may be classified as the main producer of all types of solid and liquid waste. Under this Act some measures are being taken to regulate solid waste management and disposal, through incineration. However modern /appropriate waste management tools have to be introduced in all states (separation, recycling ...).

5.2.2.3 *Atomic Energy Corporation Act 1996*

This act establishes the institution as a focal point to Local Atomic Energy Act and the relevant activities.

5.2.2.4 *The Ionized Radiation regulation Act 1997*

Under this Act a committee had been established as institutional body under the authority of the Ministry of Health. It's mandate is to lay down the ground for the general policies for the protection against the hazards of ionized radiation. the system has no provision for waste disposal and it has a greater link to the atomic energy corporation .

5.2.2.5 *Food Control Act 1973*

This Act pact with food safety, pollution and hazards .a consultative committee was formed with the mandate to develop standard for food pollution and hazards. This was conflicting with some of the mandate of the Sudanese specifications, standards measurement Organization (SSMO) and the Ministry of health in food standers (locally and imported). It is now solved.

5.2.2.6 *Smoking regulation Act 2005*

This Act provides intuitionl framework and protect against smoking human health hazard, there is a new draft Act not yet ratified

5.2.2.7 *Labor 1967*

This Act regulate the institutional framework of the work environment conditions against inter alias, hazards waste.

5.2.2.8 *Pharmacy and poisons Act*

Regulate Pharmacy y for Human and veterinary consumption .this involve waste and hazards due to the production and medical use of pharmaceuticals. Standard and Metrology corporation Act 1992 this Act regulate the interdisciplinary nature of standard setting .Co-ordination is required to a void the overlapping of different competencies (e.g. manifestation of compositeness between SSMO and ministry of health and Ministry Of Agriculture).The ISO set out the standards of waste management and disposal. The same fill the gap of licensing and waste management approach in the industrial sector.

5.2.2.9 *Pesticides and insecticides Act 1992*

This Acts provide the institutional framework for the management of pesticides and insecticides. Pesticides constitute one of the major sources of hazards waste.

5.2.2.10 *Petroleum Resources Act 2002*

This Act regulate all activities of the oil sector under the auspices of the Ministry of Energy and Mining.The operational oil industries are carried under the Environmental Protection in the Petroleum Industry Regulation 2002. In spite of that, Most of the Oil industries were carried out without an EIA which results into the great environmental damaged and unsolved oil industry waste problem waste.

6 Challenges

Localities have a responsibility to care for the environment to ensure that the health and quality of living of residents is protected and that residents continue to benefit from the environment in the

long term. At the same time, they are responsible for expanding economic opportunities within their area of jurisdiction and to extend municipal services. As a result Localities are faced with the challenge of balancing economic, social and environmental factors on a day-to-day basis with the aim of achieving sustainable development.

7 Way Forward

The waste management hierarchy puts the focus on waste prevention (preventing the generation and minimizing the waste that is being generated) as a first priority. Thereafter would follow reuse and recycling of waste (utilizing waste as a resource) and only after that treatment and disposal of the remaining waste. Currently the focus of waste management in Sudan is still on collection and disposal of waste, although under the previously mentioned Acts some measures are being taken to regulate the management and disposal of solid waste through different methods, yet ,modern techniques, and proper strategize waste management is needed .

7.1 Waste management strategy

The strategic approach to be applied for the development of the strategy is to be based on the international waste hierarchy approach, which includes Waste Prevention, Recycling, Collection and Transport, Treatment and Disposal.

Apart from the waste hierarchy, two other aspects also form an integral part of the strategy. These include Waste Management Planning backed up by a Waste Information System. Both of these will lead to the development of important management tools e.g. long-term plans and an up to date database that is necessary for long term planning.

Critical aspects are to be taken into account during the strategy formulation process are: such as: the existing institutional and legal framework with regard to waste management.

Responsibilities should be allocated for managing waste in the strategy within the existing responsibility framework of localities.

Key to the success of the implementation of the waste management strategy would be whether government, localities and other stakeholders could actually provide the necessary resources needed for implementation.

7.2 Recommendations

- The rationale and justification behind proposing a National Solid Waste Management Strategy are many and varied. A Solid Waste Management Strategy is required that addresses the key problems and that covers the country as a whole. A clean environment will impact positively on public health and result in a reduction of health problems. National Solid Waste Management Strategy (NSWMS) for Sudan to be sets out with the following vision for the country:
 - o “To develop, implement and maintain an integrated waste management system that will reduce the adverse impact of all forms of solid waste, so that social and economic development in Sudan, the health of its people and the quality of its environment and its resources benefit.” The strategy serves two purposes:

- To inform the public of the Government's objectives and how the government intends to achieve them and,
- To inform government agencies and state organs of the objectives and their roles in achieving them.

The implementation of the strategy should be relate to the short-term initiatives), and the long-term initiatives (5 - 10 years after approval). This will however be dependent on the resource base made available by government, as well as the extent to which the various institutions commit themselves to the implementation of the Strategy. For the implementation of the Strategy to be successful, the following issues need to be addressed:

- The relevant institutions to develop action plans related to their mandates that have been agreed upon.
- Priority should be given in these action plans to the priority initiatives, as identified in the Strategy.
- Action plans should however also cover all applicable aspects of the waste management system, from planning to disposal and remediation.
- Action plans for the relevant institutions must also cover the Capacity Building aspects.
- The possibility of introducing economic incentives and other funding mechanisms.
- The implementation of the Strategy should be supported by strong enforcement.
- The necessary tools (e.g. licenses, authorizations, and guidelines) to enforce the regulations to be developed by the relevant authorities.
- The Capacity Building plan to be implemented in all relevant institutions to ensure the development of the necessary skills for implementing the strategy.

7.3. Suggested Future Directions

- Localities can develop integrated waste management plans systems that promote waste reduction and recycling. This will lower the burden on waste collection services, lengthen the lifespan of landfills and create economic opportunities for recycling.
- Identifying and addressing key environmental concerns: The key environmental concerns of localities should be enhanced and to give more concerns relating to pollution and human health.
- Solid waste collection fees are currently paid, even in low-income areas.
- There is limited enforcement of sanctions against public or private organizations that violate standards. Despite these failings, there is considerable political support for improving waste management services now a day, further more we should recognized that to improve the situation, small, unsanitary dumps must be replaced with larger, controlled landfills that serve different types of wastes and several collection-service areas.
- Localities should develop a better understanding of their environment and the impact of activities within the municipality on the environment. In addition localities could adopt Waste management tools such as strategic environmental assessments to assist in sustainable planning.

- Promoting Co-operative Management: Co-operative agreements between localities and stakeholders on various aspects of waste management, such as , agreement on the reduction in waste production of industry in exchange for other concessions from the locality , should be investigated by localities . Co-operative mechanisms of promoting environmental management reduce the reliance on policing and enforcement and increase self-monitoring by stakeholders. The major barriers to sustainable waste management are weak locality institutions, although there is willingness to pay for services.

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Annex I

Waste Management in Agenda 21

Waste is an underlying issue throughout most of the Chapters of Agenda 21 - either as a cause of a number of environmental problems, or a result/output of human activities. While Chapters 20, 21 and 22 deal specifically and directly with waste issues, other chapters (outlined below) deal with the impact and effect of waste on other environmental issues.

As the following paragraphs show, most of the chapters either directly emphasize the need to manage waste, or advocate the institution of measures that reduce generation of waste, or its effective integration into recycling or reuse scheme that maintains material flow loops.

Chapter 4. Changing consumption patterns

Changing consumption patterns is dealt with in this chapter in terms of its influence over resource optimization and waste minimization. Minimization of waste generation is a key activity advocated by this chapter, calling for recycling and reusing of waste products from industrial and other everyday processes.

Chapter 5. Demographic dynamics and sustainability

Chapter 5 calls for incorporating demographic features into policies and plans: “ ... in formulating human settlements policies, account should be taken of resource needs, waste production and ecosystem health.”

Chapter 6. Protecting and promoting human health conditions

Taking into account the link between waste generation and its risk to human health, Chapter 6 calls for the development of appropriate solid waste disposal technologies on the basis of health risk assessment, particularly in large cities. It also emphasizes that there is an urgent need to address the prevention and reduction of man-made disasters and/or disasters caused by industries, unsafe nuclear power generation and/or toxic wastes.

Chapter 7. Promoting sustainable human settlement development

In promoting sustainable human settlement development, Chapter 7 calls for the integrated provision of environmental infrastructure: water, sanitation, drainage and solid-waste management, along with sustainable energy and transport systems. It calls for innovative city planning strategies to carry this out, particularly as developing countries adopt a ‘fast-track’ approach to their growing economies. It stresses that one of the parameters of sustainability in urban areas is effective management of its wastes.

Chapter 8. Integrating environment and development in decision-making

In advocating effective environmental decision-making, Chapter 8 calls on governments to explore, in cooperation with business and industry, how effective use can be made of economic instruments and market mechanisms in number of issues, including wastes.

Chapter 9. Protection of the atmosphere

While recognizing that industry is essential for the production of goods and services and is a major source of employment and income, and industrial development as such is essential for economic growth, Chapter 9 also states that “... industry is a major resource and materials user and consequently industrial activities result in emissions into the atmosphere and the environment as a whole.” One of the measures it advocates in protecting the air quality and the atmosphere in general is the reduction of wastes.

Chapter 11. Combating deforestation

In Chapter 11, one of the measures advocated for combating deforestation is the reduction of wood wastes and its effective reuse either as-is, or as a part of ‘composite’ materials that reduce the use of virgin and natural wood.

Chapter 14. Promoting sustainable agriculture and rural development

In order to promote sustainable agriculture and rural development, Chapter 14 calls on governments to develop and disseminate to farming households integrated farm management technologies, while enhancing techniques for waste and by-product utilization.

Chapter 16. Environmentally sound management of biotechnology

Chapter 16 recognizes the role of biotechnology particularly in detoxification of hazardous wastes, and links it to the goal of better, overall human health. It calls for the adoption of production processes making optimal use of natural resources, by recycling biomass, recovering energy and minimizing waste generation, as well as the use of biotechnologies, with emphasis on bio-remediation of land and water, waste treatment, soil conservation, reforestation, afforestation and land rehabilitation.

Chapter 17. Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources

A critical element of the protection of oceans and other water bodies is effective waste management, and chapter 17 advocates several measures for this - improved environmental management of coastal cities. Developing countries are emphasized, calling for cooperation through financial support, to maximize control and reduction of substances and wastes that are toxic, persistent or liable to bio-accumulate and to establish environmentally sound land-based waste disposal alternatives to sea dumping.

Chapter 18. Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources

Chapter 18 makes a special case for waste-water issues, and its impact on freshwater. It covers the impacts of discharge of wastes into water bodies as well as groundwater pollution from landfills etc. Purification of wastewater before it is discharged is called

for, including their use in agriculture and aquaculture, and the use of appropriate technologies for the purpose. It also sets targets for governments: “... By the year 2000, to have ensured that 75 per cent of solid waste generated in urban areas are collected and recycled or disposed of in an environmentally safe way.”

Chapter 19. Environmentally sound management of toxic chemicals, including prevention of illegal international traffic in toxic and dangerous products

This chapter focuses on prevention of the illegal traffic in toxic and dangerous products and wastes by monitoring and making regional assessments of that illegal traffic and its environmental and health implications. It also encourages industry to develop an internationally agreed upon code of principles for the management of trade in chemicals, recognizing in particular the responsibility for making available information on potential risks and disposal practices if those chemicals become wastes.

Chapter 20. Environmentally sound management of hazardous wastes, in hazardous wastes

Chapter 21. Environmentally sound management of solid wastes and sewage-related issues

Chapter 22. Safe and environmentally sound management of radioactive wastes

Chapters 20, 21 and 22 focus exclusively on waste issues, including hazardous and radioactive waste. It lays out objectives and action to be taken, as well as some key numeric targets to be achieved.

Chapter 24. Global action for women towards sustainable and equitable development

Chapter 24 recognizes the impact of environmental problems on the lives of women/children. It calls for urgent measures to avert the ongoing rapid environmental and economic degradation in developing countries that generally affects the lives of women and children in rural areas suffering drought, desertification and deforestation, armed hostilities, natural disasters, toxic waste and the aftermath of the use of unsuitable agro-chemical products.

Chapter 30. Strengthening the role of business and industry

Chapter 30 recognizes that more efficient production processes, preventive strategies, cleaner production technologies and procedures throughout the product life cycle, can play a major role in reducing impacts on resource use and the environment, and in minimizing wastes. It calls on governments, business and industry, including transnational corporations, to aim to increase the efficiency of resource utilization, including increasing the reuse and recycling of residues, and to reduce the quantity of waste discharge per unit of economic output.

Chapter 32. Strengthening the role of farmers

The chapter calls for the establishment of networks for the exchange of experiences with regard to farming that help to conserve land, water and forest resources, minimize the use of chemicals and reduce or reutilize farm wastes.

Chapter 34. Transfer of environmentally sound technology, cooperation and capacity-building

Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes. By definition, waste generation becomes an important criteria to identify and select a technology as 'environmentally sound'. The chapter extensively covers the topic and how this can be done.