APPCED VII

Proceedings of the Seventh Asia-Pacific Parliamentarians' Conference on Environment and Development

NOVEMBER 20 - 23, 1999

THE NATIONAL ASSEMBLY OF THAILAND

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The Seventh Asia-Pacific Parliamentarians'

November 20 - 23, 1999,

Conference on Environment and Development

Chiang Mai, Thailand

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Foreword

This publication compiles the proceedings of the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development (APPCED) which was held during November 20-23, 1999 in Chiang Mai, Thailand.

This was the seventh meeting of the APPCED, aiming amongst other things, to respond to the United Nations Conference on Environment and Development in Brazil in 1992 and to further the purpose of the First APPCED Conference in adopting parliamentary measures for sustainable development in the Asia-Pacific Region.

The theme of the Seventh APPCED Conference was "Waste Treatment and Garbage Disposal in the Cities". The issues are one of the major global environmental concerns which need cooperation of parliaments, governments and private sectors as well as public participation to solve them urgently.

The Year 1999 was an auspicious year for Thailand as it was the year of the 72nd Birthday of His Majesty King Bhumibol Adulyadej. Thus during the Conference, the Thai National Assembly organized exhibitions to honor His Majesty the King as a national developer and an environmental conservationist. Exhibitions on community participation and monitoring of waste treatment and garbage disposal projects initiated by the Montfort College in Chiang Mai and Thanyasittisin School in Pathumthani provinces were also displayed .

The Seventh APPCED Conference was successful due to contributions from several government agencies, the United Nations Environment Programme and the Thai people. Country reports on the status of environment presented at the conference and reproduced in this publication are very informative. Parliamentarians clearly demonstrated their awareness of the environmental problems and their commitment to working cooperatively to address them.

I look forward to seeing such cooperation at the next APPCED Meeting in India in 2000.

(Wanmuhamadnoor Matha)
President of the National Assembly of Thailand

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ต้นฉบับไม่มีหน้านี้

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Welcome Delegates to participate
the 7th Asia Pacific Parliamentarians' Conference
on Environment and Development
RIVERSIDE PLAZA

หน้าว่าง

Declaration

หน้าว่าง

Signing of the Chiang Mai Declaration

Signing of the Chiang Mai Declaration

Chiang Mai Declaration
7th General Assembly of the Asia – Pacific Parliamentarians' Conference on Environment and Development

We, Members of Parliament and Conference participants representing countries from the Asia-Pacific Region at the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development (APPCED) in the City of Chiang Mai, Thailand from 20th to 23rd November, 1999, having discussed the theme "Waste Treatment and Garbage Disposal in the City" with a shared concern for the rapid aggravation of environmental problems in cities of the Asia-Pacific Region, have concluded the meeting successfully with the hosting country's excellent organizations and kind hospitality:

Recognizing that the environment and natural resources provide the basic conditions for the existence and development of humanity and that environmental protection is essential to sustainable economic development and social progress,

Stressing the need of strengthening the cooperation for long-term common goals and broad common interests shared by the Asia-Pacific countries,

Recognizing that environmental problems have critically escalated at the global as well as at national and regional levels, posing challenges to the effectiveness of international goals and norms for protecting the global environment,

Taking into account that the quantities and complexities of waste and garbage being generated daily have increased rapidly with economic development and unsustainable patterns of production and consumption,

Aware that urbanization and industrialization have contributed to a large extent to the aggravation of environmental pollution, and the mega burden on urban waste treatment and garbage disposal,

Mindful that environmental problems in the cities caused by imprudent and indiscriminate use of resources have led to social conflicts and futile generation of all forms of waste and garbage, which adversely affect the ecological balances and the quality of life of people as well as the economic and social development of nations,

Noting that contamination through wastes from domestic and industrial sources can have detrimental effects on the ecosystem and human health,

Noting further that the causes of the mounting problems of waste treatment and garbage disposal in some cities are attributable to the lack of national and local capacities to handle and manage them; deficiencies in regulatory frameworks; insufficient education and training programs;

awareness and participation.

Reaffirming our support for Agenda 21: Program of Action for Sustainable Development and the 1992 Rio Declaration on Environment and Development, which set out a blueprint for global sustainable development into the 21st Century and guidelines for environmentally sound waste management.

Stressing the need for all countries involved to develop institutional structuring and programming to respond to the recommentdations of international agreements,

Considering the formulation of suitable policies, legal and administrative arrangements for waste management, aimed at encouraging both governments and parliaments to adopt specific measures for waste management, while making them aware of the grave problems to the environment caused by the rapid growth of large cities;

Do hereby declare as follows:

Urge parliaments and governments in the Asia-Pacific region to further strengthen the bilateral and multilateral cooperation to promote sustainable development in this region, particularly, the developed countries and international financial institutions to provide new and additional financial and technological assistance to the developing and least developed countries so as to enhance their capacity to support sustainable development,

Call upon parliamentarians to take the lead in implementing and modernizing laws and regulations; adopting innovative approaches and policy guidance for improved environmental management; promoting the role of local governments, municipalities and city administrations in waste and garbage management, encouraging and increasing public and private sectors' participation and partnership including NGOs in the promotion of appropriate waste treatment and garbage disposal,

Urge governments to develop incentives and compliance mechanisms for waste minimization,

Urge each local authority to enter into dialogues with its citizens, local organizations, and private enterprises and to take steps for the formulation of "a local Agenda 21",

Callupon urban communities to develop effective environmental management systems for protection and restoration of the environment,

Further call upon entrepreneurs to voluntarily participate and expedite their roles towards cleaner production and life cycle assessment by adhering to environmentally sound codes,

Enourage efforts to minimize waste and garbage generation such as:

- Introducing recycling programs at educational institutions, communities and commercial sites,
- Using clean technology to reduce waste generation,
- Widely using recycled materials,
- Upgrading and retrofitting existing systems,
- Promoting public participation and awareness programs for waste reduction in communities, institutions, industries,
- Promoting recycling industries through green public procurement and green consumerism,
- Introducing economic instruments and various incentives to reduce waste and garbage in urban areas,
- Urging people to separate all wastes at sources to facilitate recycling and treatment,
- Inviting private corporations to showcase their latest technologies,
- Promoting access to useful waste treatment and garbage disposal technology,

Call upon countries in the Asia-Pacific Region to strengthen the networking of information and environmentally safe and sound technology for waste and garbage management.

Done in the City of Chiang Mai, Thailand this 22nd day of November 1999.

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Nov. 22, 1999
Chiang Mai, Thailand

MASTER MUZIBUR RAHMAN

BANGLADESH

IRAN

NAURU

RUSSIA

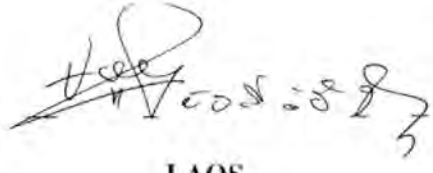
CAMBODIA

IRAQ

NEW ZEALAND

SINGAPORE

CHILE



LAOS

PAPUA NEW GUINEA

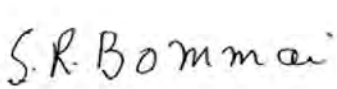
U.S.A.

CHINA

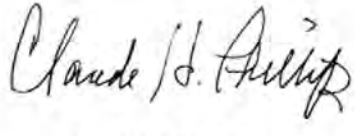
MEXICO

PERU

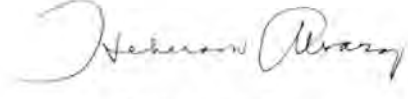
VIETNAM



INDIA



MICRONESIA



PHILIPPINES

Exhibition

Exhibition

Exhibition

Exhibition

Inaugural Ceremony by H.E.Mr.Tanin Kraivixen, Privy Councillor

Inaugural Ceremony by H.E.Mr.Tanin Kraivixen, Privy Councillor

Section I

Summary of Speeches

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Meeting the Challenges of the Next Millennium

by
Professor Dr. Emil Salim
Former Minister of Population and Environment from Indonesia

The key word is recycling. Waste is recycled into useful product.

The notion of sustainable development requires that development must take place in which renewable resources are exploited below the threshold level of renew-ability and the non-renewable resources are used most efficiently and recycled.

The clue in sustainable development is to exploit resources without exceeding the limitations of nature's capacity to absorb waste.

To meet this challenge of growth, it is important that Asia-Pacific follows a new scenario and indulge itself in a new pattern of growth in which:

1. Production is based predominantly on renewable resources, recyclable energy and recyclable non-renewable resources;
2. Production employs clean technology minimizing waste, energy, and resources within the pattern of eco-efficiency;
3. Environmental costs are explicitly incorporated into the price structure, business costs and "green budget";
4. The consumers exert influence on production through product certification and ecolabeling;
5. Economically inter linked producers and consumers are in a network that work harmoniously in a web of life.

หน้าว่าง

A Policy Proposal for Waste Management Problems

by
Mr. Takashi Kosugi
Member of the House of Representatives from Japan

Japan had confronted successive social changes and environmental problems throughout the course of economic development. The problems resulted in the ever-increasing quantities of wastes, diversifications of wastes such as toxic wastes and inadequate waste treatment and garbage disposal that consequentially led to public distrust in the government. In the urban areas, problems such as these made it difficult to locate treatment facilities and gave rise to demands for advanced technologies for dioxin reductions.

A series of laws and regulations were enacted to respond to these problems and demands. Also, social restructuring were required to realize sustainable growth based on the philosophy of waste minimization.

It was recommended that eventhough capital investment in waste treatment and garbage disposal would not directly increase GDP, it was critically needed to avoid social losses, detrimental environmental impacts and political problems. On the other hand, comprehensive policies were to encompass effective city-planning, waste minimization and public access to information. In a pro-active approach, governments should focus on initiating a social change to limit the scale of waste management problems. The need to promote technological development and capacity-building of technicians were underlined.

From Garbage to Gold : Waste Reduction and Recycling is a Win-Win for the Environment and the Economy

by
Hon. Karen Fraser
Senator, Washington State Legislature,
the United States of America

Based upon the US experiences in the management of voluminous solid waste - 189 million metric tons as of 1995, the progress and success of the nation was elaborated. On a daily basis, an individual generated 1.2 kilograms in 1960, yet the rate increased to 1.9 kilograms per capita per day in 1966. However, a burden on a final disposal was significantly reduced by 23 percent once the US seriously opted for recycle, reuse and reduction of wastes. Sanitary landfills catered 60 percent of the solid waste and the rest was incinerated. A new definition of 'garbage', thereby, emerged and included only the amount of waste destined to be disposed. Waste minimization in the US, hence, led to an impressive reduction of environmental pollution, economic loss and impacts on natural resources particularly on a fragile global ecosystem. The derivation of economic value from normally-worthless waste was, in fact, turning the 'garbage' into 'gold'. Sustainable development became more real and enhanced a better quality of life for the next generation. Some of the routine methods of waste reduction were personal reuse, source reduction, smart shopping and waste to energy. In all, the success attributed to improved environmental standards, a financial gain potential, convenience of collection systems, public motivation and government leadership and assistance.

Section II

Speeches

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Keynote Speech on From " Garbage " to "Gold" : Waste Reduction and Recycling is a win-win for the Environment and the Economy
by Hon. Ms. Karen Fraser, Senator, Washington State Legislature

Keynote Speech on A Policy Proposal for Waste Management Problems
by Hon. Mr. Takashi Kosugi, Member of the House of Representatives, Japan

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Speech
by
Prof. Dr. Emil Salim
Former Minister of Population and Environment from Indonesia
Meeting the Challenges of the Next Millennium

The theme of the Seventh Asia-Pacific Parliamentarians' Conference on Environment and Development in Chiang Mai, Thailand, November 1999 is "Waste Treatment and Garbage Disposal in the City."

Let me start first with the question what is waste.

The Garbage Model in Thanyasittisin School separates waste into:

a. valuable garbage that the students sell;
b. organic waste that the students dump;
c. rubbish that is also dumped;
d. hazardous waste that students put in containers.

Looking deeper into waste, one finds that "waste is resource."

In Indonesia during crisis, waste became a valuable resource. City garbage as free resource in combination with muscle power of the unemployed and skills from Non-Governmental Organizations has transformed garbage into useful compost. Plastic waste are transformed into pellets that become raw material for making plastic bottles. Cartons and used newspapers ate made into household and artistic items.

I can go on and on. The message is clear: waste is resource that can be used for further development. This Indonesian case is not unique. Exhibition outside this hall shows that Thai school children know how to treat garbage and make them useful. To make summer-hats from used milk-boxes, etc.

Mrs. Karen Frazer from the United States has exhibited items made from waste, such as carpets from used plastic bottles, pencils from recycled US currency papers. Cloth material from plastic waste, etc. I urge you to see this exhibition.

Garbage and waste material can be transformed into useful simple items (like those made by Thai school children) or more sophisticated (made by US businessmen).

The key word here is recycling. Waste is recycled into useful product. Because waste is resource.

But what is resource use for?

Development in general and production in particular is a function of natural resources, human and societal resources and man-made resources.

In economics we learn about the circular flow of goods and services between producer and consumer. In this circular flow natural resources are taken for granted. It is not further specified.

In ecology however natural resources are part of ecological or eco-systems, and to be separated into renewable (such as fauna and flora) and non-renewable resources (such as minerals and fossil fuel). Renewable resources have a threshold of renew-ability beyond which regeneration ceased to perform. Non-renewable resources are finite but some of them recyclable, like minerals.

The notion of sustainable development requires that development must take place in which renew-able resources are exploited below the threshold level of renew-ability and the non-renew-able resources are used most efficiently and recycled. This approach gives the life cycle of production a new twist, "from cradle to the grave" to "from cradle to the cradle" or from birth to rebirth.

Development produces also in addition to useful products negative by products, such as fluid waste that is dumped into the water, gaseous waste that is dumped into the air and solid waste that is dumped into the soil. Water, air and soil are parts of ecosystem. And ecosystems has limitations in absorbing these waste.

The clue in sustainable development is to exploit resources without exceeding the limitations of nature's capacity to absorb waste.

In this model of sustainable development it is important to adhere to the principle of eco-efficiency, i.e. to raise output with reducing resource use, energy use and waste creation; reusing used material, waste and garbage; and recycling waste and garbage.

This leads us to the concept of Sustainable Waste Management, which comprises of recycling solid and fluid waste; incineration of waste material to create energy as by-product; and sanitary landfill. Of these three approaches, sanitary landfill and incineration becomes increasingly expensive, which then leaves recycling waste as the most attractive activity.

Recycling provides direct benefit because it does not pose environmental problems in disposal form; and indirect benefit in the form of energy savings and avoidance of pollution upstream.

But recycling is an input substitution technology. While this is necessary, it is however not enough. What is also needed is an input reducing technology.

We must shift technology development from tackling waste at the end of the pipe-line into preventing waste entering in the beginning of the pipe-line and thereby affecting the flow of goods and services in the pipe-line. Technology must shift the curve of production from the conventional into the sustainable curve in which production produces with less pollution, less waste, less energy and less resources.

This need of shifting the curve is important especially in meeting the challenges on development in the next millennium.

It is projected that in the next millennium OECD countries will shift the production curve from industries to services that applies cleaner technologies. It is expected that industries will move into Asia-Pacific and other developing countries.

Industrial development stimulated growth of cities. In 1900 among 10 largest Metropolitan cities with population beyond 1 million, only one city (Tokyo) belongs to Asia. In 2000 however out of 10 Metropolitan cities with populations beyond 12 million. 5 cities are in Asia, such as Tokyo (28 million people), Bombay (18 million). Shanghai (14.2

million), Seoul (12.9 million) and Beijing (12.4 million). Numerous other cities in smaller sizes will follow.

What does it mean and what are its implications?

Cities provide habitats for industrial workers that produces industrial goods for the markets but has to rely more and more on food and shelter-material from outside the city. London requires for its inhabitants food and shelter material that are derived from areas 58 times the size of London. It is hence inconceivable that such Metropolitan areas are capable to absorb all the waste they produce. What then happens? Waste is dumped in areas outside London.

In brief what happens is that the goodies flows into London and the dirt flows out of London.

This exploitative phenomenon of cities exploiting hinterland will be evident in many other countries. Out of 20,000 tons of food that New York City consumes each day, only half of it is transformed into human energy, the other half is dumped into sewers or remote landfills.

This same phenomenon is faced by the cities of developing countries now and in the next millennium. it is in this context that Sustainable Waste Management with reducing, recycling and reducing garbage becomes imperative, in addition to incineration for energy and sanitary landfill.

This is necessary but not sufficient. The growth of consumption in the cities, and thereby the production of waste and garbage, far exceeds the cities' capacity to recycle and the nature's capacity to absorb waste. Urban development must therefore be reviewed.

The UN Conference on Human Settlement, June 1996, is pleading for Sustainable City that requires a new approach of urban development with environmental considerations and embraces:

(1) environmental sound building design;
(2) efficient public transportation system that reduces the need for private transportation;
(3) sewage and sanitary systems;
(4) national policies of development that specifically integrate environmental considerations into spatial planning and takes into account nature's carrying capacity;
(5) restrict new urban development to preserve green space.

This list is not exhaustive but sufficient to demonstrate the new approach of urban development. The concept of sustainable city closely imitate the metabolism of nature, where water, food, energy and matters moves into a circular flow.

In this model ample use is made of market mechanism, such as raising fees and taxes to induce people to sort household garbage to bolster recycling; to internalize external costs into energy and water pricing to boost efficiency in resource use; to raise parking fees for subsidizing public transportation; for limiting urban growth through taxation to preserve green space.

These measures are not theoretical but has been implemented in Curitibi (public transportation), Amsterdam and Copenhagen (to preserve green space).

The growth of Metropolitan and Urban Cities will be forthcoming in Asia-Pacific. We must prepare our-self to meet this challenge in the next millennium by changing our

vision of conventional development into sustainable development with environmental considerations. To transform production and industry that leads towards "re-birth" of new production and shift of the curve requires incorporation of natural resources as components of eco-systems into the economy.

How can this be done?

We must change the business as usual scenario. The recycling approach conducted thus far, while useful is not adequate to meet the challenges of waste and garbage disposal of the new millennium.

In early 1990's US citizens recycled or composted 10-15% of household waste, double the 7% of the 1970's while the remainders are burned in incinerators or dumped in landfills. This is still not enough to cope with the ever piling up of waste and garbage.

If this is the case in a developed country, like the US, how will it be in developing Asia and the Pacific?

Even today in Manila and Jakarta are accumulating garbage "mountain" of 40 meter above sea-level and called "Mount Smoky", where methane from the rotten refuse are burning and creating acrid haze.

This business as usual approach will be adequate to meet the rapid growth of Asia Pacific in the future. It is estimated that in the next millennium half of the industrial growth will be in developing countries, most likely Asia. By 2020 about 60% of world income will be produced from Asia. With these projection it is clear that Asia-Pacific will the dynamic growth locomotive of the next millennium.

To meet this challenge of growth it is important that Asia-Pacific follows a new scenario and indulge itself in a new pattern of growth in which:

1. production is based predominantly on renewable resources, recyclable energy and recyclable non-renewable resources;
2. production employs clean technology minimizing waste, energy, resources within the pattern of eco-efficiency;
3. environmental costs is explicitly incorporated into price structure. Business costs and "green budget";
4. the consumers exert influence on production through product certification and ecolbaleling;
5. economy inter-linked producers and consumers in a network that work harmoniously in a web of life.

This approach of ecological-economic development requires the active involvement of the parliamentarians. This new development pattern requires a new set of developmental drivers that are in a triangle of equilibrium embracing; the state, business and civil society.

It is the task of parliamentarians to empower civil society, in order that hey become countervailing powers vis-a-vis the state and business.

Parliamentarians are expected to voice the aspirations of the people, which in the new millenium are voiced by the civil society. By virtue of the rise in information technology, globalization and the rise of people's aspirations, public opinion as raised by civil society becomes as important as the voice of business and politicians.

In the strive for new paradigm of ecological-economic sustainable development, it is important to capture the aspirations of the people and strives on the rising strength of people's power. It is in this context important that parliamentarians size the initiative by

empowering the civil society as the major force that pick up the challenge to build a sustainable world fully equipped to meet the challenges of the next millennium.

Chiang Mai, November 22, 1999.

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Speech
by
Mr.Takashi Kosugi
Member of the House of Representatives, Japan
A Policy Proposal for Waste Management Problems

Introduction

It is great pleasure to be able to meet all of you again.

As a member of this conference since its inception as EAPPCED, I would like to pay my respects to national assembly members of countries around the world for their positive efforts to solve environmental problems.

I am also very grateful and honored to be given this opportunity to present a keynote speech on "Garbage Disposal Technology Issue" here today.

For the past thirty years, as a politician, I have dealt with environmental issues. In particular, with a strong interest in waste management problems. I have been actively involved in this field.

Based on this experience, first of all, I would like to explain the waste management problems in Japan and their countermeasures, while reflecting on the effects of rapid economic growth on our society over the past half a century.

Secondly, I would like to introduce the problems of waste treatment and disposal in large cities, centering on actual examples in Tokyo which is my election district.

In attaining sustainable growth, waste management problems cannot be avoided. Thus, lastly, I would like to introduce the policy which I consider necessary for solving these problems.

I hope my experience will be of some reference to you when designing a policy for dealing with similar problems faced in your respective countries.

1. Rapid /social Changes and Environmental Problems in Japan

(1) Measures Against Pollution Problems

To begin with, I would like to look at the effects of rapid economic growth on our society over the past fifty years, in relation to environmental problems, focusing on waste management problems.

I have been dealing with environmental problems since around 1965, when I was first elected to the Tokyo Metropolitan Assembly. In those days, major cities and industrial areas throughout Japan had become infested with all sorts of pollution. Air pollution, water pollution, soil pollution, ground subsidence, noise, vibration, and offensive odor; these so-called "typical seven categories of public nuisances" in Japan had become serious issues throughout the country.

At that time, the Environment Agency had not been established yet, so the government was constantly behind in implementing measures against pollution. In 1973, no longer able to overlook this situation, I organized a Special Committee on Pollution within the Tokyo Metropolitan Assembly, and served as the committee chairman to tackle directly with this political issue of strengthening and implementing measures against pollution.

On the national level, around the same time, various laws and regulations for pollution control were established. In 1970 alone, the Diet passed 14 pollution-related laws and regulations.

After becoming a Diet member in the 1980s, I came to grapple with a wider range of issues concerned with conservation of the environment. As all of us are aware today, environmental problems have become global issues.

Why did pollution problems arise in Japan? There are several reasons:

One, Mother Nature could no longer take in all the discharged matters produced by rapid economic growth and urbanization.

Another reason is that, different types of pollution, such as air pollution and water pollution, were treated as individual problems independent of each other, despite the undeniable fact that everything in nature is closely related, mutually influencing one another in the ecosystem.

Furthermore, because of conscious emphasis on attaining rapid economic growth, circumstances did not allow the government, enterprises, and communities to cooperate in tackling with environment problems.

(2) Countermeasures for Waste Management Problems

What about waste management problems?

In today's Japanese society, affluence has brought about a materialistic lifestyle. Anyone can easily obtain high-quality products at reasonable prices. I believe this is the achievement of Japan's economic growth and the result of strenuous efforts of the people.

On the other hand, however, a large quantity of products on the market is destined to become waste sooner or later. Also, along with every step of mass production, processing, energy generation, as well as all other kinds of business activities, an enormous quantity of waste is produced.

In the course of becoming a great economic power, Japan has discharged a huge quantity of waste day after day at an increasing rate along with economic growth. According to statistics in 1996, waste discharged in Japan amounted to approximately 456 million tons.

Back in the 1950s, the question was how to implement quick and smooth collection of domestic solid wastes and human excreta generated in urban areas for sanitary treatment and disposal.

Then, along with increasing economic activities, quantity of waste produced from factories also increased considerably, requiring urgent measures. Thus, laws were passed in 1970 to classify wastes into two major categories, clarifying the responsibility and treatment and disposal procedure.

The first category is called, "municipal wastes," mainly consisting of domestic solid wastes and waste paper from offices. The 3,300 municipalities throughout the nation are responsible for planning the collection and combustion of domestic solid wastes, recovery of reusable resources, and landfill disposal. As one of the basic services provided to its citizens, most of the cost is covered by taxes.

The other category is "industrial wastes" generated in manufacturing, agriculture, service industry, and other business activities. Based on the Polluters Pay Principle (PPP), each business enterprise is responsible for the wastes produced and must bear the cost of treatment and disposal.

In one year, approximately 51 million tons of municipal wastes, and 405 million tons of industrial wastes are discharged. Thus, municipal wastes account for approximately one ninth or 11% of the total quantity of wastes.

Later on, not only quantity, but also quality of industrial wastes came to present a serious problem. In 1976, laws were revised to introduce stronger control on industrial wastes containing toxic substances, and tighten regulations on disposal sites and waste treatment facilities.

In addition, to respond to increasing volume and diversifying types of wastes, as well as to prevent environmentally inadequate treatment or disposal, such as illegal dumping, laws were again revised in 1991.

The main topics are as follows;

Amendments pertain to reduction of waste discharge, introduction of a new category called "Special Controlled Wastes" which may cause hazardous influences on human health and the living environment, such as infectious waste, toxic wastes, and asbestos, and establishment of a separate management system of such wastes from their generation to disposal. Legislation aimed at encouraging recycling and reuse of wastes was also enacted.

In recent years well, we continue to strengthen laws and regulations on waste management for countermeasures to reduce Dioxin generated from waste treatment procedure and environmental pollution caused by landfill. New legislation, such as the Law for

Recycling Containers and Packaging and the Law for Recycling of Designated Household Appliances (electrical and electronic equipment discarded by households) has also been introduced.

As you can see, we have adopted various legal measures, but as long as the society itself continues to practice mass consumption and mass disposal, I believe there will never be any true solution to waste problems.

In other words, should we just tackle the problems as they come by? No. The starting point must be reversed. The Earth's resources are limited that we cannot continue to waste and discard. Disposal sites are also limited, combustion of wastes causes emission of Dioxin. So, why not create a society which does not produce such wastes in the first place?

Let me summarize what I have said.

In the course of economic development, Japan has been successively confronted with various problems; ever increasing quantity of wastes, followed by diversification of wastes, such as wastes containing toxic substances, then inadequate treatment and disposal, resultiong in distrust in the government. These problems have led to difficulty in locating treatment facilities and a demand for advanced technology to reduce Dioxin.

Thus, a series of laws and regulations were established to respond to these problems and demands.

Today, however, we have reached a stage where the society itself must be restructured to realize sustainable growth. Based on the philosophy of cycle in nature, society must be changed to reduce wastes, promote reuse and recycling, and ensure proper treatment of inevitable wastes.

May task now is to effect such a transformation in our social structure.

2. Waste Management Problems in Large Cities

Next, I would like to share with you the problems of waste management experienced in large cities by citing actual examples. As mentioned before, in Japan, wastes are legally classified into two categories: "municipal wastes" and "industrial wastes."

The range and legal classification of wastes differ in each country, so, let me first clarify and define these categories. As Japanese statistical records are based on this classification, instead of "municipal wastes", I would like to use a more general term "garbage" to refer to wastes mainly generated from households.

(1) Quantity and Types of Garbage

As shown here, prior to high growth of Japanese economy in the 1950s, quantity of garbage in Osaka increased almost in parallel with population growth.

However, from here on, we see a sudden increase in garbage, regardless of the rate of population growth.

With affluence and higher level of standard of living, people have come to use things carelessly and purchase an increasing number of disposable products for everyday life, resulting in increasing quantity of garbage.

This shows the results of steady efforts by the City of Kyoto, over the years to analyze the different types of garbage. In the 1950s, and 60s non-organic wastes, such as glass, rubble, sand, pottery chips, and ash, constitute a large part. In the 60s, paper wastes start to increase, accounting for approximately 30% in 1996. In the 1980s, waste plastics come to occupy approximately 40% of the total.

In particular, containers and packages of products purchased often pose a serious problem when disposed because of their volume. Though elaborate wrapping and unnecessary containers have been reduced considerably in Japan nowadays, at one time, products packaged in many layers of wrapping paper and boxes used to be synonymous with fine products.

From the standpoint of waste management, I believe the need for policies to reduce excessive containers and packages is common in many countries.

As a countermeasure for waste containers and packages, the Law for Recycling Containers and Packaging was enacted in 1995, and similar legislation can also be found in Germany and France, etc.

In Japan, while paper and plastic containers and packages continue to increase, returnable glass bottles have decreased, making it difficult to sustain the recovery system for reuse.

Once this pattern becomes established, consumers become reluctant to purchase heavy glass bottles, and it becomes almost impossible to reverse the situation.

What I have in mind is a new social order based on a clear priority of policies; that is, reduction of wastes, promotion of reusable items, promotion of recycling of items which cannot be reused, and then, proper disposal of items which cannot be recycled.

As this is an attempt to change social structure from the perspective of waste management, it goes without saying that political initiative is critical. However, as it is also an effort to change the awareness of each citizen, it requires considerable efforts and energies.

In nations currently undergoing high economic growth, I hope such mistakes as ours are not repeated. To prevent increase in wastes brought about by a lifestyle dependent on short-life, one-way goods, such as waste containers and packages, I strongly recommend taking initiatives in all stages of business activities, including manufacturing, processing, and sale of products.

(2) Cost Required for Waste Treatment and Disposal

Taking Tokyo as an example, I would like to explain the actual cost of waste management in urban areas.

The feature of the annual cost of waste treatment and disposal in Tokyo Metropolis is the high percentage of cost for collection and transportation of wastes.

In Tokyo Metropolis, a waste collection site is designated for a group of houses in residential areas, and collection is scheduled at a frequency of two or three times a week. Each household puts garbage in a plastic bag and place it in the designated collection site at a specified time.

Similar to other municipalities, wastes from residential areas are collected by so-called load packers, or garbage collection vehicles equipped with a presser.

More frequent collection of garbage may add to the cause of traffic congestion. Reduction in the number of vehicles by introducing larger vehicles could cut personnel costs, however, few roads in densely populated residential areas in downtown Tokyo permit the passage of such large-sized vehicles.

For these reasons, transport stations are established to re-load garbage collected by load packers onto large container vehicles.

Nevertheless, to implement collection and transportation of wastes efficiently and economically, urban planning is essential to secure location of treatment and disposal facilities, including landfill sites. Road construction plans are also important for facilitating collection and transportation of garbage. Thus, serious consideration should be given to urban planning in relation to waste management.

In Japan, the ratio of combustion of domestic solid wastes is quite high, and the Tokyo Metropolitan Government is equipped with facilities capable of burning all the wastes collected.

The budget for combustion of wastes is approximately 299 million US$ (1 US$ = 106 Yen) for approximately 315 tons of wastes a year. Add 359 million US$ for construction and maintenance cost of incinerators, bringing the total cost to approximately 659 million US$. This means that, for each ton of waste, approximately 209 US$ is spent.

In nations anticipating economic development, it will be necessary to adopt policies at an early stage to control waste discharge. The so-called Not-In-My-Backyard (NIMBY) syndrome is making it increasingly difficult to secure landfill sites, so, like in Japan, sanitary and hygienic treatment of wastes, and reduction of volume and weight by combustion may be your only choice.

If this is the case, it is easy to see that considerable cost will be required.

As for the landfill cost, in the case of Tokyo Metropolis, approximately 1.34 milion tons of wastes a year is disposed, the budget for landfill related work is approximately 128 million US$, and the construction and maintenance cost of landfill sites is approximately 48 million US$. Together, approximately 132 US$ is spent on every ton of garbage.

As the area under the jurisdiction of Tokyo Metropolis is relatively small, it is not possible to secure landfill sites on ground. Instead, water surface final disposal facility enclosed by embankment is constructed in Tokyo Bay, resulting in this high cost.

The difficulty of securing landfill sites is a major problem in almost all municipalities throughout Japan. As areas close to city centers are already being used to a high degree, it is physically difficult to secure new location, and if the plan is disclosed, protest will immediately arise among local residents, making it almost impossible for construction plans to materialize.

Moreover, in provincial areas where open land is relatively available, there is the simple question of why garbage from Tokyo must be dumped in their backyard, thus it is also not easy to transport garbage to distant places. Nevertheless, it is a fact that more than half of industrial wastes generated in Tokyo Metropolis is treated and disposed in other prefectures.

Securing landfill sites in large urban cities will continue to remain a serious problem in the future as well.

Under these circumstances, it may become a burden on municipalities to bear the legal responsibility of securing domestic solid wastes treatment and disposal facilities. In Tokyo as well, the newest water surface final disposal facility, which is also the last landfill site, is scheduled to be completely filled by the year 2003. However, there is no prospect for another site, and Tokyo is not only municipality at a loss without a clue for the next move.

(3) Practical Use of Waste Treatment and Disposal

In the case of Tokyo, waste power generation, in other words, power generation by surplus heat generated by waste incineration plants, started in 1969, and today produces up to 753 million kilowatts. Not only does it supply power used in the waste incineration plants, but 329 million kilowatts are sold as well, raising more than 26 million US$ of income a year.

In Tokyo, surplus heat generated by waste incineration plants are supplied free of charge to public facilities, such as gymnasiums, heated swimming pools, greenhouses, and ward community halls, to contribute to the welfare of local residents. Surplus heat is also sold to households and factories, bringing in approximately 1 million US$ in income a year.

As combustion of wastes has such positive aspects, when planning waste management policies, I recommend that these benefits be taken into consideration as well.

This idea of utilizing wastes as energy sources leads to new development of waste treatment and disposal based on Private Financial Initiative (PFI).

Recently, I played an active role in establishing laws for promoting construction of public facilities based on this idea of PFI in Japan. As an example of applying PFI to construction of waste treatment and disposal facilities, a plan is now under way to construct a facility for economical treatment and disposal of wastes by combining industrial wastes with municipal wastes of small municipalities. What can be expected from effective utilization of

heat energy, as a by-product generated by waste incineration plants, and the generation of income is that it offers incentives to enterprises entering the PFI market.

As incinerators are also the major source of Dioxin, facilities throughout Japan are now undergoing full inspection for improvement and expansion of plants to enable reduction of Dioxin emission. With the introduction of PFI, large-scale high performance incinerators may be quickly realized, contributing greatly to solving the Dioxin problem.

Furthermore, in Japan, integrated treatment and disposal of wastes from a wide area employing Refuse Derived Fuel (RDF) technology, combined with waste power generation, is also being promoted.

With RDF, wastes are crushed, dried, and compressed into rod-shaped solid fuel. As they can be easily transported, wastes processed into RDF can be collected from a large region, enabling intensive combustion at large-scale facilities. For this reason, RDF technology is expected to help realize efficient waste power generation and reduction of Dioxin.

3. Planning of Waste Treatment Policies

Based on my experiences, Japan's historical path, conditions of large urban cities, and new trends, I would now like to make several policy recommendations.

(1) Investing capital in garbage disposal does not directly increase GDP as would capital investment in production infrastructure. It is important, however, to invest as much capital as possible, to avoid social loss, to build infrastructure of social economics, and to develop environment-related technologies.

Because it does not directly increase GDP, garbage disposal tends to be given low priority in a limited budget.

However, if garbage in urban areas cannot be collected and processed quickly, then various social losses will occur, including the spread of diseases derived from unsanitary living environment, reduction of economic activities in individual homes, and water pollution caused by corrupted wastes.

In order for government policies to be effectively put into operation, it is important to clarify the division of responsibilities within the government, standards of technology, and the substance of environmental regulations, in the legal system as related to waste.

In Japan, the Waste Management and Public Cleansing Law (1970), gives municipalities, as basic self-governing bodies, the responsibility for the planned disposal of garbage; and anticipates support from the national and the prefecture governments, and public cooperation with city, town or village policies. The law also clarifies various technological standards.

Furthermore, the "Law for Basic National Plan on Construction of Waste Treatment Facilities within Limited Period" was established in 1972 to give national financial

assistance for municipal waste treatment facilities. The law requires the government to have Cabinet approval for a five year plan.

Moreover, for the development of cross-jurisdictional coastal reclamation sites for the garbage of large urban areas, the Law for Promotion of Waste Treatment Facility Development Center in Cross-jurisdictional Bay Area was established in 1981. With consensus reached among the involved municipalities, currently in the Osaka Bay area, cross-jurisdictional sea surface final disposal facilities are being developed based on this law.

Because they lose efficiency as they are filled, new reclamation sites must constantly be secured to respond to needs quickly.

When a reclamation site can no longer be used or is the cause of environmental pollution, it becomes the political problem of garbage backed up for disposal. Also, in the areas where the development of a landfill site is being planned, social problems often occur due to opposition from residents. For these reasons, the government should continually be interested in the securing of appropriate reclamation sites.

Furthermore, in the case soil becomes polluted due to inappropriate reclamation, countermeasures are very difficult and would require great efforts. So, in order to reclaim land appropriately, it is important not to simply entrust the Administration but to also have tense relations of government auditing the Administration.

(2) The waste problem should not be dealt with solely by waste disposal policies but also comprehensively by various polices, such as the roads and city plannings. It also needs the involvement of government, business and communities.

The appropriate planning for road construction is necessary for the quick and economical collection of garbage from urban centers. And, in order to secure treatment facilities for the future, it will be necessary to select areas based on the predictions of urban expansion and future land use.

In order to reduce waste generation and promote reuse and recycling, it will be important for citizens to realize their importance, and for companies to promote voluntary efforts. And, it will be the responsibility of the government, to fairly apply necessary regulations based on scientific fact.

In doing so, the government must develop necessary infrastructure, such as the disclosure of information to make technological information readily available.

(3) In order to avoid future economic growth from complicating waste disposal, the government should take the initiative in establishing a philosophy of social development, with the view of preventing the worsening of waste management problems before they occur.

Japan has been following a path of mass production, mass consumption and mass disposal.

Because of this, Japan has had to deal with the large volume of garbage generated and has put great efforts in improving incinerators. From a public sanitation viewpoint, this has caused a rapid progress in the sanitary disposal of garbage in Japan.

On the other hand, Japan's dioxin emissions from these incinerators is one of highest in the world. As a countermeasure for dioxin emissions and from the viewpoint to using limited resources effectively, the promotion of waste reduction, reuse and recycling has become an important social agenda.

There is the tendency for garbage volumes to increase as GDP increases. It is feared that countries and regions expected to develop economically may face worries about processing large volumes of garbage, just as Japan has already experienced in its own development.

When planning future social systems, it would be better, from the viewpoint of preventing prblems in waste management, to use Japan as a counter example, and to ask the public about the promotion of waste reduction, reuse and recycling, thereby increasing public understanding and seeking public cooperation.

The inclusion into the Japanese legal system of the viewpoint for the "Promotion to Achiee Sound Material Society" is being considered, but it is not easy to change the entire social system. It may be necessary for the government to take the initiative and perhaps to push for change.

For the countries not yet at this stage, it would be better if government took the initiative to establish a philosophy of social development that included the view of preventing the worsening of the garbage problem beforehand.

Conclusion

I have made many policy proposals and problem presentations based on my personal experience and political conviction.

Waste disposal demands technologies from a wide area, including basic technologies such as the analysis of the composition of garbage and the physical and chemical characteristics of garbage, and the quantitative chemical analysis of waste water discharged from waste treatment facilities, engineering technologies such as the construction and maintenance of disposal facilities, and planning technologies such as the drafting of waste disposal plans. Therefore, it is essential to promote technological development and the capacity building of technicians.

In closing, I Would like to present recent information on Japanese ODA (Official Development Assistance).

This year, Japan created the Japan Bank for International Cooperation (JBIC) that integrated the former Export - Import Bank of Japan (JEXIM) and the former Overseas Economic Cooperation Fund (OECF). Within ODA programs, low interest, long-term monetary loan are granted for projects that address important environmental problems such as

air pollution or waste problems. In fiscal 1998, about 30% of all monetary loans were for environmental consideration.

The primary premise for environmental consideration is observation of local regulations and standards, But when necessary, environmental consideration within international standards can be established, through dialogue with the loan applicant.

I was an active participant in the establishment of the "Guidelines for Environmental Consideration" of the JBIC that provides for this kind of efforts.

If you need more detail information, please refer the JBIC homepage. (http://www.jbic.go.jp)

To end my speech, I promise to commit myself even more to the global environmental problems, together with all of you here today.

Thank you very much.

Speech
by
Hon. Karen Fraser
Senator, Washington State Legislature
From "Garbage" to "Gold" : Waste Reduction and Recycling is a Win - Win for the Environment and the Economy

I. INTRODUCTION

The title of this talk, and the thesis of this talk, is "From Garbage to Gold." This means we must move from considering all waste to be valueless garbage, to better identifying how to take advantage of value ("gold") of materials in the waste stream. This will benefit both the environment and the economy.

I want to begin by talking about the newspaper you read this morning---not the content but the actual paper itself. The newsprint consists of thousands of pressed fibers. They carried news to you while you drank your morning tea or coffee. Where are they now? What happened to them? Where have they gone?

And, I want to talk about cans and bottles; furniture and clothes; the packaging material that protects the goods you purchase; newspapers and magazines you have finished reading; and the food scraps that are left on the plate after a wonderful meal.

I want to talk about the thousands of everyday items which *today* are useful but *tomorrow* become..... GARBAGE!

As our population and economy grows, so does our waste. I'm reluctant to report that the US is the largest generator of waste in the world.

In 1996, US residents, businesses, and institutions produced more than 209 million tons (189 million metric tons) of solid waste. Americans generate about 4.3 pounds (1.9 kilograms) of waste per person per day, up from 2.7 pounds (1.2 kilograms) in 1960.

Here are three examples of how our waste grows as our population and economy grows, and as our society changes.

First, eating out at what we call "fast food" restaurants is very popular. However, it does generate a considerable amount of waste. *See graphic: "Waste generated at a fast food restaurant".* The results of a study show that serving 2,000 customers generated 108 kilograms (238 pounds) of waste per day. About 1/3 is packaging, and about 1/3 is food waste.

Second, large office buildings generate much waste. *See graphic: "Waste Generated at a Large Office Building".* At the beginning of the computer age, we thought that computerized offices would produce paperless offices. We have found this not to be the case! A study of waste generation in large office buildings shows that the amount of waste produced is 1.3 kilograms per employee per day. Note that $\frac{1}{4}$ of the waste consists of various types of paper products.

Third, as growth and development continue, we have more waste from construction and demolition of buildings and other large structures. *See graphic of "Construction and Demolotion Waste."* Key components of this waste stream are drywall, roofing, wood, asphalt, concrete and brick.

Throughout our Asia and Pacific region, population and development are rapidly increasing. Therefore, controlling the amount of waste is becoming more than a national American problem, it is a growing problem for our region and the entire world.

How can we generate less waste? There is one question central to issues of managing waste and garbage. The number one question that needs to be answered is: How can we generate LESS of it? It's simple question. And today I propose a simple yet effective answer: Turn it into gold. Yes, turn your garbage into gold.

If you can go from garbage to gold-you will go a long ways toward reducing waste and cleaning the environment.

Now what do I mean when I say turn your garbage into gold?

In the US we have made tremendous strides in reducing the amount of garbage, in great part by finding ways to derive economic value from materials that otherwise might be regarded as valueless garbage. In effect, we have found ways to find "gold" in reducing waste. This "gold" takes the form of business and job opportunities, and cost saving opportunities.

In effect, we have changed the definition of "garbage." Here are my formulas that illustrate the changes that have occurred in the US over the last 20 or more years.

OLD FORMULA FOR GARBAGE	NEW FORMULA FOR GARBAGE
ALL WASTE	ALL WASTE
	Minus valuable "GOLD:"
	a) RECYCLED MATERIALS
	b) DIVERTED MATERIALS
Equals = **GARBAGE** (for disposal)	Equals = **GARBAGE** (for disposal)

In the past, all waste was regarded as valueless garbage. This is the "old" formula.

But we've gotten a lot smarter.

What the "new" formula shows is that, now, we recognize that many materials in our traditional waste stream have economic value ("gold".) Increasingly, we are taking these valuable materials out of the waste stream so they can produce "gold" (economic opportunity). "Garbage" (for disposal) is now defined as what is left over after diverting or recycling as much as possible. Recyclable or divertable materials are NOT called "garbage" any more. We've changed both our way of thinking and our vocabulary.

This new formula for garbage shows how waste reduction and recycling strategies must be integral to waste management policies.

The more you reduce waste or recycle it, the more you reduce your biggest problem---disposal of garbage.

Waste reduction and recycling is a win-win. In addition to reducing disposal costs, it's good for the environment, public health, and the economy. It's a win-win that generates lots of public enthusiasm.

It's good for the environment and public health. It

- reduces water and air pollution,
- reduces contributions to greenhouse gases and global climate change,
- reduces need to extract or harvest natural resources; and
- reduces government costs.
- promotes sustainable living and conserves resources for our children's future

It's good for the economy. It

- stimulates formation of new businesses and creation of new jobs, and
- provides cheaper commodity supplies for many manufacturers.

Recycling is an important part of the ethic of living in Washington State where I live. We are one of the most active and successful recycling states in the nation.

U.S. experiences with waste reduction and recycling

So, what have we in the US experienced as we've attempted to reduce our waste and increase our recycling?

To answer that question, I'd like you to give you an overview of the challenges we've faced, the strategies we've developed so far, and the benefits we've received. I'll conclude my presentation with what I believe are the challenges we all face in the future.

II. WASTE GENERATION

The driving challenge in the US is the fact that we generate large quantities of waste. This graphic shows the components of waste generated in the US, before recycling is factored

in. You will note that paper is the largest slice of this pie, followed by yard waste and food waste. (Graphic: "Total Waste Generated in the US.")

It's a big problem. We spend a lot of time and money trying to address it.

Washington State generates more per capita waste than the national average, about 6 pounds per person per day. My guess at the reason is our active economy. I'm pleased, however, to report that Washington has a higher recycling rate than the national average.

What do we do with all this waste?

Most final disposal in the US is in landfills. The US is the number one nation in the world in the use of this method. About 60% is landfilled. About 20% is incinerated. And 20% is recycled.

Waste disposal is managed principally the state level of government, rather than at the national level. Therefore, the percentage disposed of by various methods varies by state. In Washington State, we landfill about 60% of waste, and recycle about 33% of waste.

In California, 72% is landfilled, 2% incinerated, and 26% recycled.

Waste disposal has changed significantly in my lifetime.

As I mentioned at the outset, I refer to the major trends in the US as moving From Garbage to Gold. I have personally watched this happen during my own lifetime. Waste has programmed from being regarded as valueless garbage to being regarded as a valuable resource, in effect a source of "gold".

Summary of waste trends :

subject :	Past system :	Present and evolving system
Assumed economic value	None	Much
Name for waste	Garbage	Solid waste
Disposal method	Simple and low cost	More complex and costly
Environmental standards	Low	Greatly increased
Environmental impacts	Bad	Environmentally protective
Cost of disposal	Low	Much higher
Disposal site name	Garbage dump	Sanitary landfill
Number and location of landfills	Many, small, local	Few, regional
Recycling	Little or none	Common and growing in daily life
Economic benefits of system	None - net loss	Many and growing

My childhood (1950's): All business and residential waste was defined as "garbage." "Garbage" was usually taken to a "garbage dump" where it was either buried or burned in the open air. There were few environmental or health safeguards.

My young adulthood (1960's and 1970's). Growth in population and development led to increased quantities of garbage. This in turn led to increased environmental impacts, particularly regarding air and water quality. This, in turn, caused increased public concern about protecting the environment. The public demanded higher environmental standards for managing garbage.

As a result, we changed our attitude, our vocabulary, and our public policies.

We quit referring to waste as "garbage", and began referring to it as "solid waste."

We quit referring to waste disposal sites as "garbage dumps" and renamed them "sanitary landfills".

We upgraded environmental standards substantially.

Air. To protect the quality of air that people breath, the US Environmental Protection Agency Severely restricted burning. Open burning on a large scale is no longer allowed. To burn waste, it must be in an incinerator with high air quality protection standards.

Water. To protect drinking water and fish and wildlife habital, we increased standards for siting and constructing landfills. They must not pollute surface or ground water, and they must have protective liners. The increased environmental standards have also increased disposal costs.

Landfill siting, construction and maintenance standards. We upgraded landfill location, construction and maintenance standards. This includes requiring that all landfills have a bottom liner, and a system for collecting leachate, the polluted water that drains off landfills as garbage decomposes.

Fewer and larger landfills.

Obviously, these increased standards have both improved environmental quality and increased costs. A major outcome of this changed economics is a trend toward having fewer, but very large, regional landfills, in contrast to our traditional practice of having many, small, local landfills.

This national trend is also taking place in Washington. It's now becoming common to ship garbage by train hundreds of miles for disposal!!! Just 10 years ago, I never would have dreamed this would become ordinary practice. Graphic: Photo of garbage train near Tacoma, Washington, about 20 miles from my home.

III. RECYCLING AND OTHER WASTE REDUCTION STRATEGIES

Because the US is such a large waste generator, and disposal is such an economic and environmental challenge, we are highly motivated to reduce the total volume of waste and therefore the total amount of it that must be disposed of.

Although the US is the number one producer of waste, I'm pleased to report that we are also the number one recycler of waste.

Our priorities for waste disposal are generally these:

1. Reduce the material entering the waste stream
2. Reuse or divert material
3. Recycle
4. Dispose in a landfill which meets environmental standards.

Nationally, the US recycles about 23% of its waste. This is about 50 million tons (45 million metric tons) per year. This percentage is increasing. Graphic: EPA chart of increase in US recycling rate: 1976-96.

Washington State recycles about 33% of its waste. I'm pleased to report that Washington State has one of the highest iecycling rates in the nation. For selected categories of waste, well over 50% is recycled. In some cities, such as Seattle or Olympia, higher rates of recycling are achieved because of the high priority effort they make.

Recycling rates of common materials in the US includes:
Auto batteries - 94%
Steel cans - 58%
Aluminum cans and packaging - 52%
Paper and cardboard - 40%
Yard waste - 38%
Glass containers - 29%
Plastic containers - 23%
Tires - 19%

You can see that our success rates in recycling vary considerably by type of waste. We're more successful with some than with others.

In recent years, Washington has increased greatly its purchase of recycled products, which shows that the economics of recycling is steadily improving.

The following two formulas illustrate the BIG PICTURE of what is going on in the US in terms of relationships between waste generation, waste reduction, waste recycling, and garbage disposal.

The BIG PICTURE

Relationships Among "Waste Generation," "Waste Reduction," "Recycling," and "Garbage"

GROSS WASTE
Minus: Waste reduction
a) Reduced waste
b) Reused waste
c) Diverted waste

Equals: NET WASTE

NET WASTE
Minus: Recycling

Equals: = GARBAGE

This chart attempts to demonstrate what I mentioned at the outset. In the US, we now define "garbage" by what's left over for disposal after you reduce, reuse, divert, and recycle.

Here's how the calculation goes.

1. You begin with a calculation of all waste of all types--- "gross waste." This is the formula on the left.
2. From this, you subtract the first way to reduce waste---reduce it by means other than recycling---such as by using less material, reusing materials, and diverting materials from the waste stream.
3. Subtracting waste reduction strategies from gross waste, you have then calculated "net waste."
4. The second formula, on the right, shows the second major way to reduce the total amount of garbage---by recycling.
5. After recycling as much as possible, you have a remainder of waste that should not have any remaining economic value and therefore should be disposed of---in an environmentally protective way.

To summarize this chart---there are two major categories of options for reducing the total amount of garbage: (1) waste reduction; and (2) recycling. Note that a lot of waste reduction can happen long before you get to the stage of recycling opportunities. The more waste reduction and recycling you do, the less total garbage you will have to dispose of.

RECYCLING SUCCESSES

I would like to describe to you some of our successes in waste reduction and recycling. I'll begin with a discussion of recycling, because it is the strategy most visible to the public. Then, I'll move to other waste reduction strategies.

What is recycling? It is the collection and/or diversion of items such as paper, glass, plastic, metals, and yard waste from the waste stream. Through various techniques, they are sorted, collected, and processed. After this, they are used in manufacturing, and later sold as new products. At the end of their useful lives, the recycled products' materials are again recycled. It is a continuous, circular process---and is the basis for the "recycle logo."

Recycling successes

We've had a lot of success in recycling.

We've have greatly expanded the use of recycled materials. For example, during the five year period of 1990 to 1995, we had large increases in uses of recycled plastics, construction debris, paper, organics and glass.

Recycled paper and cardboard. This is a big success story. Nationally, we recycle about 30% of waste paper. It's used to make:

Newspapers
Recycled paper for all typical paper uses.
Tissue
Cardboard
Paperboard
Creative new products, such as pencils made from old currency.
Excellent new building construction materials, including insulation, backing for gypsum wallboard, roofing paper, flooring, siding, and sound-absorbing panels.

Glass. US is No.1 in glass recycling---about 30% of glass. It's used to make new bottles, and increasingly we're finding new uses for it in construction, such as mixing with concrete to make building materials, and use as construction fill.

Aluminum cans. Similar outcomes are taking place with aluminum cans. I have an example with me of recycled aluminum roofing, made from aluminum cans.

Steel cans and cars. Steel cans can also be recycled into new steel cans, nails, and other construction materials. Steel in virtually all cars is recycled.

Composting. Composting of organic waste, such as yard waste, is one of our newer success stories. Composting is the decomposition of organic waste, such as food scraps, wood waste, and yard trimmings. It is a process which supplements the natural decomposition process.

Water, air and naturally generated heat from the waste itself, combine to produce a rich soil supplement which greatly aids plant growth and also conserves water in the soil. While this is a normal process in many rural and agricultural areas, it is not so common in most US in urban and suburban areas. Therefore, we regard this as a newer type of recycling for urban areas.

Our statistics show the US composts only about 4% of this type of waste, but that it is rapidly growing. In our area of the country, this is a rapidly expanding type of recycling.

Composting is becoming a successful business activity. A large organic composting business is located about 20 miles from my home. In just 45 days, they process yard and garden waste into a commercial soil supplement. They sell all they can produce.

Composting is now becoming a very popular home recycling technique in urban and suburban areas. The City of Olympia subsidizes the cost of composting bins for homeowners. Thousands have been distributed in my community.

Plastics: This is a particularly exciting and rapidly growing component of recycling.

Consider the plastic water bottles you use so frequently at conferences such as this. What happens to the empty bottles after you finish the water? Chances are it becomes disposed of as garbage. In reality, it's valuable. There are many end uses for recycled plastics such as this. Graphic: Recycling plastics.

New plastic is made from nonrenewable petroleum resources. Recycling plastic reduces our dependence on declining petroleum reserves. Also, the remanufacture of used plastic is energy efficient. The US beverage industry alone produces more than 1 billion pounds of plastic beverage bottles per year, some of which are recycled into new products.

There are two major categories of plastics:
(1) PET (Poly Ethylene Terephthalate), and
(2) HDPE (High Density PolyEthylene). End uses for recycled materials include:

PET	HDPE
Containers, recycling bins	Containers
Boat hulls, car parts	Plastic Lumber
Carpet and insulation	Structural foam
Landfill liners	Plastic/fiber
Polyester fiber/fabric	Plastic/fiber composites
Strapping	Drain pipe
Stuffing for sleeping bags	Traffic barrier cones
Tennis ball cans and felt	Semi-rigid food containers
Twine	Safety fencing

I have a sample board depicting the processing stages the plastic goes through in the recycling process. First it is shredded. Then it is converted to a fine, spun material. Then it is recycled into a new product.

New bottles are just the beginning.

Uses are expanding rapidly. I brought some samples:
a) Strong building materials, such as logs and boards.
b) Home decor items, such as rugs, tiles, flower pots.
c) Attractive, useful clothing, such as warm jackets and vests.
d) Tote bags.
e) Many, many others.

In summary. You can see we've had many successes. I expect many more to come.

Recycling techniques: How do we do it?

Key factors in recycling success:
- Money making potential
- Convenience of collection systems
- Public motivation
- Government leadership and assistance, at least at the outset

Convenient collection systems
We have numerous types of collection systems: large scale and specialized.

One of the major ways we have promoted convenient collection systems in the State of Washington is through curbside recyclables collection. In fact, we mandate it in cities above a certain size. Photos of collection can and truck.

We also have community collection locations where citizens can voluntarily bring recyclable materials. Sometimes, nonprofit organizations (NGO's) make money by collecting cans and papers and selling them to recycle companies for money.

We have numerous specialized collection systems. For example, many grocery stores voluntarily collect plastic shopping bags for recycling. Home appliance dealers take old appliances for recycling. Auto dealers are required to collect old automobile batteries.

Sorting machines-Photo

The invention of sorting technology has greatly improved convenience for the general public. Increasingly, the individual citizen no longer has to sort cans, bottles, etc. and put themj in separate containers for collection. Businesses have opened which have special technology to do the sorting mechanically.

Our future recycling potential is high.

In fact it is extraordinarily high! We have much more we can do. It is estimated that the overall recycling potential is 30-50% and much higher for selected materials. Many people are contributing their creativity and working hard to reach our full potential.

How much more could we do? Lots more. Here's the results of a study in the State of Washington that attempts to estimate lost economic value from materials in the waste stream that are not yet recycled. You can see that in our state alone, a market value of $114 million (US) is not recycled but could be. Key materials that comprise this "lost potential" are paper, plastic, and metal.

OTHER TYPES OF WASTE REDUCTION

Refer again to BIG PICTURE chart of Gross waste/net waste/garbage on page 6.

As I mentioned earlier, we need to reduce net waste as much as possible before we institute recycling.

The following are some routine methods of waste reduction in the US:
They can be called "pre---recycling" strategies.
They include: personal reuse; source reduction;smart shopping; waste to energy.

Personal Reuse. In the US we've had to relearn what many other people already know: reuse everything. For example:

- reuse shopping bags, don't just throw them out.
- Reuse clothing, reuse building materials.
- Have a personal motto of using everything at least twice, before throwing it away.
- And, don't throw away something you can give away to another person to use.

Commonly, people think of reuse as mostly a cost-saving strategy. However, we also need to think of it as a waste reduction strategy.

In the US, a major and growing business sector consists of what we call "second hand" stores. They collect and sell everyday items that have already been used.

Examples:

1) reused building materials (Olympia) Second Use Building Materials www. seconduse.com

2) Used household goods. There are a number of companies who have many retail outlets that Collect and sell used household goods. *Example in slides.* You will note they are clean and attractive. People of all income levels shop at such stores---not just the poor.

Source reduction *See chart:.*

There are many ways to use less of the earth's limited resources:

a) Change the design, manufacture, or use of products and materials to reduce the amount of waste.
b) Improve personal practices to reduce the amount of resulting waste, such as copying on two sides of a piece of paper; reducing the amount of material used in packaging.
c) Reducing emissions into the air, such as gasses, chemicals, other pollutants
d) Designing products to last longer.
e) Designing products to be easily repairable, rather than disposable.

Smart shopping *(See slide):*

a) Buy products sold in larger quantities, rather than in smaller quantities (less packaging per amount of product)
b) Buy products in returnable containers
c) Buy products that are in refillable containers (some shampoos, etc.)
d) Buy products that are reusable.

Waste to energy: This entails using waste, such as automobile tires, for fuel in a manufacturing process. In Washington, we do not technically define this as recycling; we call it a diversion from the waste stream. However, some other states do count it in their recycling statistics.

MAJOR, PRACTICAL ENVIRONMENTAL AND ECONOMIC BENEFITS

The practical benefits of waste reduction and recycling are significant:

PRACTICAL BENEFITS

- Garbage disposal costs reduced
- Air and water quality improved
- Public health improved
- Trees saved
- Nonrenewable resources saved
- *Political problems decreased (as result of all of the above)*

- Fish and wildlife habital protected
- Energy saved and created
- Greenhouse gasses reduced
- Useful new materials created
- Businesses and jobs created

(If nothing else) Landfills and waste collection: Extends life of existing landfills; reduces need to create more landfills; decreases disposal costs; decreases pollution from transportation of waste.

Public health improves because air pollution and water pollution decline. For example, producing a ton of paper from discarded paper generates 74% less air pollution and 35% less water pollution compared to producing virgin paper.

Habital and clean watersheds: Preserves habital and watersheds: preserves aesthetic qualities for residents and tourism, as well as benefits to wildlife. Photo?

Saves water. For every ton of paper recycled, we save 7,000 gallons of water.

Saves trees. For every ton of paper recycled, we save 17 trees.

Save nonrenewable resources for our children and grandchildren.
Reduced need to extract or harvest raw materials, such as minerals and petroleum, reduces business and environmental costs, and saves these resources for future generations.

Saves energy. Recycling one ton of materials in a residential curbside program conserves about $265 of energy (electricity, petroleum, natural gas, or coal)---after accounting for energy used in transportation in recycling process. Aluminum can recycling saves 95% of the energy needed to make aluminum from raw materials. Using recycled aluminum beverage cans to produce new cans allows the industry to make up to 20 times more cans for the same amount of energy it would take to make I can from raw materials.

For every ton of paper recycled, 4,100 hours of electricity are saved.

Recycled plastics also require much less energy than making new plastics.

Creates energy. Methane recovery from landfills creates electricity. This is being done in Washington State at several large regional landfills.

New construction materials. Creative, durable, cost-effective new materials improve people's lives.

Greenhouse gases reduced: Emissions from landfills, garbage transportation vehicles, and energy generation plants all produce greenhouse gasses. Recycling of solid waste in US prevented the release of 33 million tons of carbon into the air roughly the amount emitted annually by 25 million cars._____.?

Business benefits. In the US, recycling is a large and growing business sector, including a component of international trade:

a) New businesses are created
b) New opportunities for existing businesses are created

c) Save money on materials used to make products
d) Promote a positive public image
e) Useful new materials and products are stimulated

Creates jobs. Creates manufacturing jobs particularly in recycling plastics and paper. In Washington State alone, with a population of 6 million, over 18,000 people are employed in the recycling industry, and about 14,000 people are employed in the manufacture of recycled content products.
See charts.

Reduced political problems (Good for all public officials!)
As a result of so many problems solved or reduced, and new benefits obtained, more people are happier and better off, and less demanding of the political process!

FACTORS THAI HAVE CONTRIBUTED TO OUR SUCCESSES

So, what are the major factors that have contributed to our success?

Improved environmental standards.

Improved economics. The increased cost of garbage disposal makes it economically worthwhile for businesses and households to seek ways to reduce their garbage and get economic value for as much of it as possible. On the demand side, businesses are increasingly able to produce products and materials that consumers want at good prices. On the supply side, we are improving our ability to costeffectively collect quality materials for recycling.

Public understanding and enthusiasm. There is a direct correlation between public education and the amount of waste reduction and recycling.: the more educated and aware people are the greater the amount of waste reduction and recycling they do

Government leadership and assistance.
There is much government can do to play a leadership role. Some of what we have done includes:

a) Establishing formal goals. In general, we now have a priority system for managing waste. For example in Washington State, we enacted goals and a priority system in state law in 1989. The goal was 50%. We have achieved about 40%.

b) Establishing formal priorities for waste management Typical priority system in US can be described as follows:

1. Reduce waste generation (amount of materials used)
2. Reuse and/or divert waste from the waste stream
3. Recycle
4. VERY LAST CHOICE: Disposal in an environmentally responsible way

c) Research, financial assistance and public education are critical.
d) Purchasing preference for recycled materials

e) Tax and fee incentives
f) Use regulatory tools to create incentives. For example:

Require waste management plans to include waste reduction and recycling strategies..

Adopt regulatory incentives to make waste reduction and recycling cheaper than garbage disposal.

Require curbside recycling collection in larger cities.

Require data reporting, using common definitions, so progress can be measured against goals.

Help make waste reduction and recycling a more cost effective choice for citizens.

Future challenges

There are many challenges to reducing waste in the future, ranging from improving markets, products, and prices, to improving collection techniques, to improving public education. We are limited only by our creativity and amount of effort.

Our overall challenge, I believe, is to make the economics of waste work for the environment.

One way the State of Washington works to meet this challenge is by creating the Clean Washington Center. This center has been very innovative in researching new materials and products, and educating businesses about their business potential. Creation of additional similar types of centers would help significantly, I believe.

SUMMARY

Let's remember what we're about: reducing garbage!

Let's remember the BIG PICTURE. The environmental and economic costs of waste disposal compel us to shift to waste reduction and recycling strategies. They must be integral components of waste management. The more waste reduction and recycling you do, the less "garbage" you will have to deal with. Fortunately, this is a win-win for everyone. It's good for the environment, it's good for people's health; it's good for reducing government costs; it's good for business. It has almost unlimited future potential.

That is why "garbage" is becoming "gold." We can no longer afford to assume waste has no value. We must be creative, to find and reuse all value to the greatest extent possible.

We can learn a lot from each other.

CONCLUSION

First :

LESS IS MORE

LESS (GARBAGE) IS MORE (GOLD) (ECONOMIC OPPORTUNITY)

LESS (GARBAGE) IS MORE (ENVIRONMENTAL QUALITY)

Second :

WE' RE IN A FUTURE :

WE' RE GOING ------

FROM " GARBAGE " TO " GOLD " !!!!!!

หน้าว่าง

FROM "GARBAGE" TO "GOLD"

The Honorable Karen Fraser
Washington State Senator
Washington State, USA

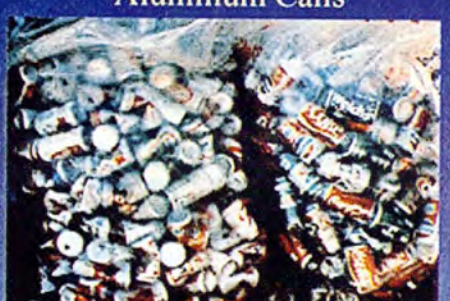
7th APPCED, Thailand, November, 1999

Garbage

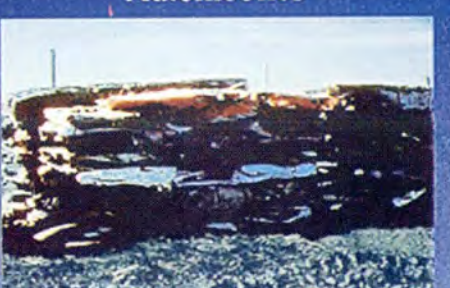
Newspapers

Automobile Batteries

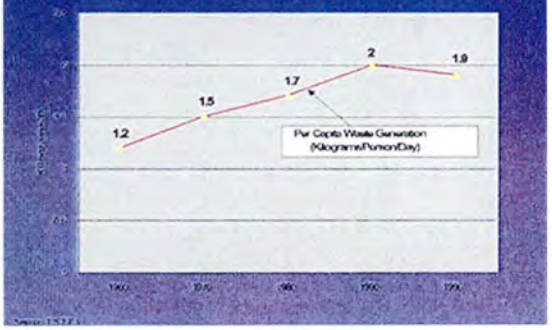
Aluminum Cans



Automobiles



Waste Generation Trend in the US

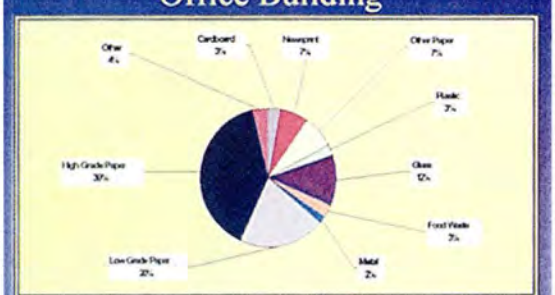


Waste Generated at a Fast Food Restaurant

34%	Corrugated Shipping Boxes
8%	Liquids, Office Paper
4%	Plastic Wraps, Syrup Containers
4%	Uncoated Paper (Napkins)
7%	Coated Paper (Sandwich wrap)
4%	Polystyrene (Hot cups)
8%	Customer Waste (Diapers)
34%	Food Waste

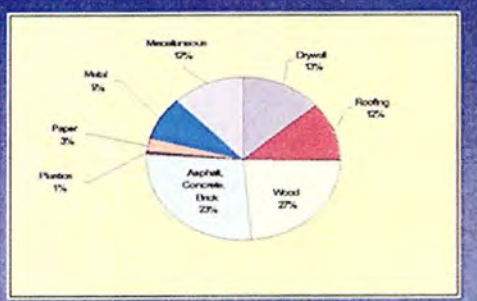
Serving 2,000 customers generates 108 kilograms (238 pounds) of waste per day.

Waste Generated at a Large Office Building



Total Generation: 1.3 kilograms/employee/day

Construction and Demolition Waste



Average composition, as disposed

QUESTION:
How can we generate LESS Garbage?

ANSWER:
Turn it to GOLD!

The Changing Definition of Garbage

Old Formula for Garbage	New Formula for Garbage
ALL WASTE = GARBAGE (for disposal)	ALL WASTE Minus valuable "Gold" (a) RECYCLED MATERIALS (b) DIVERTED MATERIALS GARBAGE (for disposal

Waste Reduction and Recycling is a Win-Win For the Environment and the Economy

It's good for:

–the Environment
–Public Health
–the Economy

Good for the Environment and Public Health

- Reduces Air and Water Pollution
- Reduces Contributions to Greenhouse Gases and Global Climate Change
- Reduces Demand for Natural Resources
- Reduces Government Costs
- Promotes Sustainable Living and Conserves Resources for Our Children's Future

Good for the Economy

- Stimulates Formation of New Businesses and Jobs
- Provides Cheaper Commodity Supplies for Manufacturers

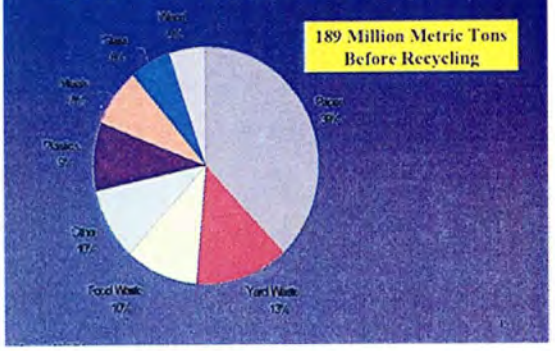
The United States

Washington State

U.S. Experiences Attempting to Reduce Waste and Increase Recycling

- Challenges We've Faced
- Strategies We've Developed
- Benefits Enjoyed

Total Waste Generated in the US



Disposal Methods Vary

	Landfill	Incineration	Recycling
U.S.	61%	16%	23%
Washington	60%	7%	33%
California	72%	2%	26%

Summary of Waste Trends

Past System	Present and Evolving System
• Low Disposal Costs	• Costly Disposal
• Many, Small, Local "Dumps"	• Few, Very Large, Regional "Sanitary Landfills"
• Bad Environmental Impacts	• Protective of Environment
• Little/No Recycling	• Recycling Very Common
• Net Economic Loss	• Economic Benefits Are Many and Growing

Fewer Landfills in Washington

- Fewer Landfills Are a National Trend
- Small, Local Landfills Are Replaced by Very Large, Regional Ones
- Landfill Capacity Remains The Same

Old Burning Landfill

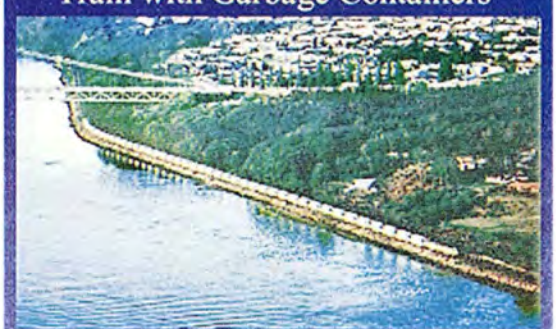
Spreading the Garbage at the Landfill

We Substantially Upgraded Environmental Standards

- Air Quality
- Water Quality
- Landfill Location, Construction and Maintenance Standards

New Landfill Under Construction

Train with Garbage Containers



Emptying the Garbage Container

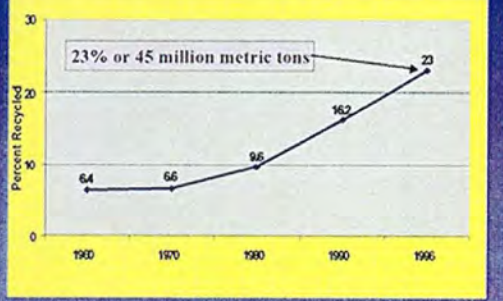
A New Era . . .

Recycling and Other Waste Reduction Strategies

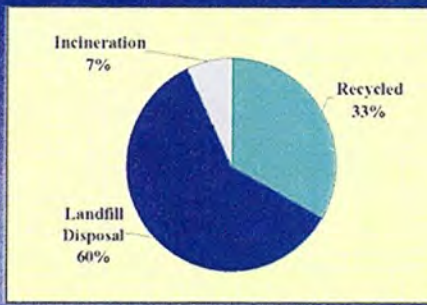
Our Choices About Waste… …In Priority Order

1. Reduce the material entering the waste stream
2. Reuse or divert material
3. Recycle
4. Dispose in a Landfill Which Meets Environmental Standards or Incinerate

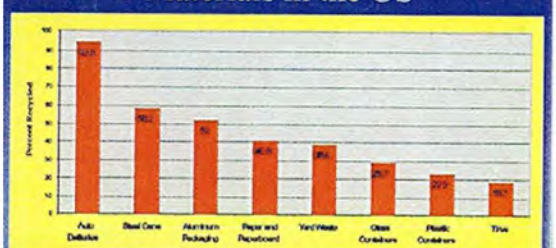
Recycling in the US Has Increased



Waste Disposal in Washington State



Recycling Rates of Common Materials in the US



The BIG PICTURE

Relationships Among Waste Reduction, Recycling and Garbage

GROSS WASTE
Minus: Waste Reduction
- a) Reduced Materials
- b) Reused Materials
- c) Diverted Waste

Equals: **NET WASTE**

NET WASTE
Minus: Recycling

Equals: **GARBAGE**

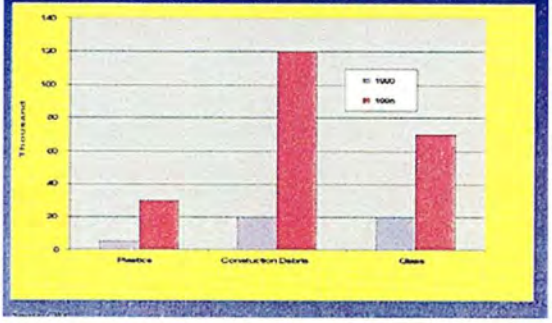
Recycling Successes

What is Recycling?

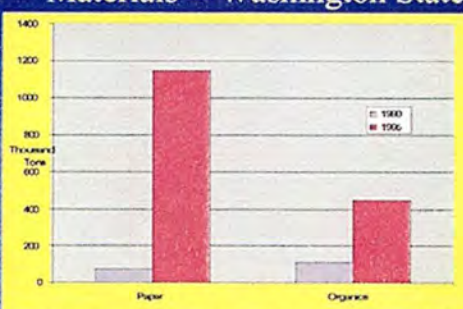
- Collection and/or Diversion of items from the Waste Stream
- Manufacture into New Products
- Consumption of New Products

Then Repeat this Cycle!

Increased Use of Recycled Materials -- Washington State



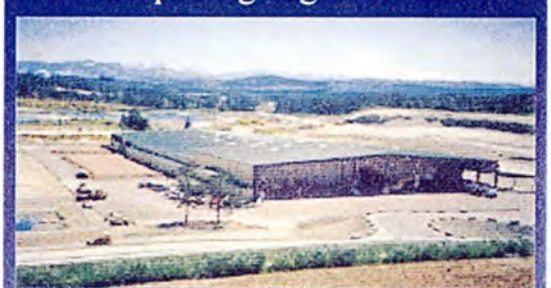
Increased Use of Recycled Materials -- Washington State



Other Recycling Successes

- Paper & Cardboard
- Glass
- Aluminum
- Steel
- Composting

Composting Organic Waste



Composting: Black Gold in 45 Days

Marketing Compost

Waste Reduction: Backyard Composting

End Uses of Recycled Plastics

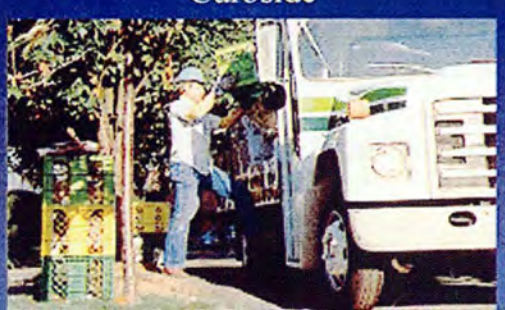
- **PET**
  - Containers, recycling bins
  - Boat hulls, car parts
  - Carpet and insulation
  - Landfill liners
  - Polyester fibre/fabric
  - Strapping
  - Stuffing for sleeping bags
  - Tennis ball cans and felt
  - Twine
- **HDPE**
  - Containers
  - Lumber
  - Grocery bags
  - Structural foam
  - Plastic/fibre composites
  - Drain pipe
  - Traffic barrier cones
  - Semi-rigid food containers
  - Safety fencing

Key Factors in Recycling Success

- Money-making Potential
- Convenience of Collection Systems
- Public Motivation
- Governmental Leadership and Assistance

Convenience: Curbside Recycling

Curbside



Olympia Curbside

Curbside Recycling

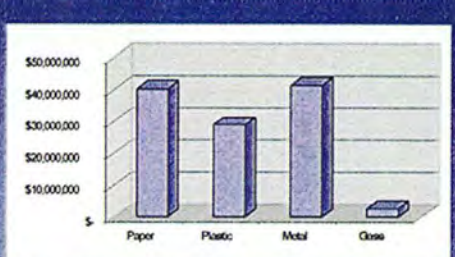
Sorting Center in Seattle

Special Collection Systems

- Batteries
- Oil
- Cardboard
- Plastics
- Refrigerators and other Home Appliances
- Plastic Shopping Bags
- Construction and Demolition Waste
- Newspapers

Our Future Recycling Potential Is High!

Market Value of Lost Recyclables in Washington is $114 Million



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NET WASTE
Minus: Recycling

Equals: GARBAGE

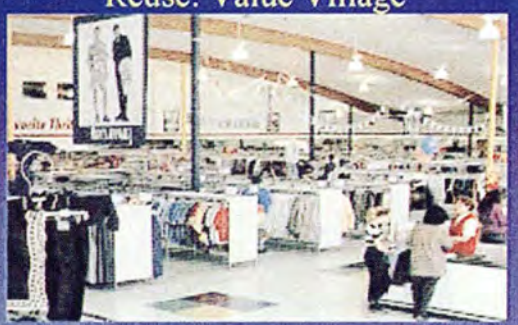
Pre-Recycling Waste Reduction Strategies

- Personal Reuse
- Source Reduction
- Smart Shopping
- Waste to Energy

Waste Reduction Through Personal Reuse

- Shopping Bags
- Clothing
- Building Materials
- Donate to "Second Hand" Store and/or Charities

Reuse: Value Village



Reuse: Value Village

Waste Reduction Through Source Reduction

- Change Design to Use Less Material
- Use Less -- Copy on 2 Sides of Paper
- Design Products to Last Longer
- Design Products to be Repairable Rather than Disposable

Waste Reduction By Shopping Smart

Buy Products:

- In bulk
- In Returnable Containers
- In Refillable Containers
- In Reusable Containers

Waste Reduction Through Reduced Packaging

Reduced Packaging

Benefits of Recycling and Waste Reduction Are Major

Practical Benefits

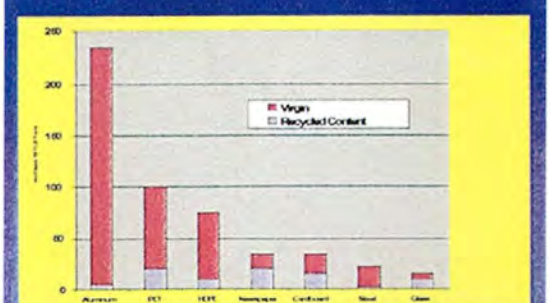
- Reduced Garbage Disposal Costs
- Improved Air and Water Quality
- Improved Public Health
- Trees Saved
- Nonrenewable Resources Saved
- Fish and Wildlife Habitat Protected
- Energy Saved and Created
- Greenhouse Gases Reduced
- Useful Materials Created
- Businesses and Jobs Created

- A Political Win! (As a Result of Achieving All of the Above Benefits)

Energy Saved

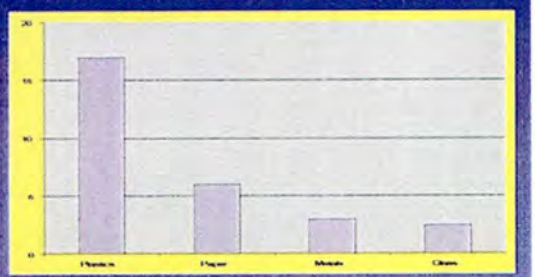
- 1 Ton of Curbside Recycling Saves $265 in Energy Costs
- Aluminum Can Recycling Saves 95% Over Virgin Bauxite
- Recycling 1 Ton of Paper Saves 4,100 Hours of Electricity

Virgin and Recycled Energy Usage

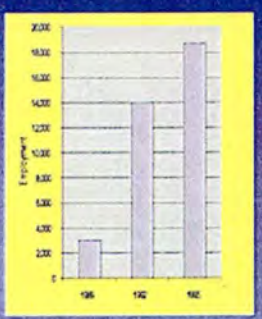


Manufacturing Jobs

Direct Jobs Per 1000 Tons Recycled



Recycling Creates Jobs



Washington State

- Over 18,000 employed in the recycling industry
- About 14,000 in the manufacture of recycled-content products
- Capital investment of $14 million
- In a state with a population of 5.5 million

Factors That Have Contributed to Our Successes

- Improved Environmental Standards
- Economics
  - Demand: Products and Materials Consumers Want at Good Prices
  - Supply: Cost-effective Availability of Quality Raw Materials
- Convenience
- Public Understanding and Enthusiasm
- Government Leadership and Assistance

Government Leadership and Assistance

- Establishing Formal Goals
- Establishing Formal Priorities for Waste Management
- Research, Financial Assistance, Public Education
- Purchasing Preference for Recycled Materials
- Tax and Fee Incentives
- Regulatory Tools

Government Promotion of Recycling

Promoting Recycling

In Summary... .

Garbage

Let's Reduce It!

The BIG PICTURE

Relationships Among Waste Reduction, Recycling and Garbage

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NET WASTE
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Waste Reduction and Recycling is a Win-Win For the Environment and the Economy

It's good for:
–the Environment
–Public Health
–the Economy

In Conclusion ...

LESS IS MORE

- LESS (GARBAGE) IS MORE -- ECONOMIC OPPORTUNITY
- LESS (GARBAGE) IS MORE -- ENVIRONMENTAL QUALITY


We're Going
From "Garbage" to "Gold"

Section III

Introduction to Country Reports

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Bangladesh

In the agro-based Bangladesh, agricultural wastes accounted for a highest proportion of solid wastes as compared to urban wastes. They were mostly reused as animal fodder, cooking fuel or farm manure; and recovered or recycled as manufacturing materials or new factory products. Urban wastes, which were generated in toxic or non-toxic and hazardous or non-hazardous domestic, municipal and industrial wastes were on the rise as migration of rural peoples into the cities surged, and were posing waste management and health problems to the municipalities as service facilities were in short supply and unhygienic environmental quality was degrading. Waste disposals in large parts of Bangladesh were made through unintegrated open dumping and recycling. Waste management, especially in the rural areas, was unorganized and inefficient. Waste collection was mainly carried out by waste pickers or scavengers whose healths were compromised through exposures to unhygienic conditions and harmful pathogens. With an organizational support from within the country, Bangladesh aimed for an integrated waste management to improve the existing practices and provide health care and health protection to its citizens. And peoples should be trained to reclaim, process and utilize recycled and valuable wastes properly.

Cambodia

Pollution was associated with wastes in Cambodia and particularly in Phnom Penh of which inhabitants and volume of solid wastes relative to its living standard and consumption behavior were rapidly increasing. Most solid wastes in Phnom Penh were domestic and commercial wastes. They were collected, transported, recycled and disposed of daily or non-daily depending on the areas, by a contracted private company. Hazardous waste was localized in the city because of limited number of industries and posed no major public health problems to the country except some imported waste that was treated before disposal. But, Cambodia was risking itself of more environmental pollution as rivers were being polluted by solid and liquid wastes released into the rivers from factories and cottages located along the watercourses. Also, Cambodia was still incapacitated to properly dispose of hazardous and clinical wastes despite a disposal system for such wastes already in place. Integrated waste management was not fully developed in Cambodia and open dumping was still the only means for waste disposals throughout the country despite the facts that incineration was introduced and attention was given to waste separation at its source. Strategic planning to improve waste management in Cambodia included training, policies and implementation, effective law enforcement, established environmental standards, international support and institutional strengthening.

Canada

Canada pointed out that accelerated economic growth in Asia and Pacific countries, together with globalization, has stimulated the development of cities and led to population migration into urban areas, causing urban problems and environmental constraints. Integrated waste management at all levels in Canada to

reduce; reuse and recycle urban solid wastes, assisted by protocols, action plans and new technologies, was highly successful. The phenomenal growth of household and industrial recycling and composting in over a decade has decreased the volume of waste going to landfills and incinerators. Furthermore, breakthroughs in technology meant that it was now possible to mitigate the environmental impact of burying or incinerating solid waste. Incorporating public views more fully into the development of waste management plans may make the options more socially acceptable and ensure that they are comprehensive and adhere to the approaches, objectives and methods identified for recovering as much as possible of the waste generated in the area.

China

China highlighted its economic growths and commitment for sustainable development. In the course of economic development, China put huge efforts and investments into environmental protection and waste management, which has raised the level of environmental standard in many parts of the country. But China continued to face tough challenges for environmental control, especially in urban areas where urbanization process has been accelerating and massive population increase as well as resource shortages were constraining environmental quality and degrading urban environment. Priority in protecting urban environment focused on waste treatment which until now was selectively adopted by each city according to its own economic strength, land resources and waste quality; and between sanitary landfilling, composting and incineration. The shortcoming of the existing waste treatment system has worsened the environment. In March 1996, China adopted the 9th Five-Year Plan Period of integrated economic development aiming at improving the environment and reversing the deteriorating ecology through energy conservation, loss-reduction and clean production technologies. China further adopted legal measures for sustainable development and promoted popular participation in environmental protection and effective enforcement of environmental laws. Regionally, China was willing to exchange and cooperate with countries in the Asia-Pacific region to synergize an environmental strategy for the region.

India

Environmental concern was integral to Indian tradition and Constitution which stressed the need for conservation and sustainable use of natural resources and the roles of the State and citizens to protect and improve the environment. Conservation and management of resources for development in India were achieved through a combination of regulatory and market-based economic instruments. India adopted legal measures, public policies, plans and programs including significant popular participation to enhance environmental qualities and waste treatment capacities. Water reuse and recycling were promoted for a clean environment. Programs were launched to conserve and manage biodiversity, wetlands, mangrove forests and coral reefs. India was now in its Ninth Five-Year Development Plan under which "participation" and "environmental assessment" were strategic to sustainable development. Policy and program initiatives and interventions from different socio economic sectors in India were key to this preventive strategy.

Iran

Iran was committed to integrated environmental management and the guidelines of the World Health Organization on pollution and detrimental effects to human health. Environmental policies were given added importance in the current Third Five-Year Development Plan for sustainable development. The plan mandated governmental actions on the preservation and protection of basic and genetic resources; integrated resource management; institutionalization of public participation in environmental planning, decision-making and implementation of a balanced protection of ecosystem and development of persuasive and deterrent policies. Iran gave prominance to the prevention of pollution and destruction of natural resources in and the coastal management of the tourism-rich Caspian Sea. Iran also called for a subregional cooperation on environment in regional bodies like the Economic Cooperation Organization (ECO), the Association of South East Asian Nations (ASEAN) and the South Asian Association for Regional Cooperation (SAARC), to facilitate environmental protection and preservation and optimization of natural resources. Activities for such cooperation could be the exchanges of views and information on environment and updates on technology.

Iraq

Iraq saw sanitary landfill as a method of waste disposal and a means for environmental protection and land reforming, which the Asia and Pacific countries could apply. It was the cheapest waste treatment source and when proper engineering techniques; site selections in non-residential areas and burial process of wastes were taken, was the real treatment of wastes that would enhance nature and reformed lands for agricultural and industrial developments. Iraq identified in particular, the possible human casualties resulted from the shortages of clean water supply, improperly managed medical wastes, and radioactive residues.

Korea

Waste minimization and reutilization were the major national agendas for Korea. Indeed, Korea ranked minimization as a priority for waste treatment over reutilization, and introduced instruments and policies to govern the efforts at state levels. Incineration and landfill were still in use in Korea, yet to a lesser extent relatively. The success of waste minimization through the volume-based collection fee system for municipal wastes has been witnessed as their generation steadily decreasing with increasing recycled wastes. The rising trends of industrial wastes and combustible components of municipal and industrial wastes have also been reported. A comprehensive and well-regulated life-cycle waste management emphasizing shared responsibilities, participation and information were applied to the national and local authorities, manufacturers and consumers during production, distribution, consumption and treatment stages. To this end, industrial waste minimization system and product charges were applied for the production of environmentally sound products. Packaging regulation policy governed production distribution. The polluter-pay-principled volume-based collection fee system, regulation on the use of

disposable goods and a treatment guarantee system for neglected wastes from businesses monitored household and business consumption volumes and types. Different kinds of waste recycling such as deposit-refund system, recycling industry and public recycling, assisted by disposal plans for transparent discharging of specified wastes were the foremost means for waste treatment in the country. Legal violations or abuses were met with strict punishment ranging from heavy fines to years of imprisonment. Education, information network and R&D activities were seen here as the tools to foster waste management initiatives among the general public, all levels of government and corporations in Korea. Regionally, an enhancement of public-private partnership for technology transfers in waste management were needed. Also, attention should be given to the relationship between sustainable consumption and environmental pressure in the rapidly growing, affluent and globalized East Asian economies. It was recommended in this regard at the Cheju International Experts Meeting for countries in East Asia to develop sustainable consumption choices through mixed economic instruments, balanced products and consumption information and programs and promotion of traditional lifestyles and cultural values for sustainable consumption.

Lao PDR

Laos aimed to develop itself with minimum environmental impact and sustainable use of natural resources, while preserving its customs and traditions. Laos also played an important role as a riparian state on the Great Mekong River in environmental protection along its riverine border with the neighboring riparian countries. Laos had no single environmental agency until the Science Technology and Environmental Agency was established in 1993. Laos also set up the Inter-Ministerial Working Group on Environment to coordinate inter-ministerial works on the issue. It set out policies and passed laws to protect and combat negative effects to its environment. In Laos, deforestation was the main environmental problem and its impacts on air quality, water supply, land fertility, and natural disasters were considerable. Impacts from industrial, mining and transport developments were still minor to Laos. Waste management and garbage disposal were new to the country, and responsibilities to handle the issues between ministries and local authorities in the fast rising urbanization of major cities were unclear and confusing. But with urban conditions deteriorating due to inadequately maintained water supply systems, amount of wastes and contaminations, the Government increasingly paid serious attention to solve the problems. Reuse and recycle of wastes were yet to be fully implemented due to lacks of funds, officials and technology.

Mexico

Mexico faced big challenges from solid wastes originating from high demographic index, industrial growth, consumption habits and urban migration. The disposition of wastes was unequal in Mexico, varying from 85% in the metropolitan zones to 10% in small urban areas. Institutional, technical and social imperfections were added causes of the problems. To reduce the amounts and composition of solid residuals generated daily, Mexico adopted an integrated environmental policy for

waste treatment and garbage disposal at the federal and municipal levels. The policy called for civic participation, legal reforms, application of appropriate technologies and financial self-sufficiency of the service notably at the municipal level. Towards the year 1998, the Mexican Congress had adopted legal measures for environmental protection and coordinated waste management across administrative and sectoral levels. Technologies for integrated waste management such as source reduction, waste recycle, thermal reduction and sanitary landfill, together with the operational outlines and administration of waste management schemes are essential alternatives for waste management in Mexico. Non-governmental efforts at the Pan-American and national levels involving governmental, academic, industrial, professional and civil institutions were strategic to the reinforcements of institutional capacities in Mexico to manage wastes and formulate policies and programs to curtail the problems. On a world scale, international contribution in waste management was integral to any comprehensive waste management schemes.

Micronesia

The Federated States of Micronesia has seen to the increase of population growth and its significant waste disposal problem given the limited land area and the fragility of the environment. A change of attitude and practice has been observed in their pattern of consumption, and hence their waste generation or, even, recycle. The roles of NGO, as well as external funding and technological development became crucial for the country to maintain a good balance between tourism, the ecosystem, and the human health.

Nauru

In Nauru, there are no waste treatment systems due to a lack of appropriate measures to cope with the problems concerned. Primary treated sewage and wastes were dumped into the ocean causing marine pollution and environmental problems. Regarding garbage disposal, wastes in all forms were collected and burned in the incinerator. No laws have yet been enacted but certain measures have already been made such as forming Waste Management Committee, promoting recycle and public awareness.

New Zealand

Having a statutory responsibility under the Local Government Act 0641, territorial local authorities carried out waste management in their jurisdiction areas and disposed approximately 3.2 million tonnes of waste in landfills in 1995. While medical and quarantine waste were incinerated, used oil was burned in high temperature furnaces of the cement industry. The growing trend of recovery of landfill gas for electricity generation was observed. Composting of organic components emerged as an attractive alternative. Hazardous waste was dealt with separately yet cleanup operations were badly needed in many areas. Eighty percent of the population had access to one or more recycling schemes for paper, aluminum or glass. The country spelled out its waste policy in 1992. The Resource Management Act and the

Hazardous Substances and New Organisms Act 1996 were enacted in order to prevent haphazard handling of hazardous waste.

Palau

Subsisting on tourism in a very limited small island area of Palau, sustainable development became a critical element and was set forth in two complementary plans. The key components of the first plan specifically included the protection of Palau's unique marine environment. The second component addressed the need to develop a framework for re-evaluating governmental policy overtime with the constant goal of protecting the environment and culture. Public funding for the Environmental Quality Protection Board was increased accordingly. Installation of sewage treatment systems and a replacement of the going-to-be-obsolete landfill were two pressing needs.

Peru

Serious deficiency in solid waste management was observed and compromised the health and the environmental quality. Only two official landfills existed yet there were 16 unauthorized dumping sites. Recycle of valuable residues was carried out by scavengers, collectors (hormigas-ants) and commercial ventures. In this fashion, recovery of waste residues, such as papers glass plastics, cans, cloths and organic components, was accomplished. Hazardous wastes, on the other hand, were not adequately handled and still posed serious health threats. On the basis of identification and management of solid residues at their generation sources, strengthening of local governmental institutions and infrastructures of final disposal were initiated five years ago. The National Environment Council (CONAM) was set up and underlined the national focus upon reduction of waste generation and upgrading the waste management process. Adopting the theme of prevention, ISO 14000, clean technology, and clean production were fostered. The Urban Cleanliness Regulation had provided a legal framework for management of household, commercial, and, to a certain extent, hospital wastes. A bill to promote sustainable development through a more comprehensive solid waste management was being drafted.

Russia

Open dumping had been widely practiced in Russia and posed critical health, finance and management problems. The nation had yet to successfully initiated privatization, technological development. Environmental pollution , therefore, resulted from the haphazard handling of household, agricultural, industrial including oilslags, mining and hazardous wastes. In 1998, the Federal Law "Wastes of Production and consumption" was passed in order to provide legal bases for the waste management. The Order of Government of Russian Federation in the same year authorized management regarding hazardous waste, transbordering transition, and other related matters.

Singapore

Over three decades, Singapore had witnessed rapid industrialization, urbanization, and high economic growth. As a result, the daily refuse output doubled every decade, reaching 7,660 tonnes per day in 1998 and dictated the need for a high-level automation of storage, removal and disposal. Nowadays all were processed either at the three incinerators (66.3%) or disposed at the 350-hectare offshore sanitary landfill. Since 1996, the collection service was corporatized but the government retained the operation and maintenance of the disposal sites.

Thailand

To no avail, the country attempted to maintain its remaining forest resources by imposing a complete ban on logging since 1989. Yet, in the past decade, the rapid economic growth had infringed upon the biodiversity, the ecosystem, and the environment. The Environmental Act of 1992 was passed in order to enhance environmental management. Other than the adopted Polluter-Pays-Principle, the nation might attempt on the Beneficiary-Pays-Principle, precautionary approach and, particularly, public participation. Thailand adopted the twenty-year Plan for the Enhancement and conservation of National Environmental Quality, 1997-2016, accelerating appropriate ways and means to cope with environmental problems.

The United States of America

The United State of America has come up with the concept of growth management which was enacted into laws in many states about a decade ago. The core concept was an attempt to comprehensively plan ahead for future growth. The Growth management Act requires rapidly growing cities and countries to develop and adopt a six year plan with active public participation throughout the process. The Act also requires local plans, strong penalties for failure to comply and also provisions for controlling growth and planning for essential services. The need to link land use and transportation is recognized with an attempt to reduce air and water pollution resulting from traffic.

Vietnam

Vietnam was facing with industrialization, demographic growth and rapid urbanization and the national focus was, accordingly, shifted to urban and industrial wastes; totaling 19,000 tons per day. Inadequate services for routine collection and final disposal prevailed, only 40-60 percent of garbage were collected. Three methods of solid waste disposal, namely, landfill, sanitary landfill, and composting plant, were employed. The Law on Environmental Protection 1993 provided the main legal framework. With close collaboration between the National Assembly and the Ministry of science, Technology and Environment, the nation would see to further improvement of waste management. However, the needs on appropriate technology, technology transfer of clean technology and effective management of hazardous wastes, were underlined.

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Section IV

Full Texts of Country Reports

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Welcome Delegates to
the 7th Asia-Pacific Parliamentarians' Conference
and Development
between 20th - 23rd November 1999

Conference

Conference


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on Environment and Development
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Country Reports

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Bangladesh
Solid Waste Management Problem in Bangladesh

Master Mujibur Rahman
Member of Parliament

Bangladesh is a predominantly agricultural country with a low level of industrialization. Industry is estimated to contribute around 16% of the GDP and urbanization is around 14%. Like many other developing countries, in Bangladesh, too, low level of industrialization does not necessarily translate to low pollution due to uneven distribution of population and industries here also.

Being an agro-based country the solid wastes in Bangladesh are generated mainly from agricultural residues, domestic and municipal sources, trading centres, street sweeping, industrial, commercial construction and farming activities and urban centres.

Agricultural Wastes

Nearly 80% of the total population of the country lives in villages and most of them depend for their livelihood on agricultural activities. So this agricultural activity contributes a major portion of solid wastes generated in the countryside. Wheat and Rice straw, jute sticks, leaves and residues of various other crops constitute this solid waste. It is difficult to quantify the amounts of such study. But fortunately these residues are mostly reused, either for animal fodder or as auxiliary fuel for cooking and meeting other energy need for rural people. Some of these wastes are also used as manure for their agricultural lands. Similarly the wastes generated from agricultural farming activities are also reused in the manner described above.

Domestic Wastes

Domestic wastes are generally generated from kitchen and household activities, domestic animals and human excreta sludge from pit and service latrines.

Wastes from Trading centres and Industrial activities

Various types of wastes such as garbage, waste papers, cartoons, discarded cloths and sweeping wastes are generated in huge quantities from the trading centres. Commercial and industrial activities produce wastes like scrap materials, residues, by products, sludge, dusts, filter materials, catalyst wastes and sometimes hazardous toxic and chemical wastes. Leaves, waste papers, grits and other forms of street litters are accumulated by street sweeping while construction wastes include all forms of discarded construction materials and demolition debris.

Municipal Wastes

The cities and towns in Bangladesh are under increasing population pressure due to migration of rural people to urban centres. The present annual growth rate in urban centres varies between 3 and 8 percent in comparison to the annual average growth rate of 2.01 percent in Bangladesh. The quantity of municipal wastes generated in an urban centre in Bangladesh is increasing proportionately with the increase in population but the increase in service facilities is lagging behind. As a result, the degradation of the quality of urban environment has become a concern and the importance of efficient municipal wastes management in the urban centres is being increasingly recognized. Municipal waste is perhaps one of the most intractable of all troubles associated with urban squalor and disease. It has been realized that if proper waste management plans are not taken for the growing cities and towns, it will cause degradation of the urban environment and severe pollution problems.

Solid Wastes Management in Rural Areas

In rural areas, there does not exist any organized authority for waste collection and disposal in hygenic manner in Bangladesh. The solid wastes/garbage generated from agriculture and domestic activities everyday in every household in the countryside are generally dumped in selected dumping ground beside the dwelling house to remain there for a long period of time. After that period the decomposed wastes in the dumping ground from compost which are used by the farmers for soil conditioning purposes and the cycle goes on agricultural wastes produced in the form of cowdung, jute stick, rice straw, rice hulls, baggases, firewood, twigs, leaves and other wastes are reused as fuel by the households in the countryside.

Solid Wastes Management in Industries

A large quantity of solid wastes is generated in many industries which is disposed off by open dumping in Bangladesh. As many industrial wastes contain toxic substances, they pollute the soil at disposal sites. In developed countries, many of the landfill sites have been declared hazardous due to disposal of toxic industrial wastes. The disposal of contaminated wastes and ashes has become an acute problem in developed countries. Several attempts have been made to export these wastes to developing countries with financial incentives. In Bangladesh, large quantity of phosphogypsum produced by TSP plant may contain hazardous substances. A much serious problem is the disposal of highly toxic waste sludge from Urea Ferto;ozer Factpry Ghorasal that was accumulated in the factory from carbon dioxide absorption tower. An estimated, 22,000 CFT of packing materials along with sludge containing 40% arsenic has been dumped in open concrete pit. Hazaribagh tanneries produce estimated 40 MT of solid wasted daily, 50% of which is hazardous due to high chromium content. Toxic chromium is being deposited in the low lying area at the western periphery of Hazaribagh area, where settling of tannery effluent takes place. Soils in the industrial area contain higher concentration of lead and chromium and a high concentration of cadmium in TSP fertilizer in the range of 50-170 ppm is a potential source of cadmium contamination.

Problems Caused by Solid Wastes

All sorts of decomposable garbage and solid wastes including cowdung, oven ash, leaves, kitchen wastes, dust, refuges etc. are dumped in open ground by every household in the countryside which produces strong odor during decomposition process and the dumping ground becomes the breeding place for mosquitoes and flies. Fly menace in rural areas is an uncontrollable problem. Flies sometimes carry germs of infectious diseases causing frequent epidemics in the rural areas of Bangladesh. The situation is aggravated by mass illiteracy and lack of hygiene education.

Unlike countryside the waste management in the cities and towns are more or less organized.

Solid Wastes Management in Different Urban Centres

The municipal solid wastes in the urban centres of Bangladesh generate mostly from domestic, commercial and industrial sources. The per capita waste collection in Bangladesh for disposal is far lower than the waste generation rates of 1.8 kilograms in New York and 2.42 kilograms US national average. The lower rate of waste generation may be due to the fact that some of the wastes escape municipal collection and are dumped in local low-lying areas. Moreover, extensive recycling of wastes in urban centres has contributed to the reduction of quantity of wastes for collection and disposal by municipalities. The total waste generated in urban centres is estimated to be 1.5-2.0 times the waste collected by municipalities. According to Dhaka City Corporation (DCC), per capita generation of solid waste is 0.5 kilogram per day. On this basis approximately 9.0 million people generate 4,500 tons of solid waste per day. But according to DCC only 0.2 kilogram of solid waste per capita per day is carried to the final disposal sites. The rest are disposed of locally. In Dhaka city, garbages are disposed of at Jatrabari, Kamrangir char, Rayer bazar, Mirput, etc.

Table-1 : Waste Generation Rate of some Asian Cities :

City	Bombay	Manila	Bangkok	Tokyo	Dhaka
Area Sq. Km.	466	636	1569	600	344
Population x 1000	8243 (1981)	7561 (1988)	5609 (1987)	8554 (1987)	3397 (1991)
Waste geneeration x 1000 ton/year	1150	1380	1800	4401	580
Kg./Cap/ Day	0.38	0.50	0.88	1.44	0.47

Source : DMDP, 1992

Like most of the other developing countries of the world we also dispose of the municipal, industrial and clinical wastes in the same dumping ground. Clinical wastes should be burnt in the incinerator so that the scavengers and others who come nearer to such wastes do not get infected.

The major components of municipal solid wastes include food wastes, market wastes, leaves, grass, paper, hoards, glass, textiles, plastics, metals, cans, bricks, debris, dirt and ashes. The very low presence of paper, plastics and metal indicates extensive recycling of these components of the refuse. The following table shows the physical composition of mixed municipal wastes.

Table-2 Physical Composition of Mixed Municipal Wastes :

Name of the Wastes	Percentage (%)
Fine Organics	33.50
Metal, Glass, Leather	1.10
Fine dust	33.80
Paper	1.50
Vegetable Matter	18.80
Stone, bricks, earthware	10.50
Rags	3.80

Recycling of Solid Wastes

In the developed countries, recycling and reclamation are being strongly promoted for conservation of resources and prevention of environmental degradation. Whilst extensive recycling is being practised in the poorer parts of the developing world, it is not a part of national waste management plans. In Bangladesh, wastes of some market value are being reclaimed or salvaged in three stages. In the first stage, the housewives separate the refuse of higher market value such as papers, bottles, fresh containers, old clothes, shoes, etc. and sell them to street hawkers. Salvage activities have some economic incentive and are in practice in all households of low to average income. The second stage of salvaging is carried out mostly by children of slum dwellers popularly known as Tokai. They collect the refuse and commercial wastes of low market value from bins and sweeping accumulation centres. The items include broken glass, cans, card board, waste paper, rags, plastics, metals and miscellaneous commercials wastes discarded by the households. The third stage of salvaging is done by the refuse pickers when fresh refuse is unloaded by municipal trucks at final disposal site. The reclaimed materials reach the waste and old materials shop through street hawkers who purchase the old materials directly from the households and through refuse collectors who reclaim materials from bins and final disposal sites.

Waste Paper and Old Cloths

Paper is one of the much used items in our every day life. Inked papers, books, magazines and old newspaper sold by households are used in the first cycle for packing loose materials in retailers shops and in folds of new cloths. These papers are then discarded by

households as waste paper. The discarded papers and boards salvaged from the bins are used in the second cycle as raw materials for the manufacture of new boards and are recirculated in the market for vaious uses. It is believed that about 25 tons of waste papers are being collected and sold per day through 2,000 shops in Dhaka city.

The old cloths of comparatively good quality are used by the poor people in the first cycle. The rags are used for cleaning purpose in the second cycle and finally these are used as raw materials in the materials in the manufacture of board.

Plastics and Rubber

Plastic wares, polythene bags and PVC product are now the part of rural and urban lifestyle. The used and old plastic can be easily remolded to produce new product. The price of various types of old plastic and rubbers vary with the quality of the materials. The old plastics are converted into powder for molding of various products in the factory. The quality of plastics deteriorates with age and the number of times these are remolded for new products. There are about 3,000 factories and shops in Dhaka city engaged in manufacturing and dealing in plastic products. According to an estimate, more than 10 million plastic bags are being salvaged and converted into alternative plastic products. The recovery and recycling of plastics are contributing towards the reduction of anticipated plastics related environmental degradation. It has been estimated that more the 90% of the plastics are being recycled.

Glass

Glass is a much recyclable item in Bangladesh with or without remolding. Some glass containers and bottles are continuously re-circulated and hardly reach final disposal site. For example, the glass containers of a particular brand reach directly or through intermediate dealers to the appropriate companies for reuse in marketing their products. The circulation goes on until the container is broken and remolded in glass factory to make alternative glassware. At present, there are about 34 factories in Dholai Khal, Tejgaon. Mohammadpur, Tongi, Demra and Savar for making glassware by remolding broken glass.

Socio-Economic and Health Impacts

The waste pickers or scavengers are most notable features of recycling activities in a city. They are extremely poor, uneducated and unaware of any harmful consequences of continuous exposure to contaminated wastes. Some of them pick from litters, bins in street and parks and collect the materials in gunny bags resting on their back. A large number of waste pickers live around the refuse dumps in apparently insanitary conditions. Ignorance, illiteracy, inability to cooperate among themselves and indebtedness to buyers of recycled materials have put the scavengers in a socially weak and disadvantageous situation.

The scavengers and the people working in recycling industries are exposed to contamination and hazardous conditions. The poor people engaged in manual sorting and resource recovery from garbage become prey to many pathogens and diseases. The scavengers have been found suffering from worm infection, skins disease, diarrhea, chronic dysentery, viral hepatitis, etc. Hazardous emission from melting of plastics and glass cause chronic bronchitis, bronchial asthma and other respiratory diseases. The recycled materials, if

not treated or processed properly before recycling, may be hazardous to public health, in general.

Final Disposal

The organic decomposable fraction of the municipal waste left after unorganized reclamation of items of immediate market value is disposed of by open dumping in low-lying areas in and around urban centres. Rapid decomposition of mixed refuse in temperature humid climate causes odor nuisance, obnoxious conditions and hazards in surrounding area. The leachate produced by infiltration of rainwater or surface water into a garbage dump has extremely high pollution potential. In general, the composition of leachate is a function of type and age of the waste and prevailing physico-chemical conditions, the microbiology and water balance in the garbage dump. Some households and industrial wastes will give rise to highly toxic leachate.

Resource Recovery

The major component municipal waste is organic food waste which is disposed of by uncontrolled dumping. The low cost option for inoffensive disposal of organic wastes is sanitary landfill. In this method, provisions can be made for collection of highly polluting leachate for safe disposal and recovery of methane gas for use as fuel. Theoretically about 0.21 cu.m. of methane gas is available by anaerobic decomposition of 1 kilogram of organic fraction of municipal wastes.

Conclusions

The present practice of solid waste collection, recycling and disposal needs improvement in order to reduce adverse impact on community, environment and public health and to maximize resource recovery and utilization. The existing resource recovery and recycling require organizational support with provisions for health protection and health care facilities for thousands of people engaged in these activities. Training should be given for proper reclamation, processing and best utilization of recyclable and valuable wastes. The organic fraction of solid waste may be separated before land filling and converted into compost for environmental protection and to promote recycling of unutilized resources present in solid wastes.

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Cambodia
H.E. Gk Vanndy
Chief of Cambodia Parliamentarian National Delegation

Your Excellency Mr. Chairman,
Excellencies,
Participants Distinguished Guests,
Ladies and Gentlemen,

I have a great pleasure to express my sincerely thankful and appreciated to the organizing committee, and especially to the National Assembly of the Kingdom of Thailand, which have made this conference very successful together into the new millennium.

Environmental pollution which is a major problem, causing by human activities in many countries of the world, are very concerned about pollution on water, soil, air quality and climate changes.

Due to exposed policy and encouragement for National and International investments of the Royal Government of Cambodia, industrial, agricultural and tourism fields etc. started developing rapidly, causing highly pollution to the Environment.

Municipal waste disposal is one of the major environmental challenges facing cities in Cambodia, though the scale of the problem is relatively small compared with cities in neighbor countries. Phnom Penh is the Capital of Cambodia has been experiencing a rapid increase in the volume of solid waste, mainly organic waste from domestic and commercial sources.

Phnom Penh is the biggest city in Cambodia. The current inhabitant numbers are 1,070,000 persons. A rise of the inhabitant numbers lead to a liners rise of the waste amount.

Solid waste management for Phnom Penh has been handling by local private company called PSBK. PSBK is responsible for waste collection, transport and disposal for 30 years since 1997 within the contract with Phnom Penh municipality.

The local private company has led to some improvements in solid waste collection in Phnom Phen. It is estimated that PSBK collects nearly 70% of the waste generated by the city.

Most of domestic waste is put in the plastic bags placed in front the house along the street waiting the labor to collect by the time limited every day or every three days depending on the areas.

Due to our technological waste management during the past few years, our Phnom Penh city has been attracted many local and foreign tourists by nearly one million visitors per year, thus our socio-economic has been upgraded drastically.

Our Royal Government has been implemented the law on Environmental Protection and Natural Resource Management, sub-decree on solid waste management. For further information please see the report of the Ministry of Environment attached.

Strategies and recomendations for successful, on behalf of the delegation I would like to request to the APPCED members country kindly support a proposal for better management on waste treatment and disposal in Phnom Penh City.

Thank you

G-3
APPCED/7/GA/Waste treatment 3

Cambodia
Solid Waste Management in the Kingdom of Cambodia

1. Introduction

Environmental pollution which is a major problem, causing by human activities. In many countries of the world are very concerned about pollution on water, soil, air quality and climate change.

Due to exposed policy and encouragement for national and international investments of the Royal Government of Cambodia, industrial, agricultural and tourism fields etc. started developing rapidly, causing highly pollution to the Environment.

Municipal waste disposal is one of the major environmental challenges facing cities in Cambodia, though the scale of the problem is relatively small compared with cities in neighbor countries. Phnom Penh is the capital of Cambodia has been experiencing a rapid increase in the volume of solid waste, mainly organic waste from domestic and commercial sources, and special waste from industrial, hospital and pharmaceutical facilities.

II. Pollution from Solid Waste

Presently, solid wastes in rural areas have not been the major problem as in the town and cities. In Phnom Penh the most obvious pollution is pollution from solid waste.

1. Sources of waste

Waste is a product or substance which the owner no longer has any use.

Waste may however be of value as a material of use in a process, or a recoverable source of energy. Waste for which there is no other value is truly residual waste for disposal.

Generally, wastes are being produced by the main sources as follows :

- Residential — domestic
- Commercial — market, shops, hotels, restaurants
- Industrial — factories, small scale factories, enterprises, workshop.
- Hospital — government and private hospitals, clinics, pharmacies, obstetrics.
- Agricultural — pesticides, chemical fertilizers, abattoirs,
- Other — street sweeping, construction sites.

According to Community Sanitation and Recycling Organization's report, the estimation of waste sources in Phnom Penh are:

- Residential wastes 66%
- Commercial waste 25%
- Industrial waste 6.2%
- Hospital waste 2.2%
- Agricultural waste 0.4%

2. **Types of waste**

Waste is either Non Hazardous or hazardous

2.1 **Non hazardous waste**

Non hazardous waste (Degradable) can be processed and managed to ensure that its volume, nature, and concentration do not pollute the Environment. This type of waste mainly produced from households, markets, hotels, restaurants, public park and street. This waste includes organic matter such as from food, vegetable, fruits, tree branches, grasses that can be composted, and other inorganic matter such as paper, plastic, glass and ceramic, and some metal debris.

2.2 **Hazardous waste**

Hazardous wastes are those wastes, often liquid, which present special problems in waste disposal, and which can be either landfilled (in term of their overall properties, have some characteristics which require a particular method of handling at the site which is not part of day to day procedure) or incinerated. This refers primarily to sewage sludge and certain hazardous and/or special wastes.

Hazardous waste produced from industries, factories, enterprises, workshop include:

- Batteries
- Chemical substance, pesticides
- Flashlight and electronic sets
- Film print waste
- Sludge from treatment
- Waste from hospital, clinic pharmaceutics
- And other as mentioned in Solid Waste Management Sub-decree

III The existing solid waste management in Cambodia

1. **Waste generation**

Phnom penh is the biggest city in Cambodia. The current inhabitant number of Phnom Penh totals to the time is 1,070,000 persons. A rise of the inhabitant number leads to a liners rise of the waste amount.

The domestic waste quantity, which is produced per inhabitants and day, is dependent on the living standard and on the consumption behavior. The starting point forms the current sorting analysis with value of 0.52 kg-person/day.

The quantity-of commercial and industrial wastes receive in the current waste analysis, corresponds to a value of 0.2 kg/person/day. So the average of waste generation for people of Phnom Penh is 0.72 Kg/person/day.

According to the waste analysis of the team "recycling" conducted in February 1997 the composition of waste in Phnom Penh is the following.

Kind of waste in Phnom Penh in 1997

Kind of waste	Quantity of waste in tones/year
Domestic waste	142,000
Industrial and commercial waste	60,000
Total	**202,000**

Thereby considerable quantities of recyclable refuse are contained

Recylable waste	Quantity of waste in (tones/year)
Share of recyclable vegetable waste in domestic waste (tones/year)	108,042
Share of recyclable inorganic waste in domestic waste (tones/year)	12,794
Share of recyclable vegetable waste in commercial andindustrial waste (tones/year)	35,540
Share of recyclable inorganic waste in domestic waste (tones/year)	2,734
Share of recyclable vegetable waste in total collected waste (%)	71%
Share of recyclable vegetable waste in total collected waste (tones/year)	143,582
Share of recyclable inorganic waste in total collected waste (%)	9%
Share of recyclable inorganic waste in total collected waste (tones/year)	18,262
Input wasste in dump site (tones/year)	197.305

2. **Waste storage, collection and transport**

Solid waste management for Phnom Penh has been handing by local private company, PSBK. PSBK is responsible for waste collection, transport and disposal of in Phnom Penh for 30 years since 1997 within the contract with municipal Phnom Penh. The company is also responsible for collecting user fees. The local private company has led to some improvements in solid waste collection in Phnom Penh. It is estimated that PSBK collects nearly 70% of the waste generated by the city.

Most of domestic waste is put in the plastic bags placed in front of the house along the street waiting the labor to collect by the time limited every day or every three day depending on the areas. It is estimated that there is approximately 10% of domestic waste remain from the collection because some waste miss the truck and some truck is not serviceable.

The storage and disposal of hazardous industrial waste is not a major public health or environmental problem in Cambodia, except hazardous waste imported. The problem is localized, mostly in Phnom Penh because of limited number of industries in Cambodia. Presently, even there are not many industries in Cambodia compare with other neighbor countries, but those factories and cottage factories were constructed in many years ago, very old, and a number of new constructed factories have not consider to the environment so environmental pollution easily occurred. Also, many of factories and cottage factories located along the watercourse, most of solid and liquid waste are released to river and sea. Cambodia has about 200 large-scale industries and 4,000 small-scale or cottage industries, involved mostly food processing, textile manufacturing and light industries.

Hazardous industrial waste from industries such from zinc plate factory and sludge from textile factories are put in safe containers waiting for secure hazardous waste landfill or incineration decided by the government of Cambodia.

Clinical wastes such as syringes, needles or other sharp instrument, bandages, swabs or dressings. Drugs or other pharmaceutical products mostly disposed of in incinerators in the hospitals. Other clinical such as parts of human and waste from obstetric section are disposed of in crematories in pagodas.

3. **Disposal of waste**

Cambodia lacks the capacity to properly dispose of hazardous (industrial) and special (clinical) wastes. There is not separation of waste at the source done in Cambodia. Therefore, these wastes are disposed of in opened dump sites that are accessible to domestic animal posing a major health risk to humans. Though the food chain, these animals could transfer pathogenic microorganisms and hazardous chemical to humans.

Steng Meanchey dump site is used since 1960 with the whole area of 8 ha and the dept of 3-20 meters. The dump site is located approximately 4 Km from the center of Phnom Penh in the dry season the fire influences the dump-operation greatly. The current depositing of the waste must be carried out in areas without fires and smoke. Because the elements fires, the waste will be inflamed and large parts of the site are burning, and wind direction (smoke) can not be influenced, constantly a new place for the depositing has to be found. In the rainy season the dump operation is influenced by the road conditions. In the open waste pile vermin (rats, insects) and germs develop very greatly.

The municipal of Phnom Penh has the goal to close the existing Steng Meanchey in the near future as its storage capacity is limited. For this reason a new location for a future central dump site for Phnom Penh must be selected. The required area need for the new dump site results from the calculation of the waste quantity development for the anticipated live-time of 20 years with the total area need of approximately 100 ha. The new proposed site is located in the southern extension of the RT 303 before the area boundary of Dang Kao, approximately 10 Km from Phnom Penh, was determined for further planning. The specific exclusion criteria are:

- Adequate land area of 100 ha.
- The contact between the dump site body and permanent staying surface water has to be avoided. Therefore, the site can not be a permanent flood area.
- To elevate the dump site bas above the seasonally high water level, the maximum soil replenishment is 1.5 m.
- Minimum distance of 300 m to residentials.
- Suitable geological underground.

According to the Final Report of thew Workgroup "Dump site Construction" in Phnom Penh, the total cost estimation for development of the new Phnom Penh dump site is:

A. 0.5m clay sealing, with leachate pumping: **12,268,795 US$**
B. Combined clay-plastic membrane sealing without leachate pumping: **24,089,696 US$**

IV Strategic planning for improving waste management

The collection and disposal of solid waste in major cities in Cambodia will continue to be a major problem confronting municipal governments because of the expected increase in urban population and growth in the industrial and tourism sectors. To avoid the major adverse public health and environmental impacts associated with inappropriate waste disposal, Cambodia should develop strategies to improve waste management, giving priority to Phnom Penh and tourism, the main potential economic growth centres:

The following measurement should be carried are:

- Need to train human resource on solid waste management, the Ministry of Environment's capacity to monitor environmental quality should be strengthened.
- Has to have policies on waste management and encourage to implement them.
- Need to ensure effective enforcement of law, sub-decree, regulation and standards on waste management.
- The Ministry of Environment should establish environmental standards for industrial waste and clinical waste disposals.
- Government of Cambodia has to have both technical and financial support from international agencies and other sources.
- Institutional strengthening of municipal agencies would include training for technical staff and provision of equipment to ensure effective monitoring or the performance of private firms and operation of a tariff structure.

Development of the new Phnom Penh dumping site

Projections for solid waste development

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	227	2008
Pop growth rate (%/a)	3.3	3.3	3.3	3.0	30.	2.8	2.8	2.8	2.8	2.5	2.5	2.5
Total population	1,070,000	1,105,310	1,141,785	1,176,039	1,211,320	1,245,237	1,280,104	1,315,946	1,352,793	1,386,613	1,421,278	1,456,810
To collection system connected population (in)	70	75	80	85	85	85	85	85	90	90	90	90
To collection system connected population (total)	749,000	828,983	913,428	999,633	1,029,622	1,058,451	1,008,088	1,118,554	1,217,514	1,247,951	1,279,150	1,311,129
Domestic waste generation rate (kg/person/day)	0.52	0.54	0.56	0.59	0.62	0.65	0.68	0.72	0.75	0.79	0.83	0.88
Collected domestic waste (tonnes/year)	142,160	163,392	186,705	215,271	233,003	251,118	270,063	293,956	333,294	359,847	387,519	421,135
Commercial and industrial waste generation rate (kg/person/day)	0.220	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475
Collected commercial and industrial waste (tonnos/year)	60,145	68,080	83,350	100,338	112,744	125,559	139,003	153,102	177,757	193,588	210,100	227,317
Total collected waste (tonnes/year)	202,305	231,473	270,055	315,609	345,747	376,676	409,067	447,058	511,051	553,435	597,619	648,452
Share of recyclable vegetal waste on domestic waste (tonnes/year) linear	108,042	119,579	131,760	144,195	148,521	152,679	156,955	161,349	175,624	180,015	184,515	189,128
Share of recyclable inorganic waste on domestic waste (tonnes/year) linear	12,794	14,161	15,603	17,076	17,588	18,080	18,587	19,107	20,798	21,318	21,850	22,397
Share of recyclable inorganic waste on domestic waste (tonnes/year) difference	0	4,841	10,669	20,432	30,065	40,179	50,835	65,324	81,768	98,388	115,789	137,826
Share of recyclable vegetal waste on c/i waste (tonnes/year) linear	35,540	39,335	43,342	47,433	48,856	50,224	51,630	53,075	57,771	59,215	60,696	62,213
Share of recyclable inorganic waste on c/i waste (tonnes/year) linear	2,734	3,026	3,334	3,649	3,758	3,863	3,972	4,083	4,444	4,555	4,669	4,786
Share of recyclable inorganic waste on c/i waste (tonnes/year) difference	2,734	3,782	8,335	13,682	18,791	24,146	29,786	35,724	44,439	51,244	58,361	65,802
Share of recyclable vegetal waste on total collected waste (%)	71.0	68.7	64.8	60.7	57.1	53.9	51.0	48.0	45.7	43.2	41.0	38.8
Share of recyclable vegetal waste on total collected waste (tonnes/year)	143,582	158,914	175,102	191,628	197,376	202,903	208,584	214,425	233,395	239,230	245,211	251,341
Recycled share of vegetal waste on total colllected waste (tonnes/year)	5,000	15,000	15,000	15,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	130,000
Share of recyclable inorganic waste on total collected waste (%)	9.0	11.2	14.0	17.4	20.3	22.9	25.2	27.8	29.6	31.7	33.6	35.6
Share of recyclable inorganic waste on total collected waste (tonnes/year)	18,262	25,810	37,941	54,839	70,202	86,269	103,180	124,237	151,449	175,505	200,669	230,810
Recycled share of inorganic waste (tonnes/year)	0	8,400	15,176	21,936	35,101	43,134	51,590	62,119	75,724	87,753	100,335	115,405
Recycled share (%)	2.5	10.1	11.2	11.7	27.5	30.0	32.2	34.0	34.4	35.7	36.9	37.8
Recycled share (tonnes)	5,000	23,400	30,176	36,936	95,101	113,134	131,590	152,119	175,724	197,753	220,335	245,405
Input at dump site (tonnes/year)	197,305	208,073	239,879	278,673	250,646	263,542	277,477	294,940	335,327	355,683	377,284	403,046
Total input waste (tonnes)				923,930								
Total input with soil cover requirement (soil/waste=1:6) (tonnes)				1,077,918								

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pop growth rate (%10)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Total population	1,493,230	1,530,561	1,568,825	1,608,046	1,648,247	1,689,453	1,731,689	1,774,982	1,819,356	1,864,840	1,911,461	1,959,248
To collection system connected population (in %)	90	95	95	95	95	95	95	95	95	95	95	95
To collection system connected population (total)	1,343,907	1,454,033	1,490,384	1,527,643	1,565,834	1,604,980	1,645,105	1,686,232	1,728,388	1,771,598	1,815,888	1,861,285
Domestic waste generation rate (kg/person/day)	0.92	0.97	1.01	1.04	1.07	1.1	1.13	1.16	1.19	1.22	1.25	1.3
Collected domestic waste (tonnes/year)	451,284	514,800	549,430	579,893	611,537	644,400	678,524	713,951	750,725	788,893	828,499	883,180
Commercial and industrial waste generation rate (kg/person/day)	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.700	0.700	0.700
Collected commercial and industrial waste (tonnes/year)	245,63	278,629	299,195	320,614	342,918	366,136	390,301	415,446	441,603	452,643	463,959	475,558
Total collected waste (tonnes/year)	696,547	793,429	848,625	900,508	954,454	1,010,536	1,068,825	1,129,396	1,192,329	1,241,536	1,292,458	1,358,738
Share of recyclable vegetal waste on domestic waste (tonnes/year) linear	193,856	209,741	214,985	220,360	225,868	231,515	237,303	243,236	249,317	255,549	261,938	268,487
Share of recyclable inorganic waste on domestic waste (tonnes/year)linear	22,957	24,838	25,459	29,095	26,748	27,416	28,102	28,804	29,524	30,262	31,019	31,794
Shate of recyclable inorganic waste on domestic waste (tonnes/year) difference	156,968	191,060	213,244	231,957	251,473	271,819	293,029	315,123	338,142	362,115	387,075	423,926
Share of recyclable inorganic waste on waste (tonnes/year) linear	63,768	68,994	70,719	72,487	74,299	76,156	78,060	80,012	82,012	84,062	86,164	88,318
Share of recyclable inorganic waste on waste (tonnes/year) lincar	4,905	5,307	5,440	5,576	5,715	5,858	6,005	6,155	6,309	6,466	6,628	6,794
Share of recyclable inorganic waste on waste (tonnes/year) difference	73,579	86,242	95,198	104,548	114,306	124,486	135,104	146,175	157,715	161,658	165,700	169,842
Share of recyclable vegetal waste on total collected waste (%)	37.0	35.1	33.7	32.5	31.4	30.4	29.5	28.6	27.8	27.4	26.9	26.3
Share of recyclable vegetal waste on total collected waste (tonnes/year)	257,624	278,735	285,704	929,846	300,167	307,672	315,363	323,247	331,329	339,612	348,102	356,805
Recycled share of vegetal waste on total collected waste (tonnes/year)	140,000	150,000	160,000	170,000	180,000	190,000	200,000	210,000	220,000	230,000	240,000	250,000
Share of recyclable inorganic waste on total collected waste (%)	37.1	38.7	40,0	40.9	41.7	42.5	43.2	43.9	44.6	45.1	45.7	46.5
Share of recyclable inorganic waste on total collected waste (tonnes/year)	258,409	307,447	339,341	368,177	398,242	429,580	462,237	496,257	531,690	560,502	590,421	632,357
Recycled share of inorganic waste (tonnes/year)	129,205	153,724	169,671	184,088	199,121	214,790	231,118	248,129	265,845	280,251	295,211	316,178
Recycled share (%)	38.6	38.3	38.8	39.3	39.7	40.1	40.3	40.6	40.7	41.1	41.4	41.7
Recycled share (tonnes)	269,205	303,724	329,671	354,088	379,121	404,790	431,118	458,129	485,845	510,251	535,211	566,178
Input at dump site (tonnes/year)	427,343	489,706	518,954	546,419	575,334	605,746	637,7.6	671,268	706,484	731,285	757,248	792,560

Total input waste (tonnes/year) 10,017,996

Total input with soil cover requirement soil/waste = 1 : 6 (tonnes) 11,687,662

Quantity and waste generations in Cambodia in 1998

No.	City/Prov. town	Population		Waste Management						
		Whole Population	Provincial Town pop.	Quantity of waste (Tones/day)	Density of waste (kg/m^3)	waste generation (kg/person/day)	Transport to dump site	Opened burn or dump in ground	Dispose in lake & river	Capacity of dump site
1.	Phnom Penh	1,070,000		510	450	0.72				8 ha
2.	Sihanoukville	124,644	10,020	10.5	230	0.72				None
3.	Battambang	773,608	134,887	21	225	0.65	70%	16%	13%	$35,000m^2$
4.	Siem Reap	637,451	84,579	6	175	0.50	68%	11%	20%	None
5.	Kampong Cham	1,491,339	41,162	40	225	0.75				2km x 500m
6.	Kampot	489,933	30,204	10	290	0.68				None
7.	Banteay Meanchey	904,256	6,047	5.5			57%	28%	14%	
8.	Porsat	357,175	53,905	4.5			59%	40%	1%	
9.	Kampong Chnnang	415,046	41,469	3			20%	49%	31%	
10.	Kampong Speu	598,101		3			92%	3%		
11.	Takeo		34,992	9			70%	10%		
12.	Kandal		48,628	15			60%	35%		
13.	Kep			1.5						
14.	Svay Reang		20,841	1.5			80%	10%		
15.	Prey Veng		52,007	3			60%	10%		N/A
16.	Pay Lin	37,000		2.5			80%	20%		
17.	Kampong Thom	N/A	N/A				N/A	N/A	N/A	N/A
18.	Prach Vihea	N/A	N/A	5			N/A	N/A	N/A	N/A
19.	Steng Treng	N/A	N/A				N/A	N/A	N/A	N/A
20.	Rattakin	N/A	N/A				N/A	N/A	N/A	N/A
21.	Mondulkin	N/A	N/A				N/A	N/A	N/A	N/A

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Development of the new Phnom Penh dump site

Cost estimates

	Quantity	Unit	US$/Unit	US$
Site Development costs				
1. Detail planning				500,000
2. Aquisition of site				
Dump area	764,400	m^2	2.00	1,528,800
Protecting zone	107,100	m^2	2.00	214,200
Operating zone	82,350	m^2	2.00	164,700
Recycling zone	131,150	m^2	2.00	262,300
SUBTOTAL	1,085,000	m^2	2.00	2,170,000
3. General development				
Land clearing of trees and brush	423,500	m^2	0.03	12,705
Access road:				
Bitumen existing road (2.6 km, 6m width)	15,600	m^2	16.00	249,600
Build new bitumen road (100 m)	600	m^2	33.00	19,800
Internal roads (550 m)	3,300	m^2	33.00	108,900
Soil replenishment,receiving area (haul, grading,compaction)	34,000	m^2	7.20	244,800
4. Base Preparation, 1 dump section				
Soil replenishment (haul, grading, compaction):				
Base 1. dump section (0.5 m height)	93,600	m^3	7.20	673,920
Optional B: General slope (0.5%)	140,400	m^3	7.20	1,010,880
Lengthwise slope of drainage section (2%)	584,064	m^3	7.20	4,205,261
Crosswise slope (3%)	131,040	m^3	7.20	943,488
Surface water interception channel (2 m deep)	2,000	m	3.20	6,400
4.1 Sealing system :				
Version A: Clay liner, 0.5 m depth				
Clay 0.5 m (haul, grading, compaction)	93,600	m^3	10.00	936,000
Version B: Plastic membrane				
Soil replenishment 0.25 m (haul, grading, compaction)	46,800	m^3	7.20	336,960
Clay 0.25 m (haul, grading, compaction)	46,800	m^3	10.00	468,000
Plastic membrane 2.5 mm (haul, sealing, testing)	187,200	m^2	20.00	3,744,000
			Subtotal	4,548,960
Geotextile above sealing system	187,200	m^2	3.00	561,600
Leachate drainage gravel layer 0.3 m	61,776	m^3	8.00	494,208
5. Leachate system				
Collection pipes 300 mm, perforated	1,872	m	30.00	56,160
Transportation pipes 300 mm, non perforated	1,250	m	30.00	37,500
Optional A Leachate pumping station	1	No.	50,000.00	50,000
Leachate collection pool				
Excavation of soil (stockpile as cover material for 1. dump section and embankments	80,000	m^3	0.80	64,000
Lining with 0.25 m clay and plastic membrane	32,400	m^2	22.50	729,000
5.1 Leachate treatment				
Treatment basins (concrete) biological step	3	No.	50,000.00	150,000
Aerator	3	No.	22,000.00	66,000

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Intermediate storage basin	1	No.	20,000.00	20,000
Activated carbon filter	2	No.	50,000.00	100,000
Technical equipment (pums. pipes etc.)	1	Set	80,000.00	80,000
5.2 Leachate discharge				
Treated leachate transmission (300 mm pipe)	1,000	m	30.00	30,000
6. Fencing				
Litter fence	1,200	m	30.00	36,000
Perimeter security fence	4,500	m	30.00	135,000
Gates and gate posts	1	Set	300.00	300
7. Landscaping				
Tree planting along perimeter	3	No.	600.00	1,800
8. Entrance and operating area				
8.1 Construction works				
Control, office and workshop building, complete 10m x 40m	1	No.	120,000.00	120,000
Surface sealing, bitumen	2,000	M^2	33.00	66,000
Surface sealing, gravel	4,200	M^2	5.00	21,000
8.2 Performance control				
Road vehicle weighbridges	2	No.	30,000.00	60,000
Computer euipment	1	Sum.	3,000.00	3,000
8.3 Overall site requirements				
Office furniture etc.	1	Sum.	4,000.00	4,000
Radio and telephone network	1	Sum.	6,000.00	6,000
Water supply	1	Sum.	10,000.00	10,000
Monitoring well for groundwater	5	No.	3,000.00	15,000
Area Lights	1	Sum.	40,000.00	40,000
Power supply	1	Sum.	80,000.00	80,000
Truck washing facility	1	No.	4,000.00	4,000
9. Design and construction supervision	0	Total		362,353
10. Site Equipment costs				
Compactor	2	No.	200,000.00	400,000
Bulldozer	2	No.	150,000.00	300,000
Wheeled loader	1	No.	100,000.00	100,000
Water tank truck	1	No.	40,000.00	40,000
Open tipper	2	No.	40,000.00	80,000
Small Pickup truck	2	No.	15,000.00	30,000
Firefighting Equipment	1	Set	5,000.00	5,000
Repair Tools, welding equipment etc.	1	Sum.	10,000.00	10,000

Total site development costs :

A: 0.5m clay sealing, with leachate pumping : 12,268,795

B: Combined clay plastic membrane sealing without leachate pumping : 24,089,696

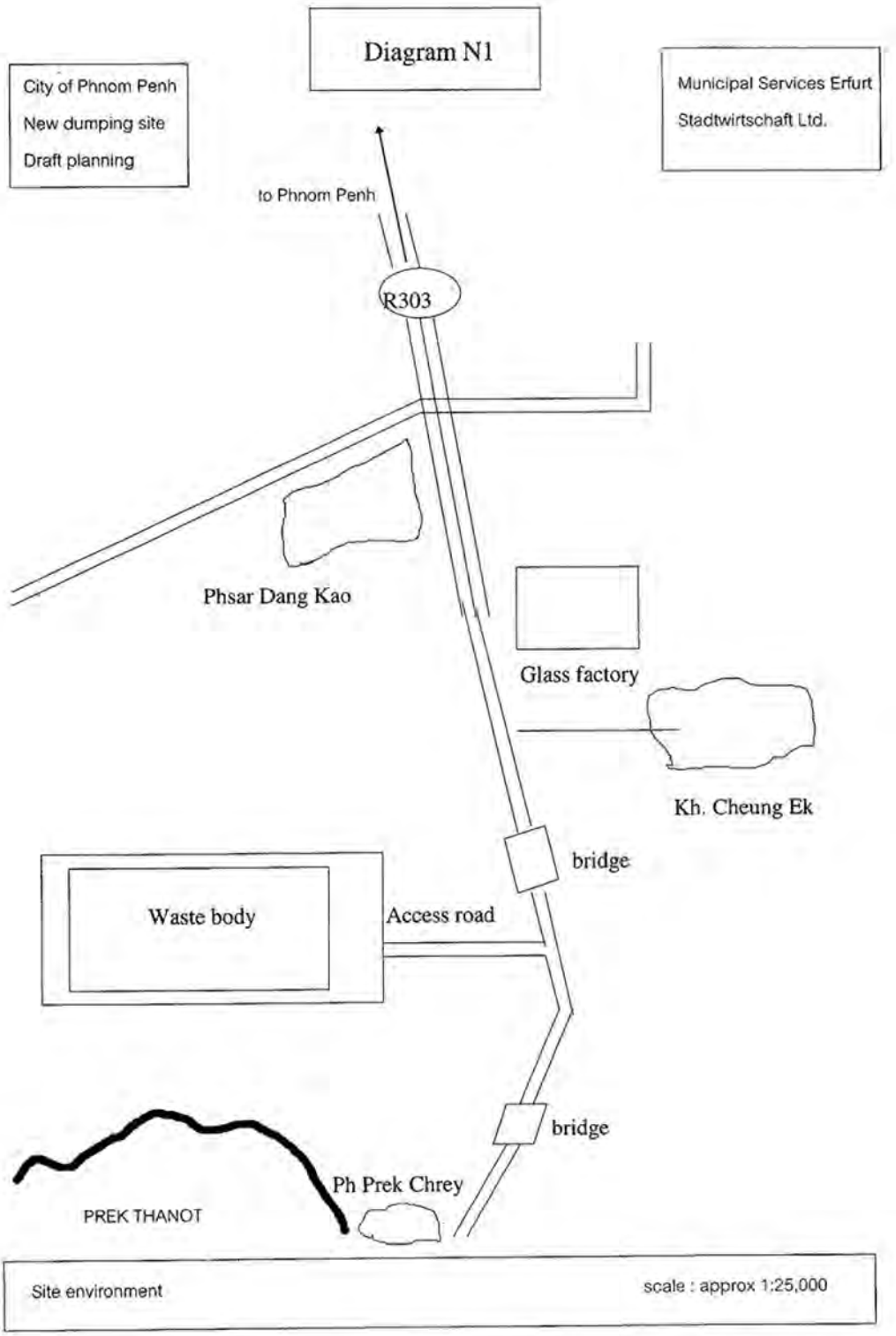
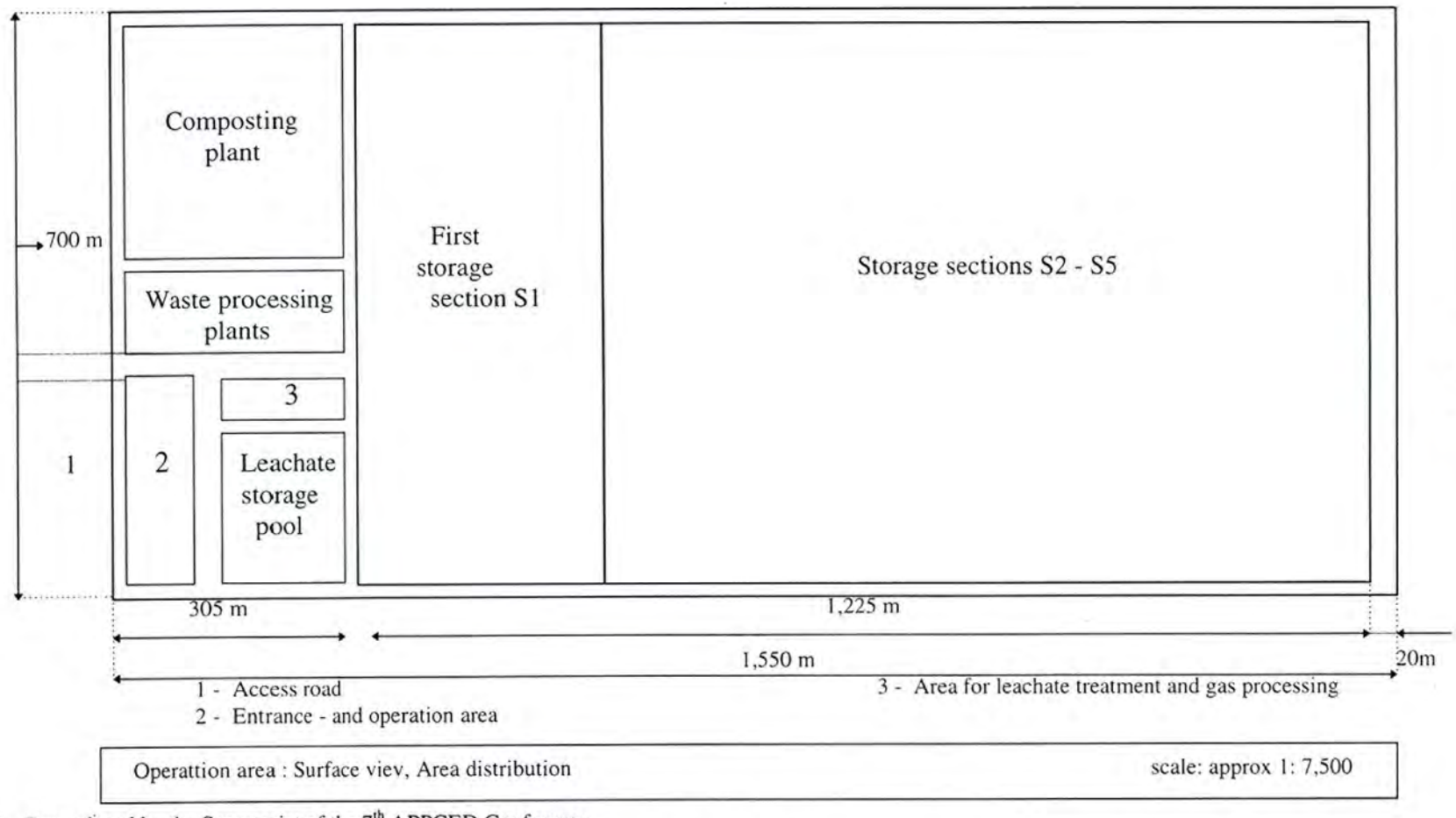


Diagram N1
City of Phnom Penh
New dumping site
Draft planning
Municipal Services Erfurt
Stadtwirtschaft Ltd.
to Phnom Penh
R303
Phsar Dang Kao
Glass factory
Kh. Cheung Ek
bridge
Waste body
Access road
bridge
Ph Prek Chrey
PREK THANOT
Site environment
scale : approx 1:25,000



Operattion area : Surface viev, Area distribution — scale: approx 1: 7,500

* Reproduced by the Secretariat of the 7th APPCED Conference.

** Some information in the top part of the document was missing at the time the Thai National Assembly received it from the Cambodia Delegation.

City of Phnom Penh
Stung Mean Chey dumping site
Draft planning

Diagram S3

Municipal Services Erfurt
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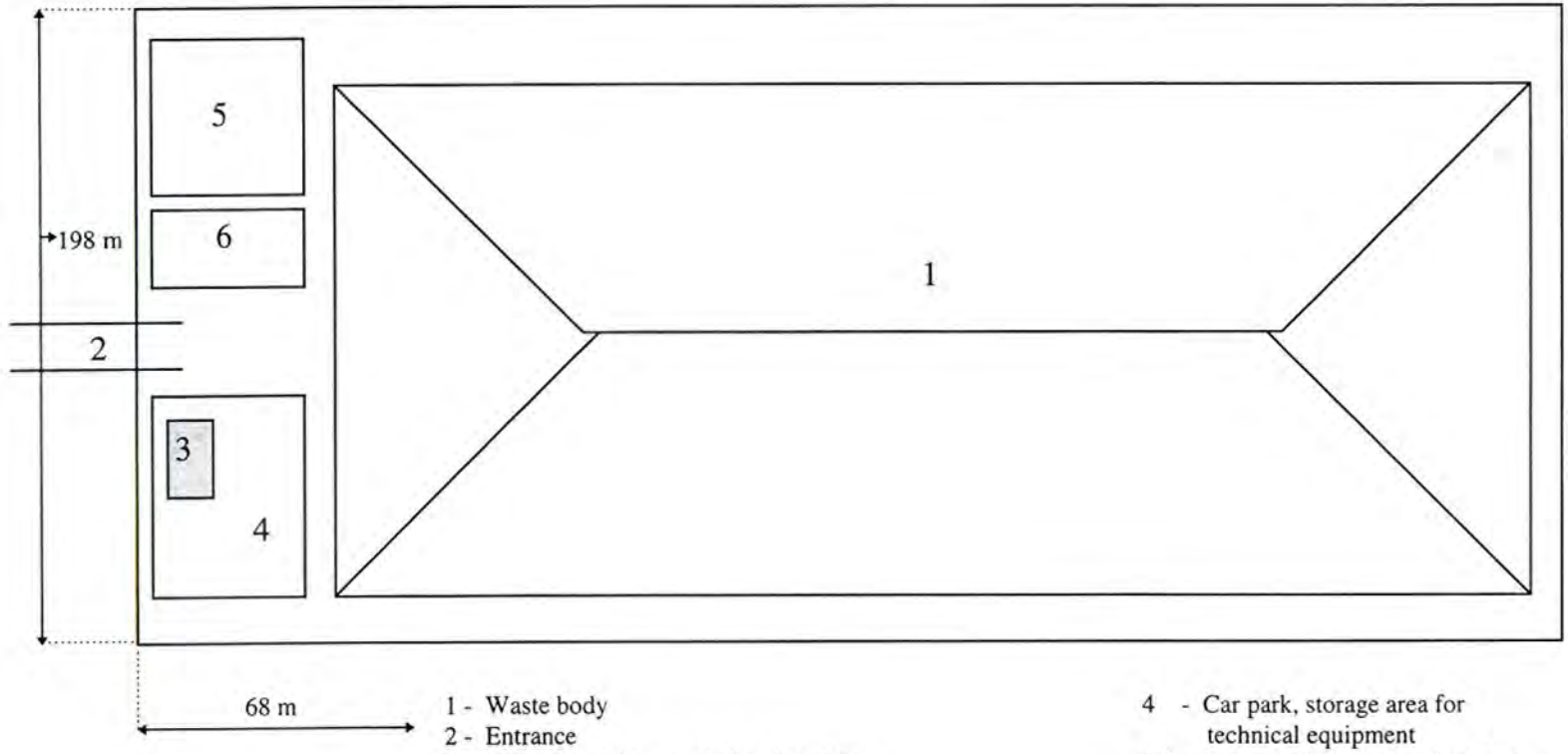

1 - Waste body
2 - Entrance
3 - Control-, office-, workshop building
4 - Car park, storage area for technical equipment
5,6 - Composting - and sorting plant

G-4
APPCED/7/GA/Country rep. 1

Canada
Domestic Waste Management in Canada

Introduction

Accelerated economic growth in Asian and Pacific countries, together with globalization, has stimulated the development of cities and led to population migrations into the major urban centres. It is estimated that by 2015, 65% of the population of Asia and the Pacific will live in cities.(1) This has not come about without causing some of the urban problems that are already familiar to Western countries, including constraints placed on the environment. The production and management of solid waste, in particular, have resulted in serious environmental, social and economic problems, which Canada has not escaped.

From an economic standpoint, the elimination of solid waste requires substantial investments by municipalities (more than $3 billion in Canada in 1995(2)). From a social perspective, the issues surrounding landfill and incineration often arouse passionate debate at the local level. There are two main concerns about the environment: gas emissions and leachates from landfill sites; and incinerator emissions and ash reduction. Fortunately, waste management is now taken very seriously by the various levels of government. With the help of technology, new integrated management solutions are being successfully implemented.

This document provides an overview of government responsibilities for solid waste management in Canada. The various stages of waste management - from collection to landfill and incineration - are outlined. Tables are used to illustrate new and innovative actions taken in various regions of Canada.

Solid Waste Management Tools

A. The Canadian Situation

The management of waste produced in urban areas is one of the major challenges facing Canadians. The quantity of waste generated in this country is

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(1) Environment Canada website, The Effects of Urbanization on APEC Member States: Facts and Figures, October 1998.

(2) Environment Canada, The State of the Environment in Canada - 1996, Ottawa, 1996, p. 12 - 21.

impressive: 21 million tonnes of solid waste in 1995, the equivalent of 1.7 kg per person per day.(3) This figure includes the following annual quantities: 425 million litres of lubricating oil, nine gallons of hazardous waste and 10 kg of all types of plastic per household, as well as 6.6 million tonnes of waste generated by businesses. (4) If waste from demolition and construction sites is included, the figure totals 29.3 million tonnes of solid waste in 1992, making Canada one of the largest producers of urban solid waste in the world.(5)

Municipalities are thus dealing with landfill sites that are quickly filling to capacity, diminishing space for new sites and increasing management costs. A 1991 Canadian government report estimated that the landfill sites serving 70% of the Canadian population would be filled to capacity by the end of the decade *(The State of the Environment in Canada, 1991).* Whether we cut waste production at its source or manage landfill sites differently, finding solutions is a major issue.

B. Provincial and Municipal Powers

Although the federal government has certain powers over the import, export and labelling of packaging, the regulation of waste management falls under provincial jurisdiction. The regulations adopted, whose number, scope and content vary with each province, concern aspects such as the management, recovery, development and elimination of waste of all kinds, as well as public education and participation, research and support for businesses (see section below entitled "The Three Rs: Reduce, Re-use, Recycle").

C. Federal Authority : the National Packaging Protocol and Incineration Guidelines

In Canada, packaging represents one-third of all solid waste generated by municipalities. The Canadian Council of Ministers of the Environment (CCME) has adopted a guide for packaging management, the National Packaging Protocol. (NPP, 1990), intended for municipalities and signed by Environment Canada on behalf of the federal government. The Protocols objectives are the reduction of discarded packaging waste: by 20% for 1992, 35% for 1996 and 50% for the year 2000. This reduction must be achieved through at-source reduction and re-utilization initiatives. The CCMEs National Packaging Task Force has also coordinated a number of activities involved in the Protocols implementation, which have given rise to other tools. Perhaps the most important is the action plan of the Federation of Canadian Municipalities (FCM), whose overall objective is to ensure that NAPP policies are complied with and that its objectives are achieved. The FCMs *Packaging Waste Reduction Guide* (6) is offered to all Canadian municipalities to help them reduce packaging waste, in particular by adopting effective supply practices. There are many other tools for managing these types of waste, such as the Canadian Code of Preferred

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(3) *CMHC, The Ecological City : Canadas Overview, Federation of Canadian Municipalities, 163 p. + appendices, May 1995.*

(4) *Website of the Recycling Council of Ontario, Fast Facts in the Communities - General Information, November 1998.*

(5) *Government of Canada, The State of the Environment in Canada, 1996.*

(6) *Federation of Canadian Municipalities. Packaging Waste Reduction Guide, 25 p.*

Packaging Practices, the Packaging Audit and Packaging Reduction Plan Guidelines, Environmental Profiles, the Guidelines for Achieving the Objectives of the National Packaging Protocol by Business, and the NAPP Bulletin.

A 1996 survey revealed that the quantity of non-recyclable packaging discarded in Canada had fallen by 51% from the reference figures established in 1988 by the National Packaging Task Force. Canadas reduction objective was thus achieved four years before the year 2000, the deadline set in the *National Packaging Protocol.*

In addition to signing the *National Packaging Protocol,* Environment Canada supports and facilitates other waste reduction activities and monitoring, develops and disseminates information, and supports 3R-technology transfer. The department provides financial assistance for research and development for new waste management technology and promotes products that have a reduced impact on waste management through environmental certification as part of the Environmental Choice Program. The greening of federal government operations has included the establishment of waste reduction and recycling programs.(7)

At the national level, the Canadian Council of Ministers of the Environment (CCME) Waste Committee in 1989 produced *Operating and Emission Guidelines for Municipal Solid Waste Incinerators,* designed to help municipalities manage their existing domestic waste incinerators or to build new plants.(8) These guidelines are especially designed for energy produced from waste incinerators fired with municipal solid waste; these offer the opportunity to reduce the amount of material that must ultimately be landfilled while at the same time producing usable energy. The guidelines detail strict procedures and standards for the releases of flue gas, ash residues from combustion, emission control processes and, to a lesser extent, processing wastewater. They also recognize the important roles that reduction, recovery, recycling and reuse must play in the control and disposal of municipal waste. Furthermore, the guidelines recommended a ban on new small-scale residential, commercial, and institutional incinerators that cannot meet minimum combustion requirements, and the phasing out of existing systems that do not meet the minimum standards.

THE THREE RS: REDUCE, RE-USE, RECYCLE

With the help of provincial, territorial and municipal governments, countless initiatives have been introduced for implementing the principles of the 3 Rs (to reduce, reuse and recycle household waste products). Waste was reduced by 23% per capita across Canada between 1988 and 1994 as a result of such programs. Governments encouraged and promoted waste reduction by passing legislation and regulations, creating and supporting infrastructures and developing education programs, all designed to promote use of the 3Rs in all sectors. Each province implemented its own particular processes. For example, Quebec has just brought in a new action plan, (see section below) which replaces the former waste policy introduced in 1989. The following examples of initiatives clearly illustrate Canada's commitment to waste

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(7) CCME, Solid Waste, CCME internet site, October 1999.

(8) CCME, Operating and Emission Guidelines for Municipal Solid Waste Incinerators, Report CCME-TS/WM-TRE003, June 1989, 37 p.

management, whether it be through comprehensive management plans, selective collection programs, waste matter recycling, composting or deposit-return systems for beverage containers.

Examples of Solid Waste Management In Canada

Quebec Waste Matter Management Action Plan 1998 – 2008
The Action Plan replaces the 1989 government policy on integrated solid waste management *(Waste matter: any matter or old object discarded or rejected by Quebec households, industries, businesses and institutions, except hazardous materials discarded by industries, businesses and institutions, biomedical waste and industrial waste from pulp and paper mills)* **Objectives:** - Waste matter management planning - Citizen participation - Education and information - Research and development - Support for social economic businesses - Recovery and development of waste matter - Elimination of waste through methods listed in order of priority - Role of society in recovery and recycling (Recyc-Quebec) -Implementation follow-up **Job creation:** 8,748 jobs maintained through Action Plan implementation and net creation of 1,852 new jobs over several years. **Financial impact:** - All waste matter management activities (removal, transportation, recovery, treatment, repair, recycling, composting, energy conversion, landfill, incineration) contributing nearly $1 billion a year - Total financial impact of Quebec Action Plan: $65 million - Annual government contribution to Action Plan implementation: $16 million a year

Source: Quebec Department of the Environment and Wildlife, Quebec Waste Matter Management Action Plan 1998 - 2008, Web site: www.mef.gouv.qc.ca, October 1999

A. Selective Collection Systems

Selective collection involves recovering waste matter for re-use: it consists of collecting materials thought curbside pick-up, drop boxes and municipal depots.(9) Most major Canadian cities now have a selective collection system for the recovery and re-use of waste matter (see the example of a selective collection program below) whereby citizens sort their waste into various categories, such as tin cans, glass bottles and jars, rigid plastic containers, styrofoam containers, aluminium foil, empty paint containers and aerosol cans and milk, soft drink and juice cartons. The types of materials collected vary from city to city. A number of cities also offer the opportunity to dispose of hazardous domestic materials (batteries, motor oil, paint, pesticides, chemicals, etc.) at a collection centre. As a result of these initiatives, more

(9) *Quebec Department of the Environment and Wildlife, Quebec Waste Matter Management Action plan 1998-2008-glossary, Website www.mef.gouv.gc.ca, October 1999.*

and more frequently it is only non-toxic wastes that are being disposed of in landfill sites; this prolongs their useful life and reduces any harmful impact on the environment.

Example of a Selective Collection Program

Ontarios Blue Box Program
Program for the collection of at least seven types of materials, introduced by the provincial government in 1985 in accordance with the waste management regulations for every municipality of more than 5,000 inhabitants - 90% of the population has access to this program. **Success:** In 1997, through the 3Rs reduction, reuse and recycling -- Ontario municipalities diverted 1.14 million tonnes of waste from disposal in landfill sites, an 11% increase over 1996. **Financial contribution:** Ontario has invested $210 million in the programs implementation, municipalities $340 million and industry $41 million. The program costs an average of $14 per household per year.

Source: Ontario Ministry of the Environment, Ontario Blue Box Program, www.ene.gov.on.ca, October 1999

B. Recycling

Recycling consists of replacing raw material with used material in a manufacturing process. The new product may be identical to the first (old newspapers recycled into new newsprint) or completely different from it (plastic bags made into garden furniture). The recycling industry has existed in Canada since early in the century, when used rags and cellulose materials were even then being used to make paper, and bone meal fertilizer was produced from slaughterhouse carcasses. Similarly, recycled metal has long been used in Canada's industrial processes.

Recycling of household waste started later, however, gaining ground in the mid 1980s.(10) Today, at least 53% of households (5,200,000 households) take advantage of some kind of recycling activity, and more than 2 million of them take part in a municipal program that includes the collection of recyclable materials. These waste materials are picked up separately from the non-recyclable waste and taken to a centre where they are sorted, made into bales and sold to the processing industries. The table below describes a Canadian sorting centre that successfully recycles household waste.

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(10) William Murray, Waste Management in Canada, Science and Technology Division, Parliamentary Research Branch, Library of Parliament, Ottawa, 16 December 1993.

Examples of a Recycling Program

The Integrated Management Plan of the City of Edmonton, Alberta

Description

Edmontons first sorting centre, opened in 1996, diverted 14% of household waste from landfill. 18% of household waste will be diverted with the opening of the new Materials Recovery Facility (1999).

Size of plant - 5,920 square metres; can process 40,000 tonnes of recyclables per year, collected from Edmontons new blue bag program and the community depots

Technologies:
- mixed sorting (manual and automated)
- residents can use bags, which carry more waste than boxes
- vibrating conveyor separates wastes
- magnetic trommel

Job creation:
- 46 full-time staff

Program costs:
Total cost $12.5 million
Cost of the recycling program is competitive with landfill disposal on a lifecycle cost analysis basis.

Financial impact:
- Edmonton will receive 75% of all gross revenues from the sales.
- Edmonton will pay from $90 to $96 per tonne of recyclables processed.
- Estimate of total gross revenues -$1 million per year.

Source: Connie Vitello, Integrated Waste Management, Solid Waste and Recycling, August/September 1999, p.16

C. Composting

Composting is a biochemical treatment method in which aerobic micro-organisms rapidly decompose materials that can rot under controlled conditions of aeration, temperature and humidity; the end product is an organic, biologically stable, hygienic, humus-rich soil additive called compost. Across the country, composting is attracting increased attention as an environmentally sound way to manage yard waste as well as industrial sludge. Composting turns organic waste into a superior soil conditioner or mulch suitable for most landscaping and gardening uses.(11)

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(11) Environment Canada, *Composting,* The Green Lane website, October 1999.

In Ontario, for example, composting of leaves and yard waste is mandatory in all municipalities with more than 50,000 residents.

D. Deposit-Return

Except for Ontario and Manitoba, Canadian provinces encourage beverage container recycling through deposit-return programs for aluminum cans, large and small glass and plastic containers, large and small alcoholic beverage containers, and beer bottles. The deposit-return principle involves collecting a deposit, which is refundable in whole or in part, when a product is purchased, to promote post-consumption recovery; as a result, beverage producers have greater responsibility for the containers they use. The funds generated by this type of program go toward paying for recycling centres which receive operating allowances for collecting beverage containers and in many cases agree to pick up other recyclable materials.

In all ten provinces, beer bottles are also collected via deposit-return systems because of either government mandate or industry self-regulation.(12) Refundable deposits are used to manage refillable containers, which dominate the beer market almost exclusively - for example, milk containers are not part of any such system. The high rates of recovery and recycling of cans and bottles in Canada has resulted in a significant reduction in beverage container waste.

Sanitary Landfill Sites

The concerns of the past few years have led managers to change their procedures for burying waste. In addition to social concerns and the problems of finding sites, the contamination of the areas adjacent to landfill sites is a significant environmental issue. Methane is emitted from decaying organic matter, volatile organic compounds are released from plastics, and toxins leak into groundwater. As a result, new requirements for sanitary landfill have been established across the country. These requirements focus in particular on the collection of leachates(13) so as to protect the immediate environment, the development of watertight sites to protect groundwater, and the collection and safe evacuation of bio-gases. Many existing landfill sites take advantage of the soil's ability to filter out substances and purify leachates. However, sites increasingly have water collection and treatment equipment (see the example of a model landfill site below). Efforts are being made to ensure that sites are developed in accordance with strict rules, far from sources of drinking water and in such a way that they do not pose a threat to everyday life. Waste matter that cannot be reduced at source, recycled or recovered will thus be eliminated in a way that is safer for the environment and for human health.

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(12) Container Recycling Institute, Beverage Container Rouse and Recycling in Canada - Executive Summary, Internet Site, October 1999.

(13) Leachate : water that has seeped through waste material.

Example of a New Generation Landfill Site

Centre technologique AES inc. Mobile Landfill Site, Chicoutimi, Quebec

Description: A world first - Sites total life expectancy : 30 years - Eight cells - Total volume authorized: 1,730,991 m3- total area authorized: 14,09 ha-estimated annual weight: 30 tonnes-serves 173,372 persons.

Innovative technologies:

- Mobile building on rails covering the eight cells to limit the disadvantages associated with landfill sites (spread of waste, odours, seagulls)
- The cells can be isolated for research purposes: accelerated stabilization
- System for recovering drained leachate to a treatment plant to be recirculated in residue to accelerate decomposition
- Concrete tunnel separating the cells into two groups for easier access and containing three piping systems: groundwater circulation system, gas leaks detection system, leachate collection system
- Management of biogases, which are collected and burned, with the heat thus produced being used in the leachate treatment process
- Cell dampproofing system consisting of two alternating layers of geocomposite membrane and sand
- Composting platform (to come) and resourcing centre (operated by the city)

Project cost:

$53 a tonne (in 1998 dollars) on a 20-year contractual basis. This amount includes construction, opening, closing and environmental monitoring for 15 years.

Source: Quebec Department of the Environment and Wildlife, Centre technologique AES Inc., personal correspondence, November 1998.

Incineration of waste

In many countries like Canada, municipal garbage has traditionally been buried in landfills. However, in view of the increasing cost of landfill operations and site maintenance, the filling up of existing sites, and the high price of land near urban areas, incineration of domestic waste has become an interesting alternative, particularly when used in combination with efficient recycling programs. Technological improvements, and its potential for producing energy from waste, have also helped promote incineration.

A. An Overview of Incineration World-Wide

As illustrated in Table 1, Japan and countries of Western Europe rely a great deal on incineration for disposing of domestic waste. In Japan, 76% of municipal solid waste is burned in incinerators. Within the European Union, the two main methods of disposing of waste are landfilling (69% in 1990) and incineration (18% in

1990).(14) Since the European Union (EU) now requires landfill operations to be strictly curtailed, however, there may be a growth of incineration in that community. In some countries, for example Sweden, incineration of waste is also a major source of usable energy, providing enough to heat as many as 250,000 houses; the use of oil and gas, and the emission of greenhouse gases are reduced accordingly.(15) France had announced plans to build 100 new solid waste incinerators by the year 2002, but some organization are now calling for a moratorium on the construction of new incinerators. (16)

Table 1
Rate of Domestic Waste Incineration in Selected Countries

Country	Rate of incineration (%)
Japan	76
Switzerland	59
Belgium	54
Denmark	48
Sweden	47
France	42
United States	16
Canada	8

In the U.S., the 1980s saw tremendous growth in the solid waste incineration industry. In 1980, the U.S. was burning only 1.8% of its solid waste but by 1990 that had grown to 15.2% and the U.S. Environmental Protection Agency (EPA) estimated that by the year 2000 it would have grown to 21%. However, some operating incinerators were prematurely shut down, such as that at Glen Cove, Long Island, which closed in 1991 after only eight years of service.

In Canada, the use of incineration for disposing of domestic waste is rather limited (only 8%). The main municipal waste incinerators are located in Burnaby, B.C.; London and Brampton, Ontario; Quebec City, Quebec; Cape Breton County, N.S.; and P.E.I. The Burnaby and Quebec City incinerators are the largest with a respective capacity of about of 700 and 1,000 tonnes of waste per day.(17) The smallest incinerator is located in P.E.I. and has a capacity of 100 tonnes par day.

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(14) *The European Commission, Waste: Facts and trends, Directorate General X1 on Environment,* Nuclear Safety and Civil Protection, 1998, Electronic Document at: http://europa.eu.int/comm/dg11/waste/facts-en.htm#facts (information was updated on 8/5/98).

(15) Stephane Gagne, Le recyclage du papier pollue, La Presse, 31 August 1997, p. B12.

(16) Incineration News, Rachels Environment & Health Weekly, #592, 2 April 1998, Electronic Edition at: http://www.rachel.org.

(17) Robert Gilbert, Incineration in Canada: Prospects for Energy-from-Waste, Solid Waste and Recycling, October/November 1998, p.12.

All these currently operating incinerators are highly efficient, whether for burning municipal waste, producing steam delivered to nearby industries (the Burnaby incinerator), or in the production of electricity (Brampton and Cape Breton incinerators). The bottom ash produced in the primary chamber, generally representing 10 to 20% of the initial waste volume incinerated, is most often landfilled, but in the case of Burnaby it has received environmental approval for use as a road sub-base material.

B. Incineration of Domestic Waste: Good or Bad for the Environment

Some experts credit municipal waste incineration with many advantages; they claim:

- *It reduces the volume of waste. This is important as it can significantly reduce our reliance on landfills. Landfills are overflowing, and it is becoming virtually impossible to site new ones.*
- *Incineration can produce energy in the form of electricity, steam or hot water. This saves the use of non-renewable fossil fuels; a comparative study of the pollutants emitted by different types of power plants has shown that emissions from waste incinerators are either lower than or equivalent to the emissions from oil-and coal-powered generation facilities.*
- *Incineration results in an over-all reduction in the emission of hazardous materials into our environment. Combustion destroys organic compounds, including rotting and hazardous wastes, thus reducing the net amount of toxic material in the waste. Once burned, waste neither leaks fluids nor emits gases.(18)*

However, incineration of domestic waste also has negative effects. It is known to contribute to the emission of toxic contaminants and particles such as volatile organic compounds (VOC), nitrogen oxide (No_X), and sulphur dioxide (SO_2) Carcinogenic (Cancercausing) and other toxic chemicals released from the smoke stacks of incinerators include heavy metals (such as arsenic, lead, cadmium, mercury, chromium and beryllium); acid gases, including hydrogen fluoride; partially burned organic material such as polyvinyl chloride (PVC), herbicide residues, and wood preservatives; and other organic chemicals, including polycyclic aromatic hydrocarbons (PAHs); and dioxins and furans. One recent analysis identified 192 volatile organic compounds being emitted by a solid waste incinerator. Several PAHs and dioxins and furans are known or suspected human carcinogens, the first of these having been identified as known human carcinogens by the World Health Organization in 1997.(19) In January 1998, three French solid waste incinerators were closed when milk from cows on nearby dairy farms was found to be contaminated with excessive levels of dioxins.(20) Fairly high concentration of dioxins were also found in samples of beef and veal in France, as had been found earlier in the Netherlands and Germany.(21)

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(18) Hans Tammemagi, Waste Incineration Is a Sure-Fire Option," The Toronto Star, Wednesday 2 August 1995, p. A19.

(19) Rechels Environment & Health Weekly (1998).

(20) Ibid.

(21) Dioxines dans la viande," La Presse, Tuesday, 26 May 1998, p. A15.

Another important problem is that the incineration of waste produces as much as one third of the waste (by weight) in the form of bottom ash and slag, which must be landfilled. Moreover, the flue ash captured by the air pollution equipment is often the contaminated with heavy metals, and must consequently be treated at great expense at a hazardous waste disposal facility.(22)

The choice of incineration for disposal of domestic waste may also hinder recycling and composting programs by burning potentially valuable materials; in this way we lose the opportunity to become a society that conserves its resources and produces less waste. Not only does it cost more to build and maintain these facilities than to have landfills, incinerators need a constant, ample supply of mixed waste. Burning this material as fuel may often compete with and undermine the principles of the 3Rs (reduce, reuse, recycle); for instance, it has been estimated that in the U.S. 76% of materials burned in municipal waste incinerators could be recycled or composted. In planning to have incineration as part of a municipal waste management program, careful consideration must be given to the recycling potential of many materials.

Although incineration still remains controversial among the public, pilot testing in Canada and elsewhere has shown that modern high-temperature incineration methods, coupled with efficient emission controls, could largely overcome air emissions problems. If incineration is to become more acceptable to the public and with respect to its effect on the environment, it has been proposed that it be implemented under the following conditions"(23)

An incinerator must not compete with the recycling industry.

Incinerators must be designed to create useful energy.

State-of-the-art pollution control devices must be used.

Incinerator ash must be properly managed. Because the toxic components will be concentrated into a smaller and more homogeneous volume, it would be feasible to encapsulate the ash in a sturdy, leach-resistant form shah as cement. This final product would be far more suitable for disposal than the untreated garbage.

Local residents must be stockholders in the process. They must have decision-making power in areas that affect their health.

Conclusion: Integrated Solid Waste Management in Urban Centres

In Canada, as in many other countries, government authorities have made a considerable effort to reduce, reuse and recycle the solid waste produced in urban centres. The phenomenal growth of household and industrial recycling and composting over the past 15 years has decreased the volume of waste going to landfills and incinerators. The highest rate of recovery is for metals, paper, cardboard and glass, but other materials, particularly the various types of plastic, are increasingly being collected by recycling firms. Significant progress has also been made with

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(23) Tammernagi (1995)

regard to construction and demolition waste. Furthermore, breakthroughs in technology mean that it is now possible to mitigate the environmental impact of burying or incinerating solid waste. Incorporating the views of the public more fully may make these options more socially acceptable.

The progress made at all levels in waste management in recent years demonstrates the importance of adopting an integrated vision and planning process for SWM. For example, we would certainly be travelling down the wrong path if we were to authorize the construction of a new, high-performance incinerate which, in the name of profit, stopped the re-ues or re-cycling of certain materials. Integrated waste management involves considering all the sources of waste material - domestic, industrial, commercial or institutional. All those involved, including the general public, must be closely involved in the development of waste management plans to ensure that they are comprehensive and adhere to the approaches, objectives and methods identified for recovering as much as possible of the waste generated in the area.

Integrated solid waste management can be defined as:

An optimized system of waste management practices for a given jurisdiction, based on the sound evaluation of site-specific environmental, energy, economic and socio-political considerations, which includes one or more waste management options.(24)

It is now up to the government authorities responsible for these issues to ensure that this approach is central to any waste management policy within the context of sustainable development.

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(24) Environment Canada, Integrated Solid Waste Management," Ecocycle, Issue 6 - Spring/Summer 1998 (available on the Environment Canada web site at: http://www.ec.gc.ca/ecocycle/english/framesete.htm

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China
Mr. Wang Tao
Leader of the Chinese Delegation

First of all, please allow me, on behalf of the delegation of the National People's Congress of the People's Republic of China, to extend my warmest congratulation on the convening of the 7th General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development. I also wish to express my heartfelt thanks to the kind hospitalities and warm reception accorded us by the host, Thai National Assembly. According to the proceeding of this General Assembly, I would like to present a brief report on the progress that China has made in terms of environment and development and explore with the distinguished participants on ways and means to further strengthen the cooperation on environment in the Asia-Pacific region.

Since the 6th General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development, the Chinese government has been keeping on the implementation of the sustainable development strategy. The national economy has enjoyed an increasing growth momentum with the adoption of positive fiscal policies, expansion of domestic demands as well as steady driving of reforms. In the first half year, Gross National Products (GNP) is 7.6% higher than that for the period in 1998; summer grains output higher than that of previous year. Industrial output keeps increasing with corporate profits improved; fiscal revenues got added with even operation of funds. The state foreign currency reserves keep increased with stable exchange rate. Moreover, great efforts have been focused on the environmental protection. In the "9th Five-Year Plan Period", particularly since 1998, infrastructure construction has been strengthened. The government takes infrastructure facilitied construction for ecological equilibrium as investment priority. As a result, more expenditure has been added for environmental protection. In 1998, total investment for the nation-wide pollution control accounted 72.18 billion RMB. This track record figure is 43.7% than that of 1997, sharing 0.9% in GDP, among which 45.6 billion RMB are allocated for the urban environment infrastructure construction. Therefore, environmental protection and control made rather greater progress. Recently, 65% of the national industrial wastewater discharge and 66% of industrial waste gas emission are up to the state standards. Preliminary obvious results have been shown in the state key river basins and regions. The water quality of those rivers and lakes, especially those closely tied to the living of people got improved greatly with discharge almost up to the state standard.

China has always give priority to environmental protection in the urban districts. The urbanization process in China has been accelerated since the reform and opening to the outside world. In 1980, cities with a population above 200,000 only accounted for 115 all over the country, but right now increased to 286 urbans in 1998. Urbanization level has increased to 30.4% in 1998 from 19.39% in 1980. Consequently, cities suffer a sharp increase of urban inhabitants, which then followed by the degradation of urban environment. In 1998,

gas-firing application rate of urban inhabitants went up to 78.9% from 68.4% of 1980 of Green land areas per capita in cities reach 6.1 square meters. More than 40 key cities for environment protection and others have eliminated the use of leaded gasoline. 29.56% of urban waste-water got treated from 20% in 1980. At present, the water and air quality of some major cities has come up to the special environment standard in accoordance with its functions.

The harmless waste treatment is a major challenge for urban environmental protection. With the economic growth and population increase, the volume of municipal refuse got increased at a rate of 9% per year, which greatly stresses the urban environment and arouses high attention of the government. In order to have an earlier solution to the municipal waste; government has organized relevant departments, enterprises, research institutions and experts to be actively involved in the exploration of means and measures from points of volume reduction, resources to harmlessness. As a result, pragmatic and feasible policies on the handling and harnessing of the wastes have been developed. Three treatment approaches, namely land-burying, compost and incineration, have been adopted selectively by each city according to its own economic strength, land resources and waste quality, among which sanitary filling is more often used. The volume of land-burying is increasing and incineration and treating facilities are under construction in some cities. Over 510 cities have been involved in a nation-wide environmental protection program in terms of comprehensive control and quantitative examination. Finally, 11 cities emerged, namely Dalian and Shenzhen etc, as "Model City for Environment Protection". This program has favorably facilitated the progress of environmental protection.

However, China today is still facing tough challenges for environmental control. Many areas see no improvement yet in the field of environment, some are even worse with problems like soil erosion, deterioration of forest and grasslands etc. The urban environment, with even conspicuous problems, such as municipal waste hills, white pollution, water, air and sonic environment pollution etc, is a heavy stressed burdened subject to the increasingly growing population and automobiles.

Massive populations, relative shortage of resources, as well as degradation of environment are the critical restraints of the national economic growth and social development. It is more clearly recognized right now that economic development and environmental protection are integral with even importance. The better harmony of economic and social development with population, resources and environment will be a must for the realization of sustainable development. In March 1996, the National People's Congress of the P.R.C passed *The 9th Five-Year Plan and 2010 Program Outlook for the National Economic and Social Development of the People's Republic of China.* To coordinate the concurrent development of social economy with population, resources and environment is regarded as one of the primary goals of China's modernization construction. In line with the Program, the country will not only maintain the steady rapid growth of economy in the early decade of next century, but also define the following goals:

1. By year 2000, to try with utmost to bring environmental pollution and ecological deterioration under control and improve the environment of some cities and regions to a certain extent.

2. By year 2010, to basically reverse the situation of ecological environment deterioration and make remarkable improvement of the urban environment.

Therefore, China is actively implementing the strategy of revitalizing the nation by science and technology and facilitating the development of economy and environment control by technical advances and renovations. More technical inputs will be added for the environment preservation by focusing on research and development of advance and appropriate technology. The environmental protection will be gradually shifted from the end control up to the whole process control by a wider application of energy conservation and loss-reduction technology as well as clean production technology etc.

To ensure the smooth implementation of sustainable development strategy, China pays high attention on the development of legal systems. With regard to environmental protection, 6 laws and 9 laws on resources have been issued one after another. A legal environmental framework has initially come into being on the basis of *The Constitution of the People's Republic of China and The Environmental Protection Law of the People's Republic of* China as the mainstay, which contains the pollution, improves the environment and lays legislative foundation. Currently, the National People's Congress is formulating *The Environmental Impact Assessment Law.* Environmental protection shall be taken into consideration in all major state investment projects, including river basin development, regional development and urban construction etc. Moreover, certain numbers of laws promulgated in 1970s and 1980s got amended and modified so as to fit the new prevailing requirements and bring the legislative systems to be more perfect and effective.

The realization of environmental protection goal must rely on the support and involvement of the public, enterprises and social communities. Therefore, China is always persisting in the promotion and education of environmental protection to the public, popularization of relevant knowledge, policies and laws on environment and ecological construction so as to make the public bear in mind a good sense moral concept of environmental protection. We shall actively guide and mobilize popular participation in environmental protection. Every citizen shall fulfil his or her obligations for environmental protection while enjoying his or her own right for a better environment. We shall be firm on law enforcement combined with public supervision in multiple ways, thus, ensuring an effective implementation of environmental laws.

Many environmental issues are regional and global ones. How to protect the environment, which the human being rely on for survival and development is a tough and pressing challenge for all the people in the world in concurrence to the development of economy. Environmental protection requires the synergy of nations around the world disregarding countries boundaries, nations and social systems for the common interest of mankind and the individual interest of each nation. In this way, sustainable development may realize with the joint commitment for environmental protection and control. With the further implementation of the sustainable development strategy in China, the development of energies, such as power, oil and gas, coal bed methane and other new energies are now on the top agenda of national programs. The treatment of wastewater, prevention of air pollution and planting of trees and grass have aroused the attention of the government of China. The environmental industry is facing with unprecedented development opportunities. We are willing to consolidate the cooperation and exchange with countries in Asia-Pacific region in this regard.

The Asia-Pacific Parliamentarians' Conference on Environment and Development offers a good opportunity for the cooperation and exchange on environment among the countries in Asia-Pacific region. It has made significant contributions to the environment and development. China will join hands with the member countries in this region as always in the future by extending continuous support for the activities of APPCED. We believe that the joint commitments of countries and regions will lead to new achievements of environment and development cause in Asia-Pacific region. Finally, I wish every success of the 7th General Assembly.

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APPCED/7/GA/country rep.5

India
A Country Report on Sustainable Development

Introduction

The accelerated growth of economic activities and the increase in global population have resulted in increasing environmental degradation in almost all the countries. Environmental degradation is the result of the dynamic inter-play of socio-economic, institutional and technological activities. Environmental changes may be driven by many factors, including economic growth, population growth, urbanization, intensification of agriculture, rising energy use and transportation. Poverty still remains at the root of several environmental problems. The global problems of ozone depletion, loss of biodiversity, depletion of natural resources and desertification are examples of environmental unsustainability.

Economic development without environmental considerations can cause serious environmental damage, thus impairing the quality of life of present and future generations. Sustainable development attempts to strike a balance between the demands of economic development and the need for protection of the environment. It seeks to combine the elements of economic efficiency, inter-generational equity, social concerns and environmental protection.

Sustainable development was defined by the 1987 Brundtland Commission as the meeting of the needs of the present without compromising the ability of future generations to meet their own needs. The ideal of sustainable development is harmonization between economic growth and environmental preservation. The goal is to maximize simultaneously the biological system goals (genetic diversity, resilience, biological productivity), economic system goals (satisfaction of basic need, enhancement of equity, increasing useful goods and services) and social system goals (cultural diversity, institutional sustainability, social justice, participation, etc.).

Sustainable development is about the future. It is about leaving the next generation a similar or better legacy of resources than that which was inherited. It means taking only the sustainable yield from renewable resources and honoring the environment's limited capacity to absorb waste. It means using exhaustible resources wisely so that, as they are depleted, the profits from their use are reinvested in technology and other forms of capital wealth.

Sustainable development is not a static and dogmatic concept concerning only the environment. It is a dynamic long-term process, including social and economic development as essential elements, seen in perspectives that may change over time, leading to improved quality of life for all human beings and to the eradication of poverty and the reduction of inequality. The concept of sustainable development carries inherent tensions, in particular between, on the one hand short-term economic needs and expectations and the demands of

political and social stability and on the other, the goal of long-term sustainability for future generations. Implementing sustainable development is, therefore, inevitably an incremental process which needs to be re-evaluated and reinforced as it proceeds.

Sustainable Development in India

With its geographic, climatic and biological diversity, India has a unique environmental heritage. The country represents almost all types of habitats of the world and the land mass of the country and its water bodies sustain an extremely rich variety of plants and animals.

Environmental concerns have been an integral part of Indian traditions as reflected in the Upanishads which first stressed the need for conservation and sustainable use of natural resources two thousand years ago. These concerns are evident in the Constitution of India under the Directive Principles of State Policy which provide that the State shall endeavour to protect the environment and to safeguard the forests and wildlife of the country. Further, the Constitution provides that it shall be the fundamental duty of every citizen to protect and improve the natural environment, including forests, lakes, rivers and wildlife. By a Constitutional Amendment in 1976, the subject of forest and wildlife was brought under the Concurrent List in the Seventh Schedule, thereby enabling Central as well as the State Governments to legislate on these subjects. The roots of the growing trend towards popular participation in the conservation and natural resource development programmes lie in these constitutional provisions.

In India, the Ministry of Environment & Forests is the nodal agency responsible for the protection, conservation and development of environment. The Ministry works in close collaboration with other Ministries, State Governments, Pollution Control Boards and a number of scientific and technical institutions, universities, non-governmental organisations, etc.

India is of the view that environmental protection cannot be isolated from the general issues of development and must be viewed as an integral part of development efforts. Various efforts have been made to integral part of developmental efforts. Various efforts have been made to integrate environmental concerns into the decision-making process. Environmental standards and environmental management plans prescribed are important measures taken to protect environment. The same applies to environment audit which is being made mandatory for major industries. Environment protection does not only involve a prevention of pollution and of natural resource degradation, but has to be integrated with the overall development process and the well-being of people.

Carrying Capacity

It is now accepted that, in terms of natural resources, a country's demand for its sustenance should not exceed its carrying capacity. Sustainable development calls for a balance between development activities and their impact on environment quality so that welfare of the society is maintained on a long-term basis. The concept of "Carrying Capacity" is not new and yet, efforts to extend the same in the realm of developmental planning are few. Environment, with its biotic and abiotic components, provide the basic resources and support the production-consumption activities and assimilates residues generated during the course of these activities. The limits to development are, therefore,

defined by the supportive and assimilative capacity of the planning region. The important components of Carrying Capacity-based developmental planning are estimation of supportive and assimilative capacities and optimal allocation of resource base to various socio-economic activities.

Carrying Capacity studies have been initiated in typical problem areas with high degree of replication in many parts of the country. These studies are aimed at evolving development portfolios for sustainable development keeping in view the following:

- Cumulative environmental impacts of development projects;
- Demarcating environmentally sensitive and fragile areas needing protection; and
- Optimisation of limited natural resources for achieving a better quality of life.

Over the last few decades, India has evolved legislations, policies and programmes for environmental protection and conservation of natural resources. The Government of India's policy has been expressed in the form of statements on forestry, on the abatement of pollution, the national conservation strategy and the policy statement on environment and development. The spirit of Agenda 21 principles adopted at the Earth Summit of 1992 held in Rio de Janeiro has already been incorporated in these policies. For instance, with regard to the social and economic dimensions of Agenda 21, India has become a signatory to the Montreal Protocol for phasing out ozone depleting substances, the Basel Convention on trans-boundary hazardous substances, the Convention on biological-diversity, climate change and other international treaties. Similarly, poverty alleviation programmes have been launched wherein family planning and welfare are a major focus. Environmental concerns are being integrated in decision-making as well.

Compliance with the conditions stipulated is being ensured by monitoring the progress of implementation of Environmental Management Plans. Conservation and management of resources for development are sought to be achieved through a combination of regulatory and market-based economic instruments. The role of major groups, including the NGOs, farmers and other communities is being strengthened by directly involving them in the process of identification, formulation and implementation of environmental programmes. The important role of capacity building, legal instruments and mass media for promoting public awareness is fully recognised.

The main environmental problems in India relate to air and water pollution, degradation of common property resources; threat to biological diversity, solid waste disposal and sanitation. Increasing deforestation, industrialization, urbanization, transportation and input-intensive agriculture are some of the other major causes of environmental problems being faced by the country. Poverty presents special problems for a heavily populated country with limited resources.

Status of India's Environment

The Constitution of India has assigned the responsibility of protecting the environment to the Union and State Governments. Environmental protection laws have been enacted under the Environment (Protection) Act. 1986; the Air (Prevention and Control of Pollution) Act, 1974. The Environment (Protection) Act, 1986 has empowered the Central Pollution Control Board (CPCB) to lay down and maintain the ambient air quality and water

quality standards, to demand information regarding effluent emissions, to shut down polluting activities and to prevent discharges of effluent and sewage.

Air Quality

The urban areas represent complex environmental problems. The living conditions of millions of urban poor are such that they pose a threat to their health and have potentially catastrophic social consequences. For the urban poor, the living conditions are the worst. If these problems are not addressed in an effective and timely manner, serious environmental and associated health consequences will follow. Burgeoning urban population beyond the carrying capacity of the different components of urban eco-systems, coupled with i: different urban governance, are the root causes for urban environmental problems. Air pollution can cause chronic and acute respiratory diseases, ventilatory malfunction, heart diseases, cancer of the lungs and even death.

Water Resources and Water Quality

With the rapid increase in the population of the country and the need to meet the increasing demands of irrigation, human and industrial consumption, the available water resources in many parts of the country are getting depleted and the water quality has deteriorated. In India, water pollution comes from three main sources; domestic sewage, industrial effluents and run-off from agriculture. The most significant environmental problem and threat to public health in both rural and urban India is inadequate access to clean drinking water and sanitation facilities.

Solid Wastes and Hazardous Chemicals

There has been a significant increase in the generation of domestic, urban and industrial wastes in the last few decades. Although a major part of the waste generated is non-hazardous, substantial quantities of hazardous waste is also generated. The growth of chemical industries has resulted in the extensive use of chemicals, which release huge quantities of wastes into the environment in the form of solids, liquids and gases. (A detailed note on Management of Solid Wastes is included in the Report in the later pages).

Land Degradation and Soil Loss

Soil erosion is the most serious cause of land degradation. The accumulation of salts and alkalinity affects the productivity of agricultural lands in arid and semi-arid regions which are under irrigation. Fertilisers and pesticides are important inputs for increasing agricultural production. Their use has increased significantly from the mid-60s. Over use and unbalanced use of these chemicals are fraught with danger. Suitable agronomic practices will be helpful in this regard.

Forests, Wildlife and Bio-diversity

Forests are important for maintaining ecological balance and preserving the life supporting system of the earth. They are essential for food production, health and other aspects of human survival and sustainable development. Indian forests constitute 2 percent of the world's forest area but are forced to support 12 percent of the world's human population and 14 percent of the world's livestock population.

The National Forest Policy (1988) stipulates that a minimum of one-third of the total land area of the country should be brought under forest or tree cover. It is envisaged that this

will be achieved by involving local stakeholders like farmers, tribals, women, NGOs and the Panchayat Raj Institutions (PRIs).

Another concern relating to the state of forest resources is that of biodiversity and extinction of species. India has a rich heritage of species and genetic strains of flora and fauna. For in situ conservation of biological diversity, India has developed a network of protected areas, including national parks, sanctuaries and biosphere reserves. This network, which is being progressively expanded, now covers about 4 percent of the total land area of the country. As a result of the amendments made in 1991 to the Wildlife (Protection) Act, hunting of all species of wild life for commerce or for pleasure has been banned.

Strategy for the Ninth Five Year Plan (1997-2002)

One of the objectives of the Ninth Five Year Plan is to ensure environmental sustainability of the developmental process through social mobilisation and participation of people at all levels. The Ninth Plan is also based on the belief that the principal task of planning in a federal structure is to evolve a shared vision and commitment to the national objectives and development strategy. The Ninth Plan also lays greater stress on reorienting the policies than on direct intervention so as to signal and induce the various economic agents to function in a manner consistent with the national objectives.

The Ninth Plan strategy for the environment sector has been drawn up in accordance with the need to develop the required measures to protect the environment in such a way as to achieve sustainable development. The Ninth Plan recognises the symbiotic relationship between the tribals and the forests and gives a special focus to the tribals and other weaker sections living in and around the forests. A number of enabling conditions have been already created for harmonising economic growth and environmental conservation.

The strategy for the Ninth Plan is based on the belief that macro-economic stability is fundamental not only for economic growth but also for sound environmental management. The Ninth Plan envisages a multi-pronged strategy for sustainable development of the country.

Important Elements of the Ninth Plan Strategy

- Empowering the people through information generation, dissemination and access.
- Involving the industry in both the private and the public sectors.
- Integrating environment with decision-making though valuation of environmental impacts.
- Evolving market based economic instruments as an alternative to the command and control form of environmental regulation.
- Appropriate pricing of natural resources based on their long-term marginal cost of supply.
- Appropriate fiscal reforms and natural resource accounting.
- Evolving the rights for common property resources.
- Inter-sectoral coordination and cooperation.
- Ensuring scientific and technological inputs.
- Participation of people (particularly women) in the management and sharing of usufruct through Joint Fo est Management.

- Involvement of NGOs for awareness building and as an interface between forest department and the people to be encouraged.
- Integrated development of villages in and around forests.

Programmes for the Ninth Five Year Plan

Environmental protection requires both preventive and curative measures. The strategy for environmental protection in the Ninth Five Year Plan relies more on initiatives and interventions through policies and programmes of different sectors, notably, Health and Family Welfare, Transport, Rural Development, Energy, Agriculture, Fertilisers & Chemicals, Urban Development and Education. The underlying logic is that curative treatment should come only as the last resort, the primary emphasis being placed on the preventive approach.

Energy sector is a major polluter. In order to minimise its adverse impact on environment a number of steps have been taken. All major power projects are subjected to an environmental impact assessment. Environmental clearance is granted to them only after stipulating appropriate environment management plans. These are rigorously monitored for compliance. Relocation and rehabilitation plans and Catchment Area Treatment are an integral component of River Valley projects. A separate regulatory agency has been established for the nuclear power plants.

In the interest of transparency, it is stressed that the Annual Reports of the Department of Power, the Department of Coal and the Ministry of Petroleum and Natural Gas should give a Balance Sheet of carbon dioxide generated by their activities and counterpart sink created by them or through resources contributed by them. The Ministry of Petroleum and Natural Gas has also laid considerable stress on improving the quality of petroleum products, particularly automotive fuels like motor spirit and high speed diesel.

Issue-Specific Programmes

(i) People's Involvement and Role of Information

A challenging task is mobilisation and involvement of the people in environmental protection. The Ninth Plan has already had a good beginning in this regard in the sense that through an amendment made on 10 April 1997 to the notification relating to Environment Impact Assessment (EIA), a provision has been made for the process of public hearing. All important developmental activities, covered by the EIA Notification dated 27 January 1994 are covered by this amendment which provides that only after the due process of public hearing, any major activity can be undertaken. It is also significant that even under the delegation of powers to the State Governments under the Environmental (Protection) Act, the provision of public hearing is applicable. Another aspect is the setting up of the National Environment Appellate Authority which looks into complaints against environmental clearance accorded by the Central/State Governments.

Citizens Monitoring Committees are being established under the National River Conservation Programme. Specific schemes have been launched for involving people from all cross-sections of life ranging from students to retired soldiers in the gigantic task of environmental protection.

(ii) Strengthening of the Surveillance and Monitoring System

A wide network of air and water quality monitoring stations has been established under the National Ambient Air Quality Management, Global Environmental Monitoring System and other programmes.

(iii) Integrating Environmental concerns with Decision - Making

In order to lend a reasonable degree of rationality to the process of policy formulation and decision-making, the Ninth Plan lays specific emphasis on epidemiological studies and environmental economics. It is hoped that this would facilitate integration of such environmental concerns with the decision making process.

Area-Specific Programmes

(i) National River Conservation Programme (NRCP)

The National River Conservation Plan (NRCP), aimed at implementing pollution abatement measures to conserve rivers which are the primary fresh water sources of the country, is being implemented in 141 towns in 14 States and covers 22 major rivers. This Plan was started during the Eighth Five Year Plan and its forerunner, the Ganga Action Plan Phase-I, was started in 1985. The National River Conservation Plan which now includes the Ganga Action Plan Phase-II was initially a Centrally Sponsored Scheme with 50 percent Central assistance. However, it was realised that many States were not in a position to match it with their own funds to the extent of 50 percent. Therefore, during the Ninth Plan period, it has been decided to make it a 100 percent Centrally Sponsored Scheme.

The Plan has an outlay of Rs. 2013.46 crores and the thrust areas of attention are as follows:

- Carrying out interception and diversion works designed to prevent the domestic sewage from out-falling into rivers, use of low cost and people friendly technology for sewage treatment plants with emphasis on microbial pollution abatement and encouraging the utilisation of treated sewage for irrigation, aquaculture and forests;
- Supervising the strict enforcement of environmental laws through the Pollution Control Boards to ensure the control of industrial pollutants;
- Enlisting the active involvement of the local bodies like municipalities in the construction and maintenance of interception and diversion works and sewage treatment plants;
- Mobilising the participation of the public and self help groups in activities aimed at controlling the non-point sources of pollution.

(ii) National Lake Conservation Programme (NLCP)

Due to pressure of human activities, a number of lakes are shrinking or getting polluted beyond the point of recovery. The objective of the NLCP is to arrest further degradation of lakes and to revive these water bodies to acceptable environmental standards. On the recommendations of a National Committee under the Chairmanship of the Secretary of the Ministry of Environment & Forests, 21 urban lakes considered to be highly degraded were identified for conservation and management in 1993. Later, a Committee prioritised 11 lakes. However, the plan has not been approved yet and the Ministry of Environment & Forests is considering conservation of Dal Lake in Srinagar only to take up as a stand alone project with internal resources.

(iii) Himalayan Region

In March 1992, an Expert Group was constituted by the Planning Commission to formulate an National Policy for the integrated development of the Himalayas. With a view to operationalising the recommendations of the expert group, a Steering Committee has been constituted by the Planning Commission.

For generating and strengthening the knowledge about the ecology and sustainable development of the Himalayas, the Ministry has set up the G.B. Pant Institute of Himalayan Environment and Development. This Institute has emerged as a focal agency to advance scientific knowledge, to evolve integrated management strategies, demonstrate their efficacy for conservation of natural resources and to ensure environmentally sound development in the entire Indian Himalayan region. Towards this end, R&D activities have been undertaken by the Institute.

(iv) Coastal Regulation Zone

India has a long coastline with a total length of 7,500 kms. The total number of islands is about 1,197, which include the offshore islands of Andaman and Nicobar and Lakshadweep. The territorial waters of India have an extent of 155,889 sq. kms. This coastline harbours many ecologically sensitive flora and fauna and also supports the economy of the coastal people. In order to conserve and protect this coastal area, a Statutory Notification was issued which classifies the different areas of coast into ecologically sensitive areas, areas which have already been built up, and areas which are rural and which can be used for developmental activities. The Notification prohibits specifically some of the activities such as setting up of industries and dumping of waste in the coastal areas. It also puts restrictions on drawal of groundwater from these areas. In 1998, a National Coastal Zone Management Authority was constituted for protecting and improving the quality of coastal environment and preventing, abating and controlling environmental pollution in coastal areas. In the coastal States also, similar authorities have been constituted. During the Ninth Plan, it is proposed to draw up an integrated coastal zone management plan which would inter alia take into account ecological concerns in the adjoining marine and land areas.

(v) Islands

With a view to recommending policies and programmes for the integrated, environmentally sustainable development of Andaman and Nicobar and the Lakshadweep groups of Island, the Island Development Authority (IDA) was reconstituted in August 1998. The Authority, which is chaired by the Prime Minister, also reviews periodically the progress of implementation and impact of the programmes of development. Simultaneously, the Standing Committee of the IDA has also been reconstituted under the chairmanship of the Deputy Chairman, Planning Commission.

Sector-Specific Programmes

Environment

The sub-strategy under this broad head for achieving the wider purpose consists of prevention of pollution at source; encouragement, development and application of the best available feasible technological solutions; application of the "polluter pays" principle; focus on heavily polluted areas; and public participation

(i) Strengthening the Central Pollution Control Board

The Central Pollution Control Board is the apex regulatory and enforcement agency. The programme areas for the Ninth Plan are proposed to be environmental monitoring and assessment of the pollution; environmental standards and action plans; enforcement of pollution abatement programme; and promotion of infrastructure and capacity upgradation programme.

Some of the highlights of the proposed activities are introduction of bio-monitoring for assessment of pollution and health of aquatic system, water quality monitoring in medium and small rivers, ground water quality monitoring, soil pollution monitoring, epidemiological studies for formulation of standards based on health considerations, environmental audit, promotion of infrastructure and capacity upgradation programme.

(ii) Industrial Pollution Control and Prevention Projects

After the successful conclusion of the Industrial Pollution Control Project, presently a Project on Industrial Pollution Prevention is being implemented with World Bank assistance. The proposed Project will strengthen four State Pollution Control Boards in respect of their facilities, equipment and skills to enable them to more effectively perform their mandate; facilitate priority investments dedicated to prevent pollution from industrial sources by encouraging use of clean technology; and provide technical assistance for waste minimisation and adoption of modern tools of information.

(iii) The Common Effluent Treatment Plants (CETP)

The CETP would be an important scheme for assisting in the setting up of common facilities for clusters of small scale units for treatment and disposal of solid, liquid and gaseous waste generated by small scale units located in industrial estates/clusters.

(iv) Adoption of Clean Technologies in Small Scale Industries

A scheme for promoting the development and adoption of clean technology, including waste water re-use and re-cycling, has been formulated for small scale industries. This scheme links research and development with diffusion and adoption of pollution prevention measures. Under this scheme, activities relating to demonstration of already proven clean technologies, preparation of sector-specific manuals on waste minimisation, setting up of waste minimisation circles in specific clusters of small scale industries and training and awareness programmes for personnel in small scale industries would be undertaken.

(v) Environmental Statistics and Mapping

The Ninth Plan proposes the preparation of statistical data base and reports on the status and the trends in environmental quality with reference to air, water, soil and noise and depicting them on an Atlas. It is also proposed to prepare a Zoning Atlas for locating industries in States. Environmental statistical cells are proposed to be set up in the Central as well as the State Pollution Control Boards.

(vi) Environmental Impact Assessment

Environment Impact Assessment (EIA) is statutory for 29 selected activities which cause pollution, degradation of land, requires resettlement and rehabilitation of local inhabitants, and requires large quantity of resources like water and energy. As mentioned

earlier, as per the provisions of environmental impact assessment notification, which requires assessment of these projects, public hearings are statutory and the project proponents have to explain to the public the proposals. The proposals are finally examined by the Expert Committee and decisions are taken on that basis. During the Ninth Plan period, it is proposed to consolidate the achievements made in EIA and also extend it to more activities with stress on decentralisation and quality improvement.

The Ministry of Environment and Forests has also declared certain areas such as coastal zones as ecologically fragile and drawn up a detailed programme of action which include appraisal of developmental projects and conservation of nature.

(vii) Development & Promotion of Cleaner Technologies

The Indian industry today uses many obsolete technologies resulting in wastage of energy and raw materials, causing considerable pollution and producing wastes which cannot be utilized. End-of-pipe pollution control is an expensive strategy and has not been very successful. The real solution lies in switching over to Clean Technologies, which generates less pollution and higher output of productive goods and services.

With regard to development and promotion of cleaner technologies, the Ninth Plan envisages the taking up of demonstration projects for effective transfer of technologies. Partial funding for Demostration Projects for the promotion of Cleaner Technologies requiring scaling up/and or commercialisation is provided under the project.

(vii) Biosphere Reserve Programme

To conserve the representative ecosystems, a Biosphere Reserve Programme is being implemented. Eleven biodiversity rich areas of the country have been designated as Biosphere Reserves applying the UNESCO/MAB criteria. These reserves aim at conserving the biological diversity and genetic integrity of plants, animals and microorganisms in their totality as part of the natural ecosystems so as to ensure their self-perpetuation and unhindered evolution of the living resources.

Programmes have also been launched for scientific management and wise use of fragile ecosystems. Specific programmes for management and conservation of wetlands, mangroves and coral reef systems are also being implemented.

(viii) Biodiversity conservation

India is one of the 12 mega biodiversity countries of the world. With only 2.4 percent of the total land area of the world, the known biological diversity of India contributes 8 percent to the known global biological diversity. From about 70 percent of the total geographical area surveyed so far, 46,000 plant species and 81,000 animal species have been described by the Botanical Survey of India (BSI) and the Zoological Survey of India (ZSI), respectively. These life forms are actually and potentially important for developments in the fields of food, medicine, textiles, energy, recreation and tourism.

India became a Party to the International Convention on Biological Diversity (CBD) in May 1994. The three objectives of the convention are: (i) conservation of biological diversity; (ii) sustainable use of components of biological diversity; and (iii) fair and equitable sharing of benefits arising out of the utilisation of genetic resources.

Pursuant to India's ratification of the CBD on 18 February 1994, steps have been initiated to meet the commitments/opportunities offered by it. The main implementation measures for the CBD are through national strategies, legislation, and administrative

instruments to be developed in accordance with each country's particular conditions and capabilities.

Adopting a consultative process with the stakeholders, the National Policy and Macrolevel Action Strategy on Biological Diversity has been drawn up as a statement of strategies, gaps and further actions needed for conservation, sustainable use and realisation of actual and potential value of biological diversity. This plan aims at consolidating the on-going efforts of conservation and sustainable use of biological diversity, identifying gaps in various sectors, and providing a policy and programme regime to ensure attainment of the three objectives of the CBD. Concrete steps to turn the strategy into action are now being taken. Identifying critically important areas and gaps in taxonomic work, an All India Coordinated Project has been launched for prioritised purpose-oriented capacity building in taxonomy. To encourage taxonomic work, a national award in taxonomy is being instituted. Institutions with requisite strengths are being identified as Centres of Excellence in biodiversity to cover specific geographical areas. A Status Report on Biodiversity Conservation is also being finalised.

India's richness in biological resources and indigenous knowledge relating to them are well recognised. One of the major challenges before India lies in adopting an instrument which helps realise the objectives of equitable benefit sharing enshrined in the Convention. India has developed an outline of a biodiversity legislation which aims at regulating access to biological resources and making such access subject to terms and conditions which secure equitable sharing of benefits for the resources accessed. This has been done through a consultation process with the stakeholders, local people, industry, practitioners of indigenous systems of health care and medicine, technical and academic institutions, State Governments, institutions of self government, trade and business. The outline of biodiversity legislation is under finalisation.

(x) Research

Scientific inputs are provided by National Research Institutes, Universities and NGOs under the guidance of expert groups and committees to enhance the quality and efficiency of programmes of the Government in protecting and improving the quality of the country's environmental and ecological resources.

(xi) Policy and Law

Grants are released to the State Pollution Control Boards and the Department of Environment of the State Governments with the objective of strengthening their technical capabilities. Due to various decisions of the Supreme court and the High Courts, the responsibilities and commitments of the State Pollution Control Boards are increasing. Poor enforcement of regulations is a matter of concern. It is being increasingly felt that there is a need to strengthen the existing laws and legal instruments so as to ensure that the strengthened legal regime not only deals with environment related offences speedily and effectively but also acts as deterrent. It is proposed to create a credible system of deterrence and a system of redressal relatable to environment protection through suitable amendments in the Environment Protection Act. The labeling of environmental friendly products by granting ECOMARK helps in pollution abatement. This important activity would be considerably supported during the Ninth Plan.

(xii) The National Environment Tribunal Act, 1995

The National Environment Tribunal Act, 1995 has already come into effect. The Principal Bench of the Tribunal will be located in New Delhi. The supporting infrastructure for this Tribunal will be provided during the Ninth Plan.

Forestry & Wildlife and Afforestation

The programmes/schemes of the Ninth Five Year Plan are generally similar to those taken up during the Eighth Plan, such as Integrated Afforestation and Eco-Development Project, Fuelwood and Fodder Project Scheme. Non-Timber Forest Produce Scheme, Grants-in-Aid Scheme, Seed Development Scheme, etc., with greater focus and improved implementation on the basis of the experience gained during the Eighth Plan.

Wasteland Development

The Ninth Plan envisages regeneration of wastelands to release pressures on the forests and standardisation of the definition of wastelands, assessment of their magnitude and their development by a reorientation of the policy of "open access" to "common property resources". Clear, quantified and phased arrangements would be evolved for an equitable sharing of the usufruct. The programmes/schemes for Wasteland Development of the Ninth Five Year Plan are generally similar to those taken up during Eighth Plan such as Integrated Wastelands Development Projects Scheme, Technology Development Scheme, Training & Extension Scheme, Investment Promotional Scheme, etc.

The National Forest Policy, 1988 envisages massive afforestation and social forestry programmes on all denuded, degraded and unproductive lands. Approximately, 30 mha of non-forest wastelands are to be brought under tree cover.

Management of Solid Wastes and Related Issues

In India, solid waste management (SWM) is the function of urban local bodies. According to the 1991 census, 217 million persons out of the 844 million total population of the country were residing in the urban areas. By the year 2001, the urban population is expected to grow to 307 million, comprising more than 30 percent of the total population of the country. In 1951 there were 3,060 towns in the country. The number increased to 4,029 in 1981 and by 1991 it became 4,689.

Unregulated growth of urban areas without necessary infrastructural services and proper collection, transportation treatment and disposal of solid wastes have resulted in increased pollution and health hazards. Waste generation in the cities ranges from 200 to 500 gms per capita per day depending upon the size of the city. The larger the city, the higher is the per capita generation of waste. By the year 2001, it is expected that waste generation in urban areas will exceed 39 million tonnes per year.

The major environmental concerns in an urbanising India relate to high levels of water pollution due to poor waste disposal, inadequate sewerage and drainage and improper disposal of industrial effluents. The dumping of solid waste in low-lying areas contributes to land and ground water pollution. All these developments have contributed to the deterioration of the urban environment, a critical concern that needs specific interventions for sustainability of human settlements.

With the objective of emphasising waste reduction and recycling and reuse in industries and better management of municipal solid wastes, a scheme to initiate setting up of pilot projects, conduct surveys and funding of promotional activities in the following areas has been initiated.

(i) Municipal solid wastes:-

a) Survey of urban municipal wastes in important cities.

b) Setting up of pilot plants on utilisation of municipal solid wastes.

(ii) Setting up of pilot plants for utilisation of industrial wastes.

(iii) Development and other promotional activities for municipal and industrial wastes.

At present, solid wastes are utilised to the extent possible by the following processes:

- Conversion of garbage into energy pellets.
- Anaerobic digestion/biogas generation from garbage.
- Composting by vermiculture and other means.

The process of anaerobic digestion/biogas generation from garbage is being utilised at medium and small scale levels at several places in India, and is being encouraged in other places also. The conversion of garbage into compost by vermiculture and other processes is also being promoted. All these processes not only help in waste utilisation but also in producing energy or products of utility.

Apart from organic wastes, several other urban wastes such as waste papers, plastics, glass, rubber, textiles, metals, coconut shells, etc. are extensively recycled and their use is encouraged by the Government.

Some of industrial wastes such as fly ash, blast furnace slag, lime sludge, phospho-gypsum, red-mud, etc. are generated in large quantities and are sources of environmental pollution. Reuse and recycling of these wastes is being encouraged. Fiscal incentives have been provided in the form of exemption of excise duty on production of building materials using fly ash or phospho-gypsum and exemption of custom duty on import of equipment, and machinery, for utilisation of these wastes for gainful purposes. The collection and disposal of solid wastes is another area of concern of city management in India.

In order to improve the management of urban solid wastes and sewage related issues, there is need for capacity building, awareness and training, improved technologies and the creation of infrastructural facilities. The lack of adequate financial resources, especially at the municipal and local levels, remains a constraint.

In 1996, the Supreme Court of India entertained a Writ Petition and the apex court felt it appropriate to constitute a Committee under the Chairmanship of Shri Asim Barman, Municipal Commissioner, Calcutta Municipal Corporation to look into all aspects of solid waste management in Class-I cities of India. The Committee, in its Final Report submitted in March 1999, made various recommendations for modernisation of solid waste management in Class-I cities, which included:

- Ban on throwing of wastes on the streets.
- Storage of wastes at source.
- Community bins for multi-storied buildings, commercial complexes, group housings and slums.
- Door step segregation and collection of wastes.
- Involvement of NGOs in organising rag pickers.
- Special bins for hazardous and toxic wastes.
- Sweeping of streets and public places on all days of the year.
- Work norms ranging from 250 to 750 running meters of road length per sweeper.
- Provision of litterbins at public places.
- Abolition of open waste storage sites and unhygienic street bins.
- Transportation of wastes to synchronize with waste storage facility.
- Conversion of organic wastes into fertilizer (compost).

- Adoption of only proven technologies.
- Land to be made available on priority for processing and disposal of wastes.
- Adoption of criteria for land fills.
- Institutional strengthening and capacity building.
- Financial support to urban local bodies by the State and Central Governments.
- Strict enforcement of regulations and norms.
- Adoption of management information system.
- Active involvement of citizens
- Use of information, education and communication for public awareness.
- Constitution of a Technology Mission for solid waste management.

Taking cue from the above recommendations, the Government of India notified a draft Municipal Solid Waste management and Handing Rules, 1999 on 27 September, 1999 inviting suggestions and objections within 60 days. On the basis of the suggestions and objections to be received, the final reels will be notified in due course. The salinet features of the draft Rules are as under:

1 Municipal solid waste be collected, segregated and disposed off by the Municipal Bodies in accordance with the procedure laid down under the Rules.

2. The Rules provide criteria for selection, operation and monitoring of land fill sites to protect the air and ground water from getting polluted.

3. The Rules give standards for composting as well as those for the treated leachates from the land fill sites.

4. The municipal authorities are required to submit comprehensive report on an yearly basis covering all aspects of solid waste management to the Deputy Commissioner/District Magistrate who will forward the report to the Central Pollution Control Board through the concerned State Pollution Control Board/State Pollution Control Committee.

5. The Rules lay down an implementation schedule for setting up of disposable facilities, including those for composting. The target dates for these facilities depend upon the population of the concerned cities and towns.

Four workshops were held during October to December 1998 in Calcutta, Chennai, Mumbai and New Delhi. These workshops discussed various aspects of solid waste management in Class-I cities of India.

Taking into account the fact that bio-medical wastes are quite often dumped in municipal solid waste bins and handled and disposed of along with municipal solid wastes leading to threat to environment and health of the people, a comprehensive Bio-Medical Waste (Management and Handling) Rules, 1998 was notified on 20 July, 1998. The Rules provide requisite details about their application, duties of the occupiers, methods for segregation, packaging, transportation, storage, treatment and disposal to be practiced. The Rules provide for a Prescribed Authority for every State/Union territory and it also gives schedule for installation of waste treatment facilities like incinerator/autoclave/microwave system. Also, the Rules give standards for treatment and disposal of bio-medical wastes.

Plastic wastes comprise 5 to 10 percent of the municipal solid waste. Quite often, thin plastic bags and packaging materials are not removed by the rag pickers and waste recyclers leading to littering of the environment. To take care of this and other related issues, the Recycled Plastic Manufacture and usage Rules, 1999 was notified by the Government of India on 2 September, 1999. These Rules prohibit the use of carry bags or containers made of recycled plastics for storing, packing and carrying of food.stuffs. According to these Rules,

carry bags made of plastics will not be of less than 20 microns thickness. The Rules further prescribe that virgin plastic carry bags will be in natural shade and or white.

The Indian Center for Plastics in Environment (ICPE) has been established with its headquarter in Mumbai. The purpose of this center is to provide guidance to the plastic industries towards reduction in wastes, better utilisation of wastes and to create facilities for better research in the field of plastics and improved interaction of the plastic industry with the society.

Hazardous Wastes

Though a major part of the wastes generated are of non-hazardous type, substantial quantities of hazardous wastes are also generated. In spite of various steps taken for management of wastes generated by various sources, only a small proportion of solid wastes is properly utilized and disposed of. As a result, some of these wastes cause environmental degradation and health risks in one way or the other.

The Environment (Protection) Act, 1986 emphasises the need for laying down procedures and safeguards for handling hazardous substances and preventing accidents. Four sets of Rules have also been notified under the Environment (Protection) Act, 1986. These are the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989; the Hazardous Waste (management and Handling) Rules, 1989; the Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms/Genetically Engineered Organisms or Cells, Rules, 1989; and the Chemical Accident (Emergencies Planning, Preparedness and Responses) Rules, 1996.

The Hazardous Wastes (Management and Handling) Rules (HW Rules) were notified by the Ministry of Environment and Forests in July, 1989 under the Environment (Protection) Act, 1986. These Rules provide for regulating the generation, collection, storage, transport, treatment, disposal and import of 18 categories of hazardous wastes. One of the important stipulations made under these Rules is that the import of hazardous wastes from any other country to India is not permitted for dumping and disposal.

India is a party to the Basel Convention on the control of Transboundary Movements of Hazardous Wastes and their Disposal. The Ministry of Environment and Forests has been designated as the Competent Authority. The Convention seeds to promote the reduction in the generation of waste and calls for international cooperation in development of cleaner technologies.

The wastes from other countries are exported in large quantities for processing, reuse and recovery and to be used as raw materials in our industry in accordance with the hazardous Wastes Rules, 1989. The hazardous wastes are included in the restricted lists of imports requiring a licence, which is granted subject to the recommendation under the HW Rules.

Radioactive Wastes

India is also concerned with the environmentally sound management of radioactive wastes. The need for the establishment of a nuclear waste management system in the country was recognised at an early stage of india's nuclear programme. The system takes care of all radioactive waste generated from nuclear facilities as well as in the applications of nuclear materials in industry, research, medicines, etc.

There is a legal framework for the management of radioactive wastes and an independent regulatory body with the responsibilities for carrying out statutory control with regard to health, safety and environmental protection.

Toxic Chemicals

Chemicals occupy an important place in the effort to meet the social and economic goals of the community. However, many chemicals are toxic, highly reactive, explosive or flammable, or have a combination of these characteristics and represent a potential risk to human, animal and plant life, and the environment in general. Extreme care is necessary while handling such chemicals at all stages of manufacture, processing, transportation or use.

India is a member of the International Programme on Chemical Safety (IPCS) and International Register of Potentially Toxic chemicals (IRPTC). At the national level, the following efforts are underway:

(i) A Centrally sponsored scheme to create infrastructure in certain regulatory organisations.

(ii) Hazard analysis and off-site emergency plans in sensitive industrial pockets.

(iii) The establishment of emergency response centres. .

(iv) Establishment of poison control centres at select places with some available infrastructure. At present, except for a limited number of hospitals, cases of chemical poisoning are treated only in general emergency wards.

(v) The promotion of epidemiological studies in areas of high risk. This involves collection of data from hazardous installations, and relating to pollution status, etc.

After the Bhopal disaster of 1984, the Government have taken steps, both regulatory and non-regulatory, to reduce the environmental risk from exposure to chemicals The Environment (Protection) act, 1986 lays down procedures and safeguards to regulate the handling of hazardous and toxic chemicals. The Public Liability Insurance Act, 1991 was enacted with the objective to render relief to chemical accident victims. Steps have been taken to phase out Benzidine and Benzidine based dyes and intermediates through this instrument. Analogous provisions exist in the Insecticide Act and the Prevention of Food Adulteration Act.

To limit the discharge of pollutants into water and into the air, standards have been laid down under the relevant Acts. The "Polluter Pays Principle" has also been adopted. Environmental impact assessment has been made mandatory in the cases of specified projects and the use of less toxic chemicals, insofar as it is feasible, suggested before the sanction of the environmental clearance.

For prevention and control of major chemical hazards, legal safeguards have been framed under the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989. Specific requirements have been prescribed for safe transportation of hazardous chemicals. Exposure limits for chemicals and toxic chemicals have also been laid down. Recently, environmental audit has also been made mandatory, one of the aims being to reduce environmental risk. Government is also encouraging the use of Clean Production Technologies by providing fiscal benefits. The award of the "ECOMARK" to consumer products which are environment friendly also encourages the use of safe chemicals and technologies.

Conclusion

The environmental scene of the country today is of both concern and hope. The concern arises from the various environmental problems/issues which require immediate attention. The hope for environment arises from the fact that our country is still one of the

world's richest in terms of biological diversity and other natural resources. The hope for the future is also based on the many positive factors that are emerging - increasing number of people's movements focusing on environment, greater public and media concern for these issues and the spread of environmental awareness among children and youth.

G-7
APPCED/7/GA/Country rep.16

India
Hon. Shri G.M.C. Balayogi
Speaker of Lok Sabha

Mr. President and Fellow Parliamentarians,

A Country Report on Sustainable Development in the context of Environment and Development in respect of India has already been circulated amongst the delegates. The Report extensively details diverse aspects of the core theme. I would like to restrict myself to some of the important components of the strategies we have adopted to address the issue.

Environmental concerns have been an integral part of Indian traditions as reflected in the *Upanishads* which first stressed the need for conservation and sustainable use of natural resources two thousand years ago. These concerns are evident in our Constitution under the Directive Principles of State Policy which provide that the State shall endeavour to protect the environment and to safeguard the forests and wildlife of the country. Further, the Constitution provides that it shall be the fundamental duty of every citizen to protect and improve the natural environment.

The Constitution has assigned the responsibility of protecting the environment to the Union and State Governments. Some of the significant environmental protection laws enacted include the Environment (Protection) Act, 1986; the Air (Prevention and Control of Pollution) Act, 1981; and the Water (Prevention and Control of Pollution) Act, 1974. The Government of India's policy has been expressed in the form of statements on forestry, on the abatement of pollution, the national conservation strategy and the policy statement on environment and development. The spirit of Agenda 21 principles adopted at the Earth Summit of 1992 has already been incorporated in these policies.

Compliance with the conditions stipulated is being ensured by monitoring the progress of implementation of Environmental Management Plans. Conservation and management of resources for development are sought to be achieved through a combination of regulatory and market-based economic instruments. The role of major groups, including the NGOs, farmers and other communities is being strengthened by directly involving them in the process of identification, formulation and implementation of environmental programmes. The important role of capacity building, legal instruments and mass media for promoting public awareness is fully recognised.

One of the objectives of our Ninth Five-Year Plan, which is now under way, is to ensure environmental sustainability of the developmental process through social mobilisation and participation of people at all levels. The Plan strategy for the environment sector has been drawn up in accordance with the need to develop the required measures to protect the environment in such a way as to achieve sustainable development. This strategy relies more on initiatives and interventions through policies and programmes of different sectors, notably,

Health and Family Welfare, Transport, Rural Development, Energy, Agriculture, Fertilizers and Chemicals, Urban Development and Education.

Prior environmental clearance of developmental projects based on Environment Impact Assessment is being increasingly emphasised. Such clearance has been made mandatory for 29 specified categories of developmental processes. Several Area-Specific Programmes like the National River Conservation Programme and National Lake Conservation Programmes have been undertaken during the Ninth Plan. Special programmes have been formulated for the Himalayan Region, Coastal Regulation Zone and Islands for their integrated sustainable development with the rest of the country. The Plan also envisages Sector-Specific Programmes like strengthening the Central Pollution Control Board, implementing Industrial Pollution Prevention Project and the Common Effluent Treatment Plan.

Besides, a scheme for promoting the development and adoption of cleaner technology, including waste water re-use and re-cycling, has been formulated. Environment statistics and mapping are also part of the Ninth Plan. To conserve the representative ecosystem, a Biosphere Reserve Programme is being implemented. Programmes have also been launched for management conservation of wetlands, mangroves and coral reef systems. A National Policy and Macrolevel Action Strategy on Biological Diversity has been drawn up as a statement of strategies, gaps in our planning and further actions needed for conservation, sustainable use and realisation of actual and potential value of biological diversity.

The hope for the future of environment in our country is based on many positive factors---our rich biological diversity and natural resources, increasing number of peoples' movements focusing on environment, greater public and media concern for these issues and the spread of environmental awareness among children and youth.

Thank you.

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APPCED/7/GA/Country rep. 15

Iran
Hon. Dr. Ali Ghanbari
Member of the Islamic Consultative Assembly of the Islamic Republic of Iran

In the Name of God.

Economic development and social changes, particulary over the past decades, have had deep impacts on environment and Ecosystem. Undoubtedly, there is an interaction between development and environment and so no one may ignore the fact that nowadays the sustained economic development could not be achieved without taking into consideration the environmental factor. This is the reason that many countries have already integrated the environmental factor into the development plans.

As you are well aware, environment has gained a remarkable role in economic and social development. Hence many countries, including the Islamic Republic of Iran has rendered so much efforts to integrate environment considerations into development plans.

At present the Islamic Consultative Assembly of Iran is deliberating the Third five years Economic, Social and Cultural Development plan.

Of the 26 chapters of the above-mentioned plan, the chapter on environmental policies, have been given further importance.

To protect the environment and to optimize natural resources of the country, aimed at the accomplishment of the sustainable development, the Assembly has mandated the Government to undertake the following actions:

1. Preservation and protection of basic and genetic resources.
2. Basic resources integrated management.
3. Institutionalization of public participation in planning, decision making and implementation targeted at a balanced protection of ecosystem.
4. Promotion of public participation for achieving the aforementioned objectives, and working out persuasive and deterrent policies.

It is worth noting that the government of Islamic Republic of Iran, in order to carry out waste treatment, garbage disposal and reduce air pollution in the metropolis, will strongly observe the standards adopted by World Health Organization, in respect of pollution that may be hazardous to health.

One of the main objectives of the environmental policies provided for in the Third Development Plan are to establish well-defined limits for prevention of pollution and destruction of natural resources in the Caspian Sea, as well as the implementation of a integrated Coastal Management of this important natural tourist resort.

With these provisions that we are undertaking to protect environment and preserve the country's natural resources, and optimizing our capabilities to further develop our economy, we do not spare efforts to promote the cooperation among the countries of the Asia and the Pacific region. We would like to propose that in order to facilitate the cooperation among the countries of this region, these countries can promote their activities at sub-regional level. In the context of sub-regional arrangement, it will be much easier for the countries to exchange views and information and up to date technology in respect of protection of environment as well as the preservation and optimizing their natural resources.

Economic Cooperation Organization (ECO) is an appropriate sub-regional arrangement that can be conducive to further optimizing natural resources and it can also mobilize its capabilities for the protection of the environment in that area.

The member states of ECO over the past decades and particularly in the course of the last ten years, several more countries of the central Asia acceded to this organization, have promoted their cooperation in various areas including environment. There is no doubt that they can share their information and experiences in respect of environment and preservation and development of natural resources with others.

Last but not the least, the cooperation among all regional arrangements such as ASEAN, SAARC could be also beneficial to all.

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APPCED/7/GA/country rep. 2

Iraq
Sanitary Landfill

Dr. Dhahir J.S. Al-Habbo
Member of Iraqi National Assembly

Sanitary landfill represents a method of garbage disposal to protect the environment and to be used in the land reforming which is useful in poor Asian countries. The use of the method of sanitary landfill leads to the return of the land to its original level via the filing of the artificial pits. Also to improve its use in the future in the agricultural and industrial developments.

The sanitary landfill is the real treatment of wastes by not leaving them uncovered to avoid the bad smell and lead to the enhancement of the nature. It is the cheapest sanitary method for waste disposal, and it leads to the worthwhile land reforming which inevitably can be used in the agricultural development.

The sanitary landfill must not be randomly chosen and it is important to choose the places which require simplified controlled engineering methods to avoid any danger to environment.

The sanitary landfill must be carried out in layers not exceeding a depth of two meters which then are buried by soil (25 cm) on the same day the wastes are put in the pits. The burial process prevents the reproduction of insects and the spread of the bad smell and the destruction of fly larvae and the pathogenic germs due to the heat generated from the organic decomposition of the burnt materials.

The sanitary landfill represents the cheapest method of waste disposal and it is useful to be applied in the Asian and Pacific Countries and the rest of the civilized world.

The disposal of the uncovered and untreated wastes as is the case in many developed countries led to potential problem, the least of which are the reproduction of flies, contamination of underground water, reproduction of insects, the presence of harmful wild animals, the rise of bad smell as well as the ugly appearance of places which interfere with the beauty of nature.

The sanitary landfill leads to the decomposition of the burnt materials specially if it was well covered and will lead to the preparation of colloidal material called enzymes which decompose the fixed compounds.

The decomposition process in the areas of sanitary landfill leads to the increase of temperature in the filled areas so it will kill all kinds of pathogenic germs and harmful insects larvae.

The rise in temperature in Asian countries and east of the Mediterranean causes the death of the germs rapidly. Care should be taken in using deep pits and the process of sanitary landfill must be a way from households and dwellings.

The Sewage Disposal in Bagdad - IRAQ

The effects of sanctions and aggression on water and sewage disposals in IRAQ have caused great problems and I will take Bagdad as an example: Due to the failure of electricity, 262 pump stations and the two treatment plants in the city were completely stopped. This led to sewage flood over the ground covering 10% of Bagdad City, mainly in the housing areas. The aggression damaged 216 pump stations apart from those affected by electricity failure. 470 places on the network suffered major damages. These events resulted in 10 million M^3 / month of untreated sewage which were thrown and discharged to Tigris River, directly polluting it severely and leading to the huge death toll of the Iraqi children and people till now. As a result of destruction of the water supply stations and the shortages of chlorine, ended a high percentage of bacteriological contamination of water supply to the houses by more than 20%.

As a medical personal

It is important to mention few points on the management of medical wastes in developing countries. The management of medical waste requires diligence and care from all the personnel in the health care and the general public. There is a strong and a well-documented evidence that the main impact of improperly managed medical wastes is the cause of transmission of hepatic viral disease of the liver and AIDS specially in developing countries of Asia and Pacific. In my country IRAQ and particularly in Nineveh province for example, there is a sharp increase in viral hepatitis and increase of deaths in pregnant women which reached more than 13%. This is because of the aggression of 1991 and the unfair sanctions imposed by the Americans on my country which prevent us from having any mean to prevent such catastrophe.

The Disposal of the Uranium used by the Americans and the British during their aggression on IRAQ in 1991

The DU (disposal of uranium) used by the American and the British against IRAQ is a real danger and requires strong action to help my country in disposing more than (40 tons) of DU left behind by the American and the British as reported by the United Kingdom Atomic Energy Authority (AEA). To this concern, more than 40 tons of DU in IRAQ carried with it tens of thousands of potential deaths as reported by an independent British newspaper. The death tolls from cancer in children especially and in adult have increased by more than 20 folds and are still rising according to IRAQ cancer registry. For all these facts, I urge the parliamentarians of Asia and Pacific to take the initiative to stop the on going aggression by the Americans and the British on my country. Also, I urge you all to ask your governments to leave the unfair sanctions imposed upon my country, to improve the environment and fight the diseases that kill our children and the elderly people daily.

Accept my best regards.

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APPCED/7/GA/Country rep.13

Korea
Korea's National Report on Waste Management

1. Trends of Waste Generation

The total amount of the nation's waste generation had been dropping gradually until 1993, when it began to increase again. Entering into the 1990s, the generation of municipal waste has been steadily decreasing while industrial waste has been on a steep rise. With 1993 as a turning point, the volume of industrial waste generated began to exceed the volume of municipal waste generated, as is shown on Figure 1. Per capita municipal waste generated dropped to 0.96 kg per day in 1998 from 1.3 kg per day in 1994.

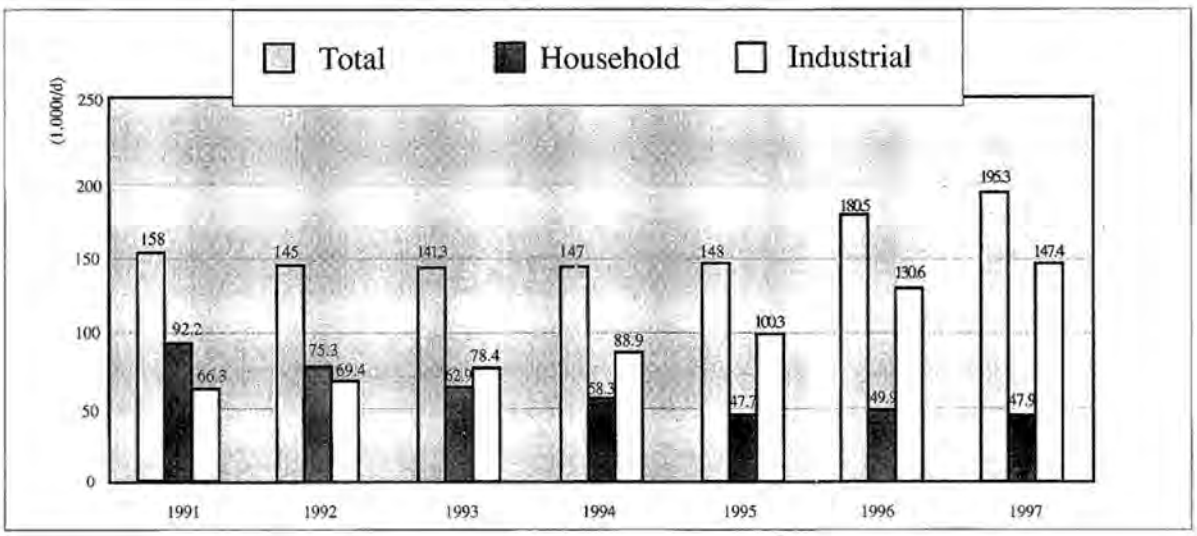

Figure 1. Trends of Waste Generation

Municipal Waste

A notable trend of municipal waste generated is that the percentage of combustible waste is on the rise. In 1991, combustible waste accounted for 57% of the nation's total municipal waste generated. The corresponding figure rose by 2.3 percentage points to 59.3% in 1998. The change in composition can be explained by the fact that plastic packaging waste and paper waste increased due to a rise in consumption in proportion to a rise in income levels, while non-combustible wastes such as coal briquette ash decreased.

General Industrial Waste

Although the percentage of combustible wastes of general industrial wastes is in a steady increase, non-combustible wastes still accounted for 70.2% of the nation's total general industrial wastes generated in 1998. Such a high percentage was due to the fact that general industrial wastes consisted of slag, ash, dust, and construction wastes.

2. Waste Treatment

The percentage of waste dumped into landfills of the nation's total wastes generated is dropping drastically; conversely, an increasing volume is being recycled. The percentage of the volume of waste incinerated is also on a steady rise.

Municipal Waste

In 1991, 89.3% of municipal wastes generated were dumped into landfills and only 7.9% of total wastes was recycled. In 1998, thanks to the Volume-based Collection Fee System, the ratio of landfill wastes dropped to 56.2% while the recycled ratio rose to 34.9%. The shows that the trend of waste treatment is moving in the desired direction. In spite of the fact that combustible wastes accounted for as high as 59.3% of total municipal wastes generated in 1998, only 8.9% of these were incinerated. This problem should be corrected at the earliest possible date given the small land size of Korea.

General Industrial Waste

27.1% of general industrial wastes were dumped into landfills in 1998, 14.7% less than in 1992. 67.6% of general industrial wastes was recycled by recycling agents, up 11.2% from 1992. The non-combustible waste percentage of general industrial wastes is relatively high, and the incineration ratio is rinsing slowly.

Teble 1. Methosd of Waste Treatment in Total

	1993	1994	1995	1996	1997	1998
Total	141,383 (100)	147,049 (100)	148,041 (100)	180,800 (100)	194,700 (100)	188,600 (100)
Landfill	76,449 (54.1)	76,5656 (52.1)	65,969 (44.6)	69,847 (38.6)	74,059 (38.0)	63,181 (33.5)

(unit;t/d)
Note : Figures in ( ) indicate percentage

Table 2. Municipal Wastes Disposal

	1991	1992	1993	1994	1995	1996	1997	1998
Landfill	89.	89.	86.	81.	72.	68.	63.	56.
Incineration	1.6	1.5	2.4	3.5	4.0	5.5	7.1	8.9
Recycling	7.4	7.9	11.	15.	23.	26.	29.	34.
Other	1.7	1.4	-	-	-	-	-	-

(unit ; %)

Industrial waste disposal agents treated major portions of the total general industrial waste generated. The self-treatment ratio of generator, on the other hand, stands at 14%

Table 3. General Industrial Waste Disposal

(unit ; %)

	1992	1993	1994	1995	1996	1997	1998
Landfill	41.	31.	34.	32.	28.	30.	27.
Incineration	1.8	1.9	4.6	5.9	5.2	4.9	5.3
Recycling	55.	66.	61.	61.	66.	64.	67.

3. Waste Management System and Policy Direction

1) Waste Management System

The Waste Management Act provides for matters pertaining to the responsibilities of waste management, waste management planning, standards for waste management, and the waste treatment business. The Act Relating to Promotion of Resource Saving and Reutilization deals with matters regarding basic plans for recycling of resources, the deposit-refund system, and packaging of waste management. The Act for Promotion of Waste Treatment Facilities and Support for Local Communities provideds for matters regarding the procedures to select site of waste treatment facilities, and environmental study on and support for the local commnunities in the vicinity of waste treatment facilities. The Act Relating to Transboundary Movement of Wastes and Their Disposal is about matters stated in the Basel Convention, which is designed to control environmental pollution entailing the import and exports of wastes.

The collection, transportation, and treatment of municipal wastes are all the responsibilities of municipalities, industrial waste should be treated by generators. The government formulates basic policy directions for overall waste management, and provides financial governors are responsible for providing financial support to and coordination between lower level local governments under their jurisdiction.

The priorities of waste management are, in order of importance: reduction in the volumes of wastes generated : recycling and reutilization : recovery as energy resources : incineration and dumping into landfills. (The first three are referred to as "minimization efforts") Under the basic principle of minimization, industrial waste minimization systems and product charges to increase environmental consideration of products are applied during the production stages. During the distribution stage, various measures for restriction on excessive packaging, encouragement of production of refillable and reusable packages and containers, and reduction in packaging material are being taken. At the consumption stage, the Volume-based Collection Fee System for Municipal Wastes and other measures discourage the use of disposable goods. The Deposit-refund System applies to packaging containers, lubricating oils and household electric appliances. According to this system, the producers of these products are held responsible for retrieving and recycling. During the waste treatment stage, the government applies standards which have established for storage and transportation of wastes, and operation and management of waste treatment facilities.

The government established the Comprehensive Waste Management Plan in 1996 for the systematic management of wastes. The plan is a revision of the Comprehensive Waste Treatment Plan (1993-2001) formulated in 1993. This plan was revised due to more recent changes or the implementation of the Volume-based Collection Fee System for Municipal Wastes (1995) and the system for local government autonomy. It was also partly revised due to changes in long-term objectives.

2) Policy Direction

The ultimate objectives of waste management policy are to preserve the environment and allow every citizen to live in pleasant environment by reducing the environmental load incurred by wastes.

To this end, efforts must be made to promote recycling of resources based on the principle of environmentally sustainable development rather than simply treating the volume of wastes that is generated. Furthermore, efforts should be made to preserve the environment: the environment should be left as intact as possible for future generations to enjoy. In the 21st century, only environmentally sound nation will formulate policy for waste management under the following basic principles ;

First, the government will make efforts to attain policy goals efficiently by rationally assigning roles and responsibility to members of the community. In particular, for product wastes, the principle under which the manufacturer, consumer, central government, and local governments will share responsibility will be respected and the responsibilities for waste management will be established accordingly.

Second, the priorities of waste management will be maintained. That is, in order of importance, the priorities will be placed on : prevention or reduction of the volumes of waste generated, reuse, recycling, energy resource recovery, incineration, and landfill in waste management.

Third, measures to attain policy goals will be improved step by step with the intention of realizing both environmental benefits and economic efficiency. In particular, rather than setting out detailed regulatory standards, the government will abide by the general principle that it is more efficient for the government to assign goals to the private sector and alllow it the autonomy and opportunity to devise means needed to attain the goals on its own.

Fourth, the government will increase the opportunities for the private sector to engage in waste management, thereby accelerating the efficiency gains in waste management, the development of viable treatment technologies, and the accumulation of know-how in waste management.

Fifth, the environmental information management system will be made public, and opportunities for the general public to voice its opinions will be extended to ensure that major policy decisions are made based on scientific and appropriate information.

In particular, in order to attain the goals of the comprehensive plan for waste management, the economic instruments for waste management should be made more efficient. After the Volume-based Collection Fee System was implemented, the system for collection of separated wastes was improved drastically. Nonetheless, as there is no recycling system to accommodate the increasing volume of recyclable goods collected, recyclable waste collection sites are increasingly overloaded.

In order to reduce the volumes of waste generated and to promote recycling, a waste management system will be established for each stage of waste flow. For each stage of collection, transportation, sorting, and recycling the responsibilities of all persons concerned will be clearly defined so that concrete results will be produced. In particular, with regard to packaging wastes and household electric appliances, which account for a considerable portion of all municipal wastes and most recyclable wastes, the roles and responsibilities of manufacturers and consumers will be clarified.

4. Waste Minimization

The concept of waste minimization engenders reduction in the volumes of waste generated, reutilization of waste, and use of waste as forms of energy. This concept defined

in order to provide the regulatory authorities a more flexible choice in establishing their policy priorities and to attain policy goals more effectively. Korea's waste minimization policy can be seen by each life cycle:

1) Waste Minimization during Production Stage through the mechanism of system for waste minimization at production sites and product charge system.

Under the system for production site minimization, companies are required to reduce wastes by improving the production processes and recycling. The purpose of the product charge system is to make manufacturers consider the full environmental impact of their products at the production stage. It is designed to encourage the manufacturers to make their products more environmentally sound.

2) Waste minimization during the distribution stage by packaging regulation policy.

An estimated 5.6 million tons of packaging materials are used for the distribution of goods every year, which account for 36.8% of the nations total volume of municipal waste generated. Manufacturers and food processors can greatly reduce the generation of packaging waste very simply by not using unnecessary packaging and by using recyclable packaging materials, producing easily recyclable packaging materials, and establishing effective recycling systems.

At present, under Article 15 of the Act Relating to Promotion of Resource Saving and Reutilization, and the Packaging Method and Packaging Materials Regulations, restrictions are placed on excessive packaging and on the use of PVC, the production of refillable products is encouraged, and the generation of packaging waste is minimized. Recycling is managed through the Deposit-refund System.

In August 1995, the Directives to Reduce Synthetic Resin Materials for Packaging of Household Electric Appliances, which included annual goals to reduce synthetic resin packaging materials for the protection of household electric appliances were announced by public notification. The Directives on Annual Reduction of Synthetic Resin Packaging Materials were announced by public notice in July 1996. The directives set forth the packaging reduction or recycling quotas for business establishments that manufacture or import such products.

3) Waste minimization at the consumption stage through the volume-based collection system for municipal wastes and regulation on the use of disposable goods.

The objectives of the Volume-based Collection Fee System for Municipal Wastes are to minimize the generation of waste and encourage households to separate their wastes for recycling. The system was put into effect nationwide on January 1, 1995. Untill that time, waste collection fees have been calculated for each residence based on the level of property taxes imposed on houses or apartments, or the size of buildings regardless of the actual volume of wasted that residents generated. The Volume-based Collection Fee System strongly adheres to the "Polluter-Pays Principle".

Household waste should be discarded in the officially designated plastic trash bags, which are manufactured and sold by city, county, and district governments. These regulations, however, do not apply to the discharge of burned coal briquettes and recyclable wastes including paper, waste iron, metallic cans, bottles, and plastics. These are collected at

no charge if discarded properly at designated locations as determined by the local governments. Local governments also have the discretion to set the collection fees for discarded furniture and major home appliances. Wastes collected during street cleaning and park cleaning may be discarded in trash bags for public purposes provided free of charge. The prices of official trash bags are determined by ordinance of the local municipal and county governments after consideration of waste treatment costs and the financial state of the local government in question. Though the implementation of this system has resulted in a large reduction in waste and increase in recycling, the 20,000 tons of non-decomposing standard bags sold yearly for the system could create environmental problems. Therefore, to solve this problem, the government plans to use bags made of biodegradable materials. Polyethylene, the material currently used in the systems bags, requires an extremely long time to decompose in a landfill, but biodegradable materials, like starch or aliphatic polyester, are decomposed by bacterial into CH4, CO2, water, etc. in only a few months. However, bags made of 100% biodegradable materials are weak and expensive. The government, therefore, is first promoting the supply and use of bags made of 100% biodegradable materials are weak and expensive. The government, therefore, is first promoting the supply and use of bags made of more than 30% biodegradable materials and then raise the ratio of biodegradable materials in stages.

Regulations on the Use of Disposable Goods was introduced as a means to reduce the wastes at the consumption stage. The convenience of disposable goods is causing their use to expand. The synthetic resins contained in the plastic bags, shopping bags, styrofoam containers, etc. that make up the bulk of disposable waste generated daily (1,035 tons/day, 380,000 tons/year) are causing many problems in waste management because they are difficult to recycle and do not decompose in landfills. Therefore, following the Act relating to the Promotion of Resource Saving and Reutilization, which saves resources and controls waste generation, the system for restraining the use of disposable goods was amended in February 1999. (Table 4)

Table 4. Regulated Disposable Goods

Workplace	Regulated Items
Restaurants	disposabal cups, containers, and plates, plastic chopsticks toothpicks, disposable spoons, forks, knives, etc.
Stores (Department stores, shopping centers, and those with floor space exceeding 33 square meters)	disposabal bags (can only be purchased by customers at stores)
Food processing industry and packaged fresh food sellers	disposable synthetic lunchboxes
Bathhouses and accmmodations	disposable razors, toothbrushes, toothpaste, shampoo, and conditioner (can only be purchased by customers)

Additionally, minimization of food wastes by various measures like improvement of institutional systems, economic incentives and public relations and campaigns was pursued.

4) Recycling of wastes is promoted through various mechanisms like separate collection of recyclable goods, deposit-refund system, fostering recycling industry and expansion of public recycling system.

5) Followings are some other measures took recently in order to solve the standing problems associated with wastes.

☐ Treatment Guarantee System for wastes neglected by waste disposal businesspeople

Although wastes neglected by waste disposal businesspeople who do not have the ability to properly treat them have had negative impacts on the environment, like polluting the nearby environment and threatening the health of the citizens, there have been no fundamental measures to solve this problem.

Previously, wastes neglected by waste disposal businesspeople were treated in their stead by administrative organizations, which collected the costs from the person neglecting the waste. However, in actuality, the administrative organizations were unable to collect the treatment expenses, as, for the most part, the businesspeople neglecting the waste had no financial ability to pay due to bankruptcy or other reasons.

Therefore, in order to guarantee the treatment of wastes neglected by waste disposal businesspeople, the amendments to the Waste Management Act require that businesspeople choose one of the three following methods and that permits be cancelled if one of these methods is not implemented.

- Waste disposal businesspeople form a Mutual-Aid Association to finance the treatment expenses for members that are unable to dispose of waste properly.
- Waste disposal businesspeople sign an insurance policy with an insurer guaranteeing the treatment of neglected wastes.
- Waste disposal businesspeople make a treatment security deposit in advance in the amount necessary to treat the neglected waste.

☐ Stronger Management of Infectious Wastes

There has long been concern that inadequately treated infectious wastes could damage citizen's health and the environment. In the past, however, infectious wastes were managed separately by the Medical Service Act or the Waste Management Act, depending on the source. In other words, the infectious wastes of medical institutions were managed by the Ministry of Health and Welfare in accordance with the Medical Service Act, and, and similar wastes generated by research centers and other organizations were managed by the Ministry of Environment in accordance with the Waste Management Act.

As standards for establishing infectious waste treatment facilities, licensing treatment businesses and punishment are weaker in the Medical Service Act than in the Waste Management Act, there were concerns about inadequate treatment. However, following the unification of infectious waste management under the Ministry of Environment, management standards are to be strengthened from August 2000; for example, the incineration temperature for infectious wastes (at the entrance to the combustion chamber) is increased from 700° C or higher to 850° C or higher, and the retention time of waste gas in the hot zone is newly regulated.

☐ Measures to secure transparency for compliance regulation in the disposal of specified wastes

When discharging specified wastes for the first time, to confirm the route of the wastes' disposal, the discharger shall submit to the Minister of Environment a disposal plan, the results of an analysis of the wastes, and confirmation of a disposal contract issued by a contractor.

Whenever contracting out the disposal of specified wastes, the discharger shall fill out six vouchers to verify the transfer of the wastes between two parties and submit two of them to the Minister of Environment. Dischargers of small amounts of specified wastes shall fill out four vouchers, which shall be kept by the dischargers and contractors who collect, transport and dispose of the wastes.

At the end of each calendar year, the dischargers of the specified wastes shall submit to the Minister of Environment a yearly report on each waste's classification, amount, and disposal method.

If any waste transporter or disposing contractor or discharger violates regulations for the first time, they shall thereafter obtain approval in advance from the supervising authority whenever transporting or disposing of wastes. If they commit an additional violation, supervisors appointed by the government shall be stationed to watch the actual conditions of the waste disposal.

☐ Stricter Punishment Regulations to enhance the Compliance of the Law

If a business illegally dumped wastes or disposed of them in an unlicensed landfill, the punishment was imprisonment of up to two years or a fine of up to ten million won (about $8,330). This has been greatly streatly strengthened to imprisonment of up to seven years or a fine of up to fifty million won (about $41,650). It is also now possible to administer both punishments together.

If a business infringed on the treatment standards of a licensed landfill, the punishment was imprisonment of up to two years or a fine of up to ten million won (about $8,330). This has been increased to imprisonment of up to seven years or a fine of up to twenty million won (about $16,660). It is also now possible to administer both punishments together.

5. Recommendations

It is very important to understand that minimization is prior to reutilization of wastes. Therefore it is needed that advanced techniques and successful case studies on wastes minimization are exhumed and popularized.

It is desirable that government intercedes to export the advanced recycling technologies which developed by local firms to the foreign countries because recycling firms usually do not have a reserve of energy to be interested in it.

Wastes minimization and reutilization is one of major national agenda. It is recommended that recycling and its related courses are established in the graduate schools, universities and colleges. Of course, environmental engineering and its related courses deal recycling but it is more desirable that experts should be cultivated in the typical department on waste recycling.

If companies take some benevolence and incentives from the government when they reduce the discharge of wastes or increase the reutilization of wastes remarkably, wastes minimization and recycling can be promoted.

Producer's responsibility in recycling has been enlarged because the role of producers is most important and fetal in waste minimization. Producers have the biggest influence on reducing wastes, modifying designs and developing new products that are easy to be recycled. Also producers act upon greatly as consumers of raw materials recycled. And distributive systems of producers are very useful for the recovery routes of wastes.

In this sense, every producer has to make the detailed and firm program to recycle his products. Moreover practical morality and compendium of producers are demanded.

Producers' responsibility may be bigger as the size of company is bigger. Therefore the large companies take the lead in the practice of minimization. It will be a good opportunity for themselves too if they inaugurate a combined institute for minimizing and recycling wastes. In this institute, they can exchange information and cohost in R&D activities.

Every institute should act in concert with other institutes organically and systematically to exchange information mutually and distribute them to recycling industry.

Programs of education for the children and publicity activities for the citizens on wastes minimization and reutilization are required. These programs can be prepared by the institutes concerned. For instance, the educational institutes and/or the organs of expression are able to draw up the detailed programs.

Transfer of waste related technologies are to be facilitated in order to meet the targeted goals in waste minimization in Asia-Pacific regions. Public-private partnership must be enhanced to meet this purpose. In this sense, governments of the Asia-Pacific region must fully support the study of the role of publicly-owned technology transfer. Furthermore, exchange of information and other educational programs can be promoted with the aid of international like World Bank and APEC.

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Korea
The Cheju Initiatives
Dr. Il-Chyun Kwak
Expert in Waste Treatment of Urban Areas

The International Experts Meeting was attended by representatives of governments, international organisations and non-governmental organisations (NGOs) from countries in East Asia and selected participants from other regions of the world.

The aim of the Meeting was to focus attention on the issue of sustainable consumption in the rapidly developing economies of East Asia where rising income levels have already produced a class of affluent consumers whose consumption patterns are similar to those of developed countries.

Whilst recognising that the need to meet basic consumption requirements of their poorer citizensa remains a critical issue for developing countries, the Meeting was designed to focus on the direct and indirect environmental impacts of consumption among higher income groups. The Meeting also recognised that efforts to address the issue of sustainable consumption need to be accompanied by measures focusing on production.

The Expert Meeting considered three themes:

1. The environmental impact of rising income levels in East Asia;
2. The impacts of globalisation;
3. The role of traditional lifestyles and cultural values in promoting sustainable consumption patterns.

The Meeting agreed the following general conclusions:

- Since sustainable consumption is concerned with the quality of consumption (not only the quantity) it is relevant to countries even before they are fully developed;

- Consideration of sustainable consumption issues is important to developing countries in order to avoid repeating the consumption patterns of developed countries - once established, consumption patterns are difficult to change

- Consumption patterns become more unsustainable as incomes rise and do not improve automatically : policy intervention is necessary to reverse the trend

The specific conclusions and recommendations agreed by the Meeting in relation to each of the themes were as follows:

Theme 1 : The Environmental Impact of Rising Income Levels in East Asia

Conclusions

The consumption patterns associated with rising income levels in East Asia are a significant cause of many environmental pressures in particular those due to rapid increases in road transport, solid waste, water pollution and land degradation.

The consumption patterns of particular concern are the widespread increases in personal demand for (among others) transport, housing, luxury goods, non-traditinal food and clothing and energy intensive products e.g. home appliances.

Several policy tools are available for moving toward the goal of sustainable consumption. These include legal and regulatory approaches; economic instruments; and education and information.

The East Asian financial crisis has reduced consumption across all sectors of society and has stimulated renewed consumer interest in local products. The crisis offers important opportunities to re-evaluate the regions development strategies; to introduce policies for sustainable consumption as part of the reform process e.g. removal of perverse subsidies; and the stimulate sustainable local production of consumer goods.

Recommendations

Government policies for sustainable consumption should involve a mix of instruments. Environmental education at all levels and economic instruments are particularly important. The aim should be to enable consumers (individuals, businesses and public authorities) to make more sustainable choices.

All efforts to promote sustainable consumption should : respect consumer freedom and cultural diversity; include appropriate safeguards to protect low income and vulnerable groups : involve public participation and debate of the options at the earliest possible stage.

Theme 2 : Impact of Globalization

Conclusions

Globalisation presents a number of important challenges to, and opportunities for sustainable consumption in East Asia. These relate to the increased international flows of trade, investment, technology and information including advertising.
The Cheju Initiative

The key challenges are : rapid spread of unsustainable consumption patterns and raised consumer aspirations; direct environmental impacts of increased international trade activity (eg transport; packaging); reduced consumer awareness of the environmental impacts of non-locally produced goods; competition for investment acting as a disincentive for higher

environmental standards in industry; undermining markets for local products which may be more sustainable. Advertising plays a major role.

The key opportunities arise from enhanced access to information. This includes data on environmental and consumption trends, information on policies and programmes; consumer rights; balanced product information; environmental performance of multi-national companies etc. The internet and new television technologies provide new opportunities for networking and for local and community TV programming.

Recommendations

Work is required to find new mechanisms or strengthen existing mechanisms to make trade liberalisation more compatible with sustainable consumption.

There should be more information-sharing between governments and industry on policies, programmes and research relevant to sustainable consumption.

Actions to influence advertising should be considered e.g. harmonisation of international codes on advertising; adoption of environmental management standards by the advertising industry; introducing environmental taxes on advertising etc.

There should be improved co-operation between government, business and NGOs to identify media opportunities for promoting sustainable consumption;

There is a need for all multi-national corperations to apply uniform environmental standards in their operations world-wide that match or exceed the highest applicable national standards.

There is a need to promote environmentally sustainable local products and services including tourism.

Studies should be undertaken on the implications for sustainable consumption of trade agreements, tax regimes, subsidies and regulation and the role of the global media; the potential for multi-lateral and bi-lateral agencies to promote sustainable consumption should also be developed.

Sustainable Consumption Patterns : Trends and Traditions in East Asia

Theme 3 : The Role of Traditional Lifestyles and Cultural Values in Promoting Sustainable Consumption Patterns

Conclusions

Traditional lifestyles and cultural values in East Asia and elsewhere often provide a source of ecological wisdom that can serve as a basis for enhancing the sustainability of consumption.

Relevant values that may contribute to sustainable consumption include community spirit, harmony with nature, caring and sharing, frugality and strong family ties.

There are opportunities to find a balance between traditional and modern approaches to consumption e.g. in house-building, natural resource management, locally produced food and clothing.

Policies drawing on traditional values and lifestyles should reflect and build upon the diversity of cultures found in contemporary Asia.

Recommendations

There is a need to identify and record those traditional practices which have the potential to constribute to sustainable consumption with a view to disseminating "best practice".

There is a need for broad co-operation nationally and internationally on the promotion of cultural values which could contribute to sustainable consumption and a need to bring together organisations working in the cultural and environmental fields.

Active steps are needed to integrate and promote appropriate traditional values in education, arts and the media.

Next Steps

The participants welcomed the opportunity provided by the Cheju Meeting; it is an important initiative in identifying the relevance of sustainable consumption to developing countries.

The participants at the Meeting committed to maintain the momentum created at the Cheju meeting and to further stimulate consideration of sustainable consumption issues in East Asia.

The participants also agreed that further detailed research should be undertaken to analyse in detail the links between sustainable consumption and rising income levels, globalisation and traditional values.

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Lao PDR
Hon. Bouasy Lovanxay
Head of the Lao National Assembly

H.E. Mr. President, Honorable Delegates,
Distinguished guests, Ladies and Gentlemen,

It is indeed our great honor to be invited to the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development being held in the beautiful City of Chiang Mai, the "Rose of the North".

On behalf of the National Assembly of the Lao People's Democratic Republic, I would like to convey heartfelt congratulations and thanks to the Parliament of Thailand, to the people and authorities of the Host City for the warm welcome and hospitality accorded to our delegation.

Mr. President,

Each APPCED General Assembly constitutes an event of great significance in forging substantial cooperation in the field of environmental protection and development among countries in the Asia-Pacific region. The issues of environment and development are central to all human progoress in the time of globalization, especially when we are preparing for the next Century. The 6th APPCED General Assembly held in Guilin, the People's Republic of China last year highlighted ways and means to achieve harmonization between development and environmental protection. Now we are here to find concrete solutions to chronic problems of urban societies : Waste treatment and Garbage disposal, the very issue highlighted by the 101st IPU meeting.

Mr. President,

Due to its unique specification of location, my country, Laos has an important role to play in the environmental protection drive within its own border and with other neighboring Countries : China, Vietnam, Cambodia, Thailand and Myanmar. Larger portion of Lao territory is washed by the Great Mekong compared to other riparian countries. We have more rivers that feed into the Mekong. Most urban areas are found on the banks of rivers, among them four main cities : Vientiane, Luangprabang, Savannakhet and Pakse are located on the bank of the Mekong River, therefore, to keep the Mekong free of Waste and Garbage constitutes both domestic and international obligations.

Bearing in mind the importance of environmental protection in general, and the Waste treatment and Garbage disposal in particular, the Lao Government has attached special attention to sustainable development strategies such as : integrated rural development plan,

termination of slash and burn cultivation project, afforestation and forest conservation projects, embankment and so on.

In conjunction with the efforts made to keep balance between socio-economic development and environmental protection, the National Assembly has enacted a number of relevant laws. The 1991 Constitution, article 17 stipulates that all organizations and citizens must protect the environment and natural resources : land, underground, forests, fauna, water sources and atmosphere. More recently, Laos has promulgated a series of laws contributing directly and indirectly to the amelioration of the protection of environment such as the laws on water and water resources, land natural resources, mining, electricity urbanization and others. All laws on socio-economic development have special provisions dealing with waste treatment and garbage disposal. Take for example, the law on the promotion and management of foreign investment which encourages the protection of environment by assuring investors on with attractive policies and congratulations. In March, this year, our National Assembly approved the law on environmental protection. Apart from general provisions on environmental protection, the law also deals specifically with waste treatment and garbage disposal. The law defines in detail waste pollution, soil pollution, air pollution, toxic chemical pollution, radioactive pollution, on pollution arising from disturbing vibration, sound, light, color and smells. The law further provides that individuals and organizations are obliged to participate in pollution control, and businesses that undertake activities that create pollution must use pollution control equipment in accordance with the prescribed environmental quality standard.

The law also requires manufacturing businesses to use advanced technology which is suitable to the actual socio-economic circumstances, to minimize the environmental impact. Individuals and organizations are obligated to deligently take part in the rehabilitation of the environment.

Mr. President,

For us, the issues of waste treatment and garbage disposal are still new. Nevertheless, the issues rank first in our urbanization process. The very first solid garbage disposal project in the capital city Vientiane started 7 years ago with financial assistance from JICA, Japan. At the first stage, the project focussed on locating waste dumping sites, the creation of "Clean Vientiane Campaign", the introduction of relevant technology for waste treatment, the reusing and recycling of wastes. The recent statistics show that Vientiane Municipal area produces 250 tones of garbage daily, but only 36% of the garbage is disposed properly. Now the project has conducted feasibility study in other 3 main cities: Luangprabang, Savannakhet and Pakse.

However, the project still has a long way to go to solve the following problems caused by:

- Large portion of waste is not routinely collected
- Collection of vehicle fleet is old and subject to frequent breakdowns
- Crude open dumping is adopted at the present disposal site, causing environmental problems, and last but not least,
- Financial and auditing procedures are in need of revision.

We strongly believe that, through proper implementation of the recently promulgated law on environmental protection and other relevant legal measures. We will gradually succeed in coping with waste and garbage problems.

Thank you for your attention.

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Lao PDR

Introduction

The Lao PDR is among the least developed counties in the world and bounded by Thailand, Myanmar, China, Vietnam and Cambodia. The country has an area of 236,800 Km2, which supports a population of 4.5 million people (1995) that is growing by 2.6% annually. The per Capita income has reached US$ 325 for 1994. Its economy is virtually undiversified and depends largely on the country's natural resource base. The country is favored with its abundant natural resources, namely forests, biological diversity, water, mineral and land. While the country's rich forestry resources have already been largely exploited, mineral, biological diversity, and water resources remain almost untouched. Ecosystems are still quite intact due to the low population density and the difficult terrain.

The aim of the Lao government is to undertake the national socio-economic development with minimal impact to the environment, with sustainable use of the national natural resources while preserving its customs and traditions. This will has been reflected in all national Socio-Economic Plans, in the constitution, in legislation, in the national Environment Action plan as well as in the national Priority Programs. It is a declared goal of the Government to lift the country out of poverty, so that by the year 2020 it would be among the developing countries (i.e. no longer among the least developed countries).

The Government recognizes the need to strengthen the established institution in charge of overall environment management and the necessity to define a legal and regulatory framework and procedures across sectors which ensure environment concerns become and integral part of development planning.

Environmental issues in the Lao PDR

The main environmental problem in the Lao PDR is deforestation, especially the degradation of forest resources from your to year. The reduction of forest resources is average 300,000 ha per year.

Causes of the deforestation are:

- Slash and burn cultivation;
- Illegal logging;
- Encroachment of farmers into forest areas by expanding agricultural land;
- Forest fires;
- Unsustainable rate of annual timber extraction.

The environmental consequences from deforestation are:

- Degradation of watershed areas;
- Increasing sedimentation;

- Erosion;
- Natural disasters, such as: floods droughts, landslides;
- Air pollution

Beside the deforestation, there are some other environmental issues originating from industrial, mining, transport development. Because of the national social and economic growth is not well developed yet, environmental concerns within those development sectors are still minor. But we think that future development in those sectors is expected to negatively affect natural resource base, unless adequate safeguards are adopted. The government also recognizes the need to establish an adequate institutional structure in charge of overall environmental management and the need to define legal and regulatory framework and procedures across sectors, which ensure that environmental concerns become an integral part of development planning. More recently, other issue being the subject of increasing concern is related to the urban development. Existing water supply systems in different towns are generally in poor condition. Ground water contamination is slowly becoming a serious issue in the capital or other cities, both from industrial and domestic wastes.

Environmental management and Protection in the Lao PDR

Before the year 1993, The Lao PDR has not any agency which was responsible for overall environmental management and protection. Environmental issues have been managed by various government sectors according to their responsibilities, for example;
Ministry of Agriculture and forestry is responsible for forest resource management and protection;

- Ministry of Industry and Handicraft is responsible for environmental management and protection relating to industrial activities;
- Ministry of Communication, Transportation, Post and Construction is in charge of environmental management pertaining to urbanization and transportation;
- Ministry of Public Health is responsible for human health, clean water;
- Ministry of Education is responsible for environmental education, public environmental awareness and others;

The environmental management and protection activities in the Lao PDR had not well developed yet in the past, because it lacked coordination activities between and among line ministries.

Therefore, the Lao Government set up the Science Technology and Environment Agency (STEA) in mid 1993. STEA is a government agency and it is under the Prime Ministry' Office. STEA is responsible for overall environmental management throughout the country and it is a main coordinator for environmental management and protection.

To ensure the effective environmental management and protection, STEA has established an Inter-Ministerial Working Group on Environment (IMWGE). This group consists of representatives from line ministries concerned, such as: Ministry of Public Health, Ministry of Agriculture and Forestry, Ministry of Industry and Handicraft and so on. IMWGE helps STEA review and evaluate environmental impact assessment report of major proposed development projects. However, until now, environmental activities have not been well performed and developed yet because of the lack of qualified staff, limited personnels,

insufficient budget. It also has not enough environmental management and protection tools, such as laws, regulations, standards and guidelines. The Lao President has just enacted the Environmental Protection Law on 3 April 1999 as National Law 20/99.

However, the Lao government has clearly outlined policies on environmental management and protection. To integrate it into the national social and economic development plans.

In terms of waste management in the Lao PDR, it is not clear and still confusing on responsibilities between among line ministries and local authorities. Sources of wastes are from industrial sectors, households, hospitals, hotels, markets and other places. In fact, the disposal of waste is under the responsibility of local authorities, for example the collection of garbage, the waste disposal by incineration, burying and other methods of disposal.

Reusing and Recycling of wastes in the Lao PDR are activities which have not been yet developed because of the lack of funding, technical officials, techniques and technologies.

The Lao government encourages and mobilizes people and various activities in reusing and recycling of wastes according to their abilities for reducing the number of wastes and saving natural resources.

Some kinds of solid waste have been reused and recycled in the Lao PDR, such as:

Reusing:

Bottle
Plastic bags

Recycling:

Recycling of paper

In terms of commercial activities, the people and producers have been encouraged and promoted by the government to use all techniques and technologies to reduce the amount of wastes.

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Mexico
Current situation on waste treatment and garbage disposal in Mexico

If generation per capita of solid municipal residuals in Mexico is compared to that of other countries members of the Organization for Economic Co-operation and Development (OECD), data shows that it is inferior to all of them. However, Mexico faces big challenges due to its high index of demographic and industrial growth, as well as for the consumption habits of its inhabitants.

The above-mentioned, joined by the continuous migration of the rural population to the urban centers, have resulted in a substantial change in the amount and composition of solid municipal residuals generated daily. This generation increased from an average of 300 grams per inhabitant per day in the decade of the 50 to 853 in 1998. It is important to point out that the population increased in the same period in around 30 million, occasioning the volume of solid residuals to reach an approximate figure of 83.830 daily tons at a national level.

Besides an increase of nine times the residuals generation, its composition has been modified from organic type to materials whose decomposition or degradation is much slower.

In terms of collection, we have a figure of 83% of the total solid residuals, which represents a volume of 69.600 tons; this means that around 14 thousand tons are dispersed daily to open sky. This collection occurs unequally between regions, achieving a 95% in the 7 metropolitan zones of the Republic but only 60% in the rural areas.

As for the largest waste disposal refers only 49% of the residuals are disposed in controlled places, adding about 41 thousand tons per day. Again, appropriate is disposal is unequal in Mexico since in the metropolitan zones it reaches an 85% of the residuals while in the small urban areas it is around 10%

In Mexico, the handling of solid municipal residuals, as a public service, is a responsibility of both state and municipal authorities.

The States, through Local congresses legislate in this matter while the Municipalities approve Regulations and have administrative institutions that take charge directly of the public service consistent in; collection, sweeping of streets, transport of residuals and final disposal.

It is important to say that waste management is regulated by a federal disposition; Article 115, III Fraction, of the Mexican Republic Political constitution, that declares the

Municipalities responsible in this matter. In terms of general environmental dispositions our constitution has 3 more articles; article 4, article 25 and article 73.

In an effort to promote environmental protection and to improve the quality of life of the Mexicans, the General Law for Ecological Balance and Environmental Protection was approved by the Congress in 1988.

The last legislation, reformed in December of 1996, although recognizes the competition of States and Municipalities in order to regulate and manage solid residuals, additionally authorizes the Federal Government, through the Secretary of Environment, Natural Resources and Fishing (Semarnap), to elaborate official norms to structure the public service of cleaning.

Considering that the only way of achieving a sustainable handling of the residuals is through the participation of all government and social sectors, Mexico has adopted a legal framework that looks for a full co-ordination in order to reach this objective.

In terms of what is currently being done by the Congress and is related to waste and residuals management we have the following:

1. A recommendation to the federal, state and municipal authorities to sign an agreement in order to consider an integral approach on the problem of all kinds of waste and residuals and at the same promote political actions to reduce *the Not in my backyard syndrome.*
2. A bill that has just been presented regarding packaging and recycling.
3. A study regarding the implementation of economic instruments such as green taxes (a green reform is being considered), deposit refund systems and low interest financing funds.
4. Several bills that look to invigorate environmental education at all levels and the performance of the environmental protection agency (PROFEPA).

Finally, I would like to talk about two experiences have been carried out in Mexico in order to look for the sustainable handling of residuals.

As part of the strategy to achieve the invigoration of the capacity of administration of solid residuals in Mexico, and the establishment of State Programs of Minimization and Integral handling of the Dangerous Residuals, technical offices have been created in several states as part of the Mexican Net of Environmental Disposal of the Solid Residuals (Remexmar).

The Remexmar is a non-governmental net that is part of the Pan-American Net of Environmental Handling of Residuals (Repamar), of which are members the following countries, including Mexico, Argentina, Brazil, Colombia, Costa Rica, Ecuador, Peru and Paraguay.

This Net is conformed by representatives of governmental dependencies, academic institutions, industrial associations, professional associations and NGOs that aim to establish programs of integral handling of the residuals. Upon gathering to the different social sectors

in this effort, the technical offices seem to have guessed right in the way of focusing the problem.

The other initiative taken to promote this sustainable development is the creation of the Group "Integral Handling of Solid Residuals" founded upon the initiative of non-governmental organizations, industrial, academic, civil associations and institutions of the Federal Government. For several years this group has been promoting the reduction of the generation of solid municipal residuals, developing didactic materials and imparting conferences, courses of training and works of field. The activities of this group contribute to the design of policies and programs to solve the problematic of the matter.

To conclude, let me say that the problems of the handling of the solid residuals are extremely complex and require legislative reforms, application of appropriate technologies and financial self-sufficiency of the service. It is also necessary to have an integral plan of handling, technical projects and reception of funds for the required investment as well as a very broad social involvement.

In Mexico, the objectives of achieving a sustainable development are expounded, and certain lines of work have been traced. However, there are many efforts still to be done for which the participation and experience of all the actors of the international system has to be included in order to achieve an integral solution.

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Micronesia
Wastes and Waste Management in Federated States of Micronesia
Mr. Claude H. Phillip
Vice Speaker

Honorable President and Chairman of the 7th General Assembly of the APPCED, Distinguished Delegates:

We welcome this, our second opportunity to represent the congress of the Federated States of Micronesia at a General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development. As head of our delegation, I would also like to introduce my fellow delegate, the Floor Leader of the Congress of the FSM, the Honorable Joseph J. Urusemal, and our delegation staff member, Mr. Dennis Belcourt, Congress's legislative counsel.

Before going into the main subject of this report, on behalf of the Congress of the Federated States of Micronesia and, more particularly, my delegation, I would like to express our great thanks to our hosts for the generous hospitality and wonderful entertainment that has been provided us through their great efforts.

Wastes and Waste Management in the Federated States of Micronesia

The subject of this general assembly, wastes and waste management, is of significant importance to our nation. I would of course rather discuss the natural beauty and bounty of the islands that make up our nation, topics that I think you would find more enjoyable.

I know, however, that if I am so fortunate to be around twenty years from now, I will not be able to talk about the beauty and bounty of my islands unless we talk about waste and waste management now, and, more importantly, unless we do something about it.

Thus, while unpleasant, the topic of wastes and waste management is of significant importance today. Indeed, wastes generated by humans in our domestic activities threaten many things we hold dear.

Let me tell you a little about our nation, so that you will know why. The Federated States of Micronesia is a nation of about 105,000 people inhabiting many small islands in the central pacific. Our ocean area is very large, but our land area is quite small. We have a population density of about one hundred fifty persons per square kilometer. With an average age of about eighteen years old and a fertility rate of 4.7, our rapid population growth should continue well into the future.

As you expect, our population increases have contributed to increases in waste generation. These increases combine with changing consumption patterns over the last decade to magnify the environmental problem of waste and trash. Our increasing use of imported packaged foods alone results in the generation of significantly more trash. Add to that everything from disposable baby diapers and motor oil to refrigerators and cars, all of which, sooner or later, must be disposed of, we face a significant waste disposal problem given our limited land area and the fragility of our environment.

How we deal with waste has evolved over time. Traditionally, most of what we used was simple and biodegradable, or at least would not damage our environment. We could reuse or make other uses of many things. If we did not have another use for something, such as the coconut husk, shell, the orange peel, we threw it away without much concern, but that was fine because it did not cause any damage to the environment.

Since we started importing packaged and disposable things, most of which do not degrade in an environmentally friendly manner, our attitudes have only slowly changed. Attitudes are changing. Some people may still dispose of used motor oil in our lagoons, but many people are coming to realize that what they do to their environment can hurt them, their children, and their grand children in the long run. Our people have a natural love for their islands, and once they are aware of the effect of their actions, they are willing to do what they can to change.

For example, some of our islands have had a great deal of success gathering up aluminum cans and sending them off for recycling.

With more public education, we could significantly reduce the amount that goes into our landfill. For example, right now, in some parts of the FSM, as much as a third of what is taken to the landfill could be transformed into useful soil by composting in our yards instead.

Once attitudes begin to change, we need to be organized to generate and sustain the necessary energy and commitment to improve our means of dealing with domestic wastes. The organization process can begin with an important event. In my state of Kosrae, we used the hosting of the Second FSM Games, a national sports event, as a reason for organizing a cleanup. This cleanup coincided with a move of our landfill to a more appropriate place and the institution of trash separation procedures designed to reduce negative effects.

The activities of non-governmental organizations have been very helpful in the organization process. In Pohnpei, NGOs have been at the forefront of cleanup initiatives. In Kosrae, they have often provided beneficial advice and know-how on dealing with waste problems.

There are many problems that cannot be dealt with by motivated, organized people alone. Sometimes the lack of money and technology is an obstacle. For example, it was estimated as a proposed single year budget for one of our states that in order to begin getting its solid waste problem in order, it would cost the equivalent of about half of what that state spends on teachers' salaries for that year.

Another example is that at this point in time, it is far too expensive for us to transport used motor and other lubricating oil to the refineries for recycling. Even other relatively benign

option options that are available, such as blending the oil for burning in generators or steamship engines, are limited by our lack of capacity.
As this example illustrates, changing attitudes is not by itself always sufficient to correct problems. I think we are not at this time ready to do without modern conveniences, but we lack the state-of-the-art technology necessary to recycle or dispose of what we use.

Given the lack of funding and access to technology, the FSM will likely continue to seek some foreign assistance in this area. Foreign assistance has helped us begin putting in septic systems at our homes and, in some urban centers, in developing sewer systems. Foreign assistance helped the State of Pohnpei begin getting its landfill in order.

Meanwhile, we must pursue whatever available measures we can. For example, we must consider environmental taxes or fees to discourage the importation of difficult-to-dispose-of products. If revenue from these same taxes or fees can be put to use in funding environmental cleanup for past mistakes, they will serve a dual purpose.

Meaning of Waste Management for Our Development

As we indicated in our country report at the last General Assembly, the Federated States of Micronesia is seeking to triple the number of tourist visitors, from thirty thousand per year to one hundred thousand per year. Even this increased amount would seem like a drop in the bucket for most places. For small islands like ours, it means a lot.

Tourists will not come to our place if our beaches are unsanitary, or our reefs are barren of life. The orderly and sanitary disposal of wastes is therefore highly important not only for tourism alone. It is also important for our fishing, agriculture, and, indeed, our own health.

Please, do not take me at my word when I say now important it is to maintain the beauty and health of our islands. Instead, you should come and see for yourself.

Thank you, and may you have a safe journey home.

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Nauru

1. Background

Nauru is a small island state in the South Pacific, situated 26 miles south of the equator, with an estimated population of about 9,800 people. It is 8 square miles in area and 21 square miles in circumfrence. Nauru is not an industrialized nation.

2. Environmental Social Problems.

While Nauru is fortunate not to have experienced any natural disasters since the turn of this century, it has not been able to adequately address the problem of social impact resulting from waste garbage disposal.

3. Waste Treatment

(i) There are no waste treatment in Nauru due to the lack of appropriate technology, waste management, land resources and adequate promotion of the waste problem and funding.

(ii) Septic tanks are used widely by domestic dwellings and government infrastructure. Septic tanks are pumped out and wastes are dumped into the ocean increased marine pollution. Other solid wastes are also dumped into the ocean, thus creating one of the most troublesome environmental problems.

(iii) Recent studies conducted by the South Pacific Environmental Agency have found sewage pollution to be adversary affecting coral reefs in Nauru and other low lying states in the Pacific.

(iv) Nauru is heavily dependent on rain waste complemented with underground water. However, sewage pollution is contaminating the underground water, adversely affecting the use of ground water.

4. Garbage Disposal

Nauru has no proper facility to treat garbage wastes, with the exception of a public incinerator. This means wastes in all forms are collected and burned in the incinerator.

5. National Legislation

Currently, there are no existing laws regulating the appropriate use of garbage disposal.

6. Measures at National Level

- Establish a Waste Management Committee to conduct and promote community participation and cooperation.

- Promote importation of recycled commodities such as aluminium items for economic development and reusable items.

- Promote public awareness.

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New Zealand
Waste Management in New Zealand
Hon. Denis Marshall

Overview

The Government's 1992 Waste Policy has two aims:

- to ensure that as far as possible, waste generators meet the cost of managing the waste they produce;
- to encourage the implementation of the waste hierarchy of reduction, reuse, recycling, recovery and residual management by waste producers.

Responsibility for managing waste disposal in New Zealand is largely in the hands of local authorities who manage landfills, refuse collections, sewerage and storm water systems, air pollution discharges, and the clean-up of contaminated site. Sometimes these tasks are undertaken directly by the authorities. Sometimes they are contracted out to private operators.

Territorial local authorities have a statutory responsibility under the Local Government Act 0641 for ensuring waste collection services are provided. In 1996, the Local Government Act was amended to require that every territorial authority adopter a waste management plan incorporation the waste management hierarchy. There is, however, no statutory standard for the plans.

Waste disposal practices are governed by the Resource management Act 1991. This aims to promote the sustainable management of natural and physical resources, and to control environmental discharges. This Act is effects based, and individual councils are responsible for setting standards for treatment plants. For example, they set allowable levels of discharge of emissions from landfills, and each landfill must comply with those standards in order to gain a resource consent to operate.

At a national level, the Government has promoted its policy through a mix of strategies, including voluntary agreements and promotion of cleaner production, and support of the eco-lable, Environmental Choice.

Voluntary agreements have been made with the packaging Industry to reduce unnecessary packaging waste, and with the major oil companies to cover the recovery of used oil.

The Sustainable Management Fund exists to provide support for a wide range of environmental initiatives. Some of those relating to waste include cleaner production

programmes for industry, retailers, orchardists, and hospitals; agrochemical and hazardous substances collections, waste analysis programmes and waste management guidelines.

The Ministry has provided Cleaner Production and Landfill Management and Monitoring Guidelines as a means of encouraging good practice. Landfill practice is being reviewed, and regulations covering some aspects of landfill practice are likely to be developed under the Resource Management Act.

A policy framework for the management of hazardous waste is under development. This will address the full range of activities from prevention and reduction through to safe disposal. It will incorporate a mix of policy tools from education and guidelines to regulation as required.

New Zealand is an active and committed party to the Basel Convention on the Tranfrontier Shipment of Hazardous Waste.

Solid waste disposal in New Zealand

- In 1995 approximately 3.2 million tonnes of waste was disposed of in landfills annually.

- We incinerate most medical and quarantine waste, but New Zealand does not use incineration for disposal of ordinary solid waste. Another form of incineration is provided by the cement industry which burns used oil in high temperature furnaces at one south island site. Used oil is also burnt in other high temperature applications, as well as in some low temperature applications, such as heating glasshouses. The latter application is currently under investigation to determine it's environmental effects.

- The estimated composition of New Zealand's landfill waste is as follows: organic matter (39%), paper (19%), construction & demolition (17%), potentially hazardous (8%), plastic (7%), metal (6%), glass (2%), other (5%).

- In addition to landfills New Zealand disposes of a large amount of construction and demolition waste into, cleantills, which are only allowed to accept inert, non-hazardous wastes.

- The harnessing of landfill gas for electricity generation is a growing industry in New Zealand. While a number of landfills flare the gas, several are now using the gas, principally for heating. In Wellington over 6% of the natural gas used is from landfills.

- Potentially hazardous waste represents 8% of landfill waste. This does not include all of the hazardous waste which is dealt with by special treatment and disposal methods. 92% of landfills do not accept hazardous waste.

- It is estimated that 80% of the population has access to one or more recycling schemes for paper, aluminum or glass. Kerbside recycling collection schemes exist in many of the larger urban centres. (Auckland City, Waitakere, Christchurch, Wellington, Lower Hutt, North Shore, etc) but many areas do not have them.

- One of the difficulties with recycling in New Zealand is that transportation of materials to markets is very costly, and we only have developed markets for a limited number of products (glass, paper, cardboard, aluminum steel, plastic films, etc). Some materials are exported, such as plastics, but this is heavily dependent on the strength of the NZ dollar and the costs of transport.

- An increasing number of local authorities have invested in community composting operations, usually located at transfer stations or landfills. There are a number of commercial operations which process garden waste, as well as a worm composting company which is concentrating on processing organic wastes from the agricultural and food processing sectors. The Living Earth Joint Venture Company has recently started composting biosolids from the new Wellington wastewater treatment plant with greenwaste. The resulting product will be sold as a garden compost.

- The scale of hazardous waste generation in New Zealand is only beginning to be understood. The past disposal and careless handling of hazardous waste has left a residual problem of potentially contaminated sites in many parts of the country. The sites are now being investigated and, where necessary, cleaned up by central and local government e.g. Mapua. The Resource Management Act and the Hazardous Substances and New Organisms Act 1996 were developed to help prevent future occurrences.

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Palau
Sustainable Development in Palau
Mr. Daiziro Nakamura
Senator

Ladies and gentlemen, I bring you greetings from Palau. I am a Senator in the Palau National Congress and my country is a group of small islands in Micronesia and was the last Trust Territory of the Pacific Islands. Administered by the United States since World War II, Palau became an independent nation in October 1994, and has a special relationship with the United States under the Compact of Free Association. Palau is now a full member of the United Nations. As a small and newly independent island nation, we have had only limited voice in world affairs even though we, like our neighbors in the Asia-Pacific region, are acutely affected by global economic and environmental trends. It is, therefore, my distinct honor to address this 7th General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development.

Because we are such a small island nation, with a population of under 20,000 people and a land mass of approximately 200 square miles, the issue of sustainable development is absolutely critical to the well-being of the Palauan people, as it is also to the millions of people represented by the delegations present here today. The Government of Palau's intentions with respect to sustainable development are set forth in two complementary plans. The first is called the "Palau National Master Development Plan." This master plan provides both the operational guidelines for the immediate future of Palau and seeks to set forth a suitable strategy for the pursuit of economic, physical and social development of the country. Key components of this plan include the protection of Palau's unique marine environment - which is the major attraction for tourists and historically has provided the means of subsistence for most Palauan families - and the inclusion of our local people in development projects that are within their financial and management capabilities. The master plan, developed originally in 1996 by international consultants with the assistance of the United Nations Development Programme and the United States Department of Interior, has been formally adopted by the Palau National Congress.

The second component of Palau sustainable development strategy is set forth in the "Palau Sustainable Development Policies and Action Plan." This plan, originally developed in mid 1997, focuses on tourism trends within Palau and establishes sustainable tourism policies and action plans. An important facet of the sustainable tourism plan, and one which is important for all countries now addressing

the need for sustainable development, is the need to develop a framework for re-evaluating governmental policy over time with the constant goal of protecting Palau's unique environment and culture. The Palau National Congress has also endorsed the sustainable development plan as the official policy of the national government.

Having charted our course for sustainable development, the Palau government now faces the responsibility of putting the master plan and sustainable development plan into action. The government is attempting to stimulate local participation in sustainable development projects by making capital available to our local entrepreneurs through the Palau National Development Bank. The Palau government also has increased funding for the Environmental Quality Protection Board, the agency charged with permitting and monitoring development projects and enforcing our environmental laws. We are looking at ponding systems to treat sewage and at other "green technologies" that may be appropriate for a Pacific island such Palau. Another project that the Palau government currently faces is the urgent need to close our single existing landfill, which is almost at full capacity and is too close to the lagoon. The government is studying other potential sites for solid waste disposal. I am therefore quite pleased with the focus of this conference, and believe that information I have learned here, and hopefully continuing interaction with the experts and delegations present at this conference, can help Palau to develop a comprehensive solid waste management plan.

On behalf of the Palau National Congress, I hope that you will have the opportunity to come to our beautiful islands of Palau, and extend to you the hope that the member nations of the Asia-Pacific Parliamentarian's Union can together face the need to develop and implement sustainable development policies through the region and the world. Thank you very much.

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Peru
Environmental Management of Solid Residues in Peru

Dr. Luis Campos Baca
President of Environment, Ecology and Amazonian Commission

Peru, southamerican, andean, high plateau, amazonic and antartic country, is situated in the central and western part of South America and it has an area of 1,285,215.6 km2, including the surface of 133.4 km2 of the Peruvian Pacific sea islands and the Peruvian part of Lake Titicaca. In addition, it has sovereignty and jurisdiction of 200 miles of the Pacific Ocean, adjacent to its marine coast, which gives Peru a strategic location in the Pacific Rim.

In 1990, Peru initiated a process of State modernization and the insertion of the country's socioeconomic activities, in the scheme of the growing globalization and the higher competitiveness of national and international markets, the management of solid residues acquires special importance for its sanitary, environmental and economic implication, and more for the preponderance that the principle of sustained development has acquired, by virtue of which the economic growth has to be compatible and harmonic with the social equity and the environmental protection.

In this respect, the government adopted many of the strategies that were defined in **Agenda 21 of the United Nations Conference, regarding the Environment and the Development.** Besides linking health to development, just as it is shown in Chapter 6 of Agenda 21: "health and development have direct relationship. Both, insufficient development that leads to poverty as well as inadequate development that turns into excessive consumption, combined with the growth of the world population, can result in serious health problems related to the environment in developed and developing countries.

There are many aspects linked to development that contribute to sharpen the complexity of handling solid residues in Peru. The growth of the Gross Domestic Product - GDP (7% in 1996 and 7.4% in 1997) the opening and modernizing of the national market and the population growth (24 million 371 thousand inhabitants in 1997, with an average growth rate of 1.7%) have initiated a greater generating of solid residues, an increment of its dangerous characteristics and negative impact, generation significant risks for the natural resources and environmental quality. Another factor that complicates the handling of solid residues, isthe process of urbanization. According to official statistics, the degree of urbanization that the country reached in 1997 was of 71.7%. It can be said that the population is eminently urban, where 7 out of every 10 Peruvians live-at present-in areas classified as urban, while only an average of 3 reside in rural areas.

It has to be taken into account that the average generation per capita of solid residues in the country is approximately 0.53 Kilograms per inhabitant per day; 2.0 kilograms per bed per

day in hospitals, 5 and 2.5 kilograms per health center and post respectively. Therefore, it is estimated that in the country, the total average generation of solid residues of domestic origin to be attended daily is approximately 12,900 tons, while the ones generated in health care establishments reach 56 tons.

On the other hand, the productive or industrial sectors generate a great amount of solid residues, eminently of dangerous nature which are added to the ones mentioned previously and they have to be handled in an integral, sanitary and environmentally appropriate way, as well as in concordance with the strategies and principles of sustained development. The generation of solid residues is associated with the different activities that contribute to the GDP of the country, namely around 23% from the manufacturing industrial activities, 56% from the service activities, 12% from the construction activities and 9% from other income sources.

The generation of solid residues and its respective handling are linked to the own model of development, for which it requires to harmonize the economic activities of the country with the proper environmental protection and fundamentally with people's health to contribute to its full personal and social development. As a consequence, the handling of solid residues is included in the regulations associated to the right for an adequate environment and health; and therefore, it has to be an object of an integral legal treatment.

At present, the services for public cleaning and handling of solid residues in general are not enough to cover in a satisfactory way the demands of the population and productive sectors, having some serious deficiency in the different steps of the solid residues handling, from its generation until the final disposal, especially, in relation to residues of dangerous nature. This situation establishes a sanitary chart that compromises seriously the health and environment in Peru, the country which presents a very heterogeneous and complex epidemiologic profile, that is to say, unequal, polarized, social and geographically stratified, regressive in some aspects and superimposed, with pathologies that belong to conditions and very different lifestyles.

The disposition of waste has as a final place the sanitary landfill. Only two official landfills exist: the one of Portillo Grande and El Zapallal. The municipal trucks also unload in other 16 landfills that do not count with authorization. In both sanitary landfills and in clandestine dumps exist a group of persons who are dedicated to the segregation and sale of the residues, called "recyclers". It is estimated that there are around 5,000 persons and their families that are making a living on the recovery of waste amounting to 290 tons per day. A hidden market exists where the collectors "hormigas" (ants), the cartwrighters, the small and great collectors participate. This chain finishes in the businesses that buy used materials to turn them into the production of new products, such as in the case of papers and cartons, glass, plastics, cans, cloths and organic residues among others.

As well, existing toxic wastes are not adequately disposed, such as the hospital and health center wastes as well as wastes from different industries. At present, few hospitals incinerate their waste as it is commanded in the norms, originating damages in the health of children and adults who are dedicated to these activities. Although there are no figures in this matter, it is known that skin and digestive diseases are caused by the proximity to environments contaminated with wrongfully disposed urban residues.

POSSIBLE SOLUTIONS

Peru, through its government institutions, municipalities (local government), non governmental organizations, universities, among other institutions and society as a whole, has established a process for the implementation of politics, plans, strategies and technical operating aspects and the required legal frame, to organize and integrate the handling of different types of solid residues, on the basis of identification and management of solid residues from their generation sources.

Therefore, for an adequate mangaement of solid residues, it has been initiated for five years, a management capacity strengthening program in the municipal government field and the implementation of sanitary infrastructure of final dispositions. In regard to industrial residues of dangerous nature and those that are objects of frontier movement, regulations in the frame of the Basilea Agreement have been established, which through the Health sector, has been taking the technical administrative handling.

On the other hand, the National Environment Council (CONAM) develops residue management activities, mainly with the assistance of the United States Agency for International Development (USAID), through which it searches to:

- Reduce the generation of residues. Residues are direct consequence of the inefficient level of the processes (the more inefficient a process is, the greater the generation of residues will be, with negative consequences over environment and health). Our main worry is to make residue generators understand that these constitute losses for their productive units and to apply mechanism oriented to improve the usage of resources.

- Reduce the negative impacts of the inadequate handling of residues. It is almost impossible to eliminate the generation of residue. Nonetheless, it is feasible to control the different stages of the residue handling (generation, segregation, recycling, treatment, transportation and final disposition) and to be able to control the risks of generating negative impacts forthe environment and the health.

Environmental management and competitiveness

In the context of reduction of residue generation, CONAM develops the following activities:

i) ISO 14000 (adoption of ISO 14000 norms as Peruvian Technical Norms, installation of Environmental Management Systems in businesses and formation of environmental auditors).

ii) Fostering of clean technology (support to environmental adaptation of the industrial and fisheries sectors, mainly).

iii) Clean Production Center (promotion mechanism of the clean production concept).

All these activities have a main pre-emptive concept that consists of anticipating the environmental impacts of the productive activities and to design mechanism to control them. lts main benefit is the increment in the competitiveness of companies.

Residue management

In the frame of impact reduction, the Environmental National Council (CONAM) develops:

i) Recycling of paper and cartons in school (Consciousness and environmental culture formation, including homes).

ii) Recycling of construction residues (Peruvian Technical norms to promote recycling).

iii) Residue bag (Trade Exchange mechanism of industrial sector residues, presently under design) and

iv) National Program of Residue Management (spread of nonconventional systems of residue management, oriented to medium and small population).

These activities have common denominator on the risk minimization of environmental impacts derived from the inadequate handling of residues.

Treatment and Reuse of Solid Residues: A feasible alternative.

The best way to tackle the problem of solid residues consists of giving a preventive focus oriented to the modification of customs, production and consumption modalities. The plans of reducing waste to minimum, the reuse and recycling constitute important and urgent programs to implement. Nevertheless, the target is far from being reached in Peru in short term.

What is imperative, is to manage the systems and markets, recognizing the benefits and costs to maintain a situation as the actual one, this problem will become even worse. If appropriate measures are not taken.

The collection, distribution, and disposal systems have to be organized in an efficient way, like the segregation process and sale of waste. Toxic residues disposal deserves special attention that at present constitutes a latent danger for the whole population.

It is necessary to invest in education. To promote an environmental culture with concrete actions of evnironmental healthiness and pilot programs of homemade recycling, production of organic fertilizers, utilization of waste to generate energy, which are some of the alternatives that can be impliemented motive and motivated.

PROPOSAL OF THE ENVIRONMENT, ECOLOGY AND AMAZONIAN COMMISSION OF THE CONGRESS OF THE REPUBLIC OF PERU

The legal frame for the management of solid residues has to be clear and integrated and it has to allow the articulation of strategies, politics, plans and programable actions in the different

levels of government and in the operators' field. Peru, since 1904 has yielded more than 6,000 environmental norms, from which more than one hundred are linked to the management of solid residues, the one that, however, do not constitute an integrated legal frame for the appropriate management of solid residues in the country.

The central norm for the handling of solid residues in Peru, is Urban Cleanliness Regulation (S.D. No. 033-81-SA modified by S.D. No. 037-83-SA) which extends only to household and commercial residues, containing some rules for the handling of hospital residues. The national legislation does not establish clear guidelines that facilitate an integral management of residues, nor delimits the attributions of competent authorities, having frequent competition conflicts in the normative aspects of control and sanction.

In order to establish a regulator frame, the Congress of the Republic has been conducting the process of formulation of the General Law of Solid Residues, through the Environment, Ecology and Amazonic Commission. We consider that it is necessary and it can not be postponed to endow the country with this legal norm to establish the rules and general guidelines for the treatment of solid residues in a clear political-normative, consistent, integral and coherent frame.

Such Law proposal pretends among other effects, the following.

- Arrange the institutional frame of the management of solid residues through the establishment of responsibilities and clear competitions in relation to normative, regulatory, and control functions.

- Preserve life quality and health condition of persons exposed to the contamination.

- Provide healthy surroundings to promote sustained human development.

- Establish principles, guidelines and rules for the integral handling of the different types of solid waste, and also consider all its handling stages from generation until final disposal.

- Guide the management of solid residues towards the consolidation of minimization and preventive strategies of the negative environmental impacts.

- Provide incentive to the participation of the private sector and the civil society in the improvement of the handling of solid residues.

- Promote the reduction of wrapping and packing of commercial products, especially, all the ones of dangerous nature.

- Eliminate centers of rodent and vector burrows that generate sanitary risks in the community.

This normative proposal is in a process of study and consultation with the public and private sectors, achieving hign levels of concordance and consensus for this Law Project. As last public consultation, an Audience will take place and from there it will go to the Environment, Ecology and Amazonian Commission, so that later it can pass to the Congress plenary.

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Russia
Problems of Waste in Russia and ways of their Disposal

Dr. Tamara Zlotnikova
Chairman of the Committee on Ecology of the State Duma

Problems of waste in Russia and ways of their disposal
Report of the Chairman of the Committee on Ecology of the State Duma of the Federal Assembly of the Russian Federation, Doctor Tamara ZLOTNIKOVA

On the territory of Russian Federation, waste pits and slag storages on grounds and unauthorized places are accumulating tens of billion tons of solid waste of industrial production and domestic origin, among them, certain (determined) share is ecologically dangerous toxic waste. The unsatisfactory situation with use, render harmlessness, accommodation of industrial, and household waste is stipulated besides of the objective reasons. First of all, it is not only extremely insufficient financing of construction of installations to render harmlessness and use of wastes, the objects of their accommodation, but also reconstruction or recultivation of existing facitities and liquidation of unauthorized places.

The annual increase of toxic waste as a whole in Russian Federation is 0.9%.While the increment of toxic waste of a first - class danger is 3.0%, second-class - 0.4%, third class - 0.1%, fourth -class of danger 1%. The advanced rates of accumulation of the most dangerous waste are stipulated by a higher level of the costs on their control and it is possible to assume that under the conditions of the economic crisis, the observable at present tendency in the nearest year, will be saved.

In connection with insufficient quantity of dumping grounds for warehousing and burial of industrial wastes, practice of accommodation of industrial wastes in places of unorganized warehousing is widely scattered, that presenting the special danger to the environment. Practically, for all subjects of Russian Federation, one of the main problems in the field of protection of the environment is a decision to render harmlessness processing household and industrial wastes. Because of insufficient economic interest of the enterprises, low technical level of used technologies, deficit of means and modern equipment, and processing and use are subject to tens of kinds of waste. In this connection, rates of their formation and the accumulation on the territory of Russia still remain. The significantly available of volumes harmful wastes require creation of effective technologies for processing and rendering harmlessness.

There is a lot of valuable raw material is not used and reaches as a result of dumps during the industrial production of useful resources. Decreasing of completeness and integrated

approach of extraction of components of ores and using of technogenical wastes enlarge the scale of an ecological damage.

Up to now the quantity of mining wastes, stored in dumps on the territory of Russia, exceeds 36 bln. tons. The volumes of these wastes were much reduced. The accounts on increasing of seales of their application in a building industry were not justified. The rates of land recultivation, infringed by a mining industry, remain low. Plants-cover is under significant damage as a result of unattended cluttering up of the territories by industrial wastes, building and household refuse, especially, in the vicinities of cities and population along the roadside of and parking places.

Pollution of the rivers by coal and forest industry, municipal ities and agriculture have been lasting.

For oil-extracting industry one of actual problems is processing of oilslags. The plenty of early formed wastes are in slags reservoirs, the question on their processing or use is not answered. Solid household wastes is presenting as a significant problem.

On territory of the airports, solid wastes are annually generated about 120 thousand tons, which engage special premises and dwmping ground. Only 18% of them prepare for wastes storage.

Furthermore, there is a sharp problem of manufacture and consumption wastes for enterprises of the railway transport.

In an agricultural sector of Russian Federation, there is a problem connected to misuse of pesticides. Their physic condition, undefined chemical structure, the unsatisfactory conditions of storage present severe danger to the environment and human health. Rendering harmlessness of pesticides till now is not practically conducted.

Dangerous sources of pollution of the environment are wastes of animal industries, especially, manure flows from large cattle-breeding farms and complexes, which is annually accumulated up to 150 mln. tons. The significant influence of pollution of the environment renders biological waste (carcasses, stillborn animals, wastes meat processing industry, and others), which can be dangerous sources of pollution to soil and water and can create intense unsanitary and unhygienic conditions which require special measures to render them harmless.

Rather an urgent problem is processing of hundreds of millions sludge from water-supplies and sewage disposal systems.

With the purposes of prevention of harmful effect of production and domestic wastes on health of the population and environment, involving waste in economic circulation as additional sources of raw material the Federal Law "Wastes of production and consumption" is passed in 1998 which determines the legal bases of the waste management.

The order of Government of Russian Federation in 1998 authorizes the plan of preparation of the normative legal acts of Government of Russian Federation, necessary for realization of this Law, providing development of the projects of the documents: "About the

order of licensing of activity on the manipulation with dangerous wastes", "About the order of transbording transition of wastes", "About the order of certification of dangerous wastes", "About the state register of objects of accommodation wastes and state waste kadastre", "About the order of development and statement of the specifications of waste formation and limits on them dispositions".

System of the account and control of the waste management in each particular enterprise is improved. Limits of formation and accommodation of wastes are developed. Payments for their accommodation are levied. As a basis of collection of the payments for wastes accommodation is fixed by a principle interactions of them on the environment.

The state policy in the field of the waste management is guided by creation minimization of a control system, introduction of perspective resource saving and waste technologies, effective means and methods of processing and rendering them harmlessness.

One of directions in the given sphere is economy of natural resource on the basis of greatest possibility involving of wastes in economic circulation and production.

The achievement of the specified purposes measures was sold within the framework of the Federal Target Program "Wastes".

The regulation of import - export wastes is conducted, pursuant to the obligations of Russia on the Basal Convention. Working under the control led transportations of dangerous wastes is required. Pursuant to the Decrees of Government of Russian Federation of 1996 "state regulation and control of transbordering transportations of dangerous wastes" in Russia, the work on the issue of the sanctions on export/import and transit of dangerous wastes is carried out. The imported wastes is carried out with the purpose of their use in technological cycles of the acting manufactures. About 5 thousand tons of wastes are imported annually in to Russian Federation and about 200 thousand tons of waste are exported. Wastes were exported to the following countries: Germany, Great Britain, Finland, Belgium, Netherlands, Italy, Spain, Czech Republic, Slovenia, Bulgaria, USA, China, Turkey, Japan, Taiwan, Pakistan, Ukraine, Kazakhstan, Uzbekistan, Estony, Kyrgyzstan.

The transit is carried out basically by second-hand trunks. Individual cases handle the transit of slog, containing medical titanium and alumniuinm.

The ecological control of waste management covers all kinds of activities, connected with formation, accumulation, storage, processing, transportation and burial of wastes of manufacture and domestic.

Singapore
Solid Waste Collection and Disposal in Singapore

Assoc. Prof. Low Seow Chay
Deputy Chairman,
Government Parliamentary Committee for the Environment

Introduction

Singapore is a densely populated island nation with over 3 million residents population. The warm and humid climatic condition which pervades Singapore throughout the year makes refuse extremely putrescible. The large quantity of refuse generated has to be removed and disposed of quickly, efficiently and safely before it gives rise to smell, vermin, infectious diseases and other public health hazards.

Over the last 30 years, Singapore has seen rapid industrialization, urbanization and high economic growth. These have brought about a wide range of environmental problems, including escalating trend of domestic and industrial waste. During the same period, the daily refuse output doubled every decade. It was 1,600 tonnes/day in 1972 and 3,200 tonnes/day in 1982. In 1992, this has increased to 6,200 tonnes/day. Daily refuse output in 1998 stood at 7,660 tonnes/day. With population growth and an expected, sustained, good economic performance, the refuse output in Singapore is expected to rise.

The solid waste management has now evolved into a high-level automation of storage, removal and disposal. Roll-off refuse compactors and dust-screw refuse handling facilities are now widely used. Most of the refuse trucks are equipped with compaction device and some with radio communication system. All the refuse are disposed of either at the incineration plants or the sanitary landfill.

Refuse Collection

Prior to April 1, 1996, domestic and trade refuse were collected by ENV. Private waste collectors removed the remaining refuse which were mainly from industrial and commercial premises, shopping complexes, shipyards, and construction sites. However, faced with an ageing workforce and difficulties in the recruitment of workers, the solid waste collection service of the Ministry was corporatised. On 1th April 1996, SEMAC Pte Ltd took over from the Ministry the collection of municipal waste. Services are monitored by ENV as the regulator.

To introduce competition in the refuse collection services and improve on the service standards, ENV started to liberalise the service in 1998. Domestic and trade premises were divided into nine geographical sectors with the aim that the refuse collection services would be progressively tendered out within the next two to three years. Already, the tenders for refuse collection services in the Pasir Ris-Tampines and Bedok sectors had been awarded and the contracts commenced on 1th July 1999 and 1th November 1999 respectively.

Refuse Disposal

All the refuse collected are disposed at disposal sites operated and managed by the Ministry. The disposal sites comprise a sanitary landfill at Pulau Semakau and 3 incineration plants at Ulu Pandan, Tuas and Senoko.

In 1998, the three incineration plants processed a total of 1.88 million tonnes or 66.3% of the total refuse generated in Singapore. The rest of the refuse was disposed at the Lorong Halus Dumping Ground. The dumping ground has reached its capacity and closed since 1th April 1999. The Ministry now operates a 350-hectare offshore sanitary landfill of Pulau Semakau, as well as a marine transfer station at Tuas, built at a total cost of $840 m. The marine transfer station receives and processes non-combustible refuse and incineration ashes before they are barged to Pulau Semakau. The offshore landfill is expected to see Singapore̊s needs beyond the year 2030.

To ensure that we have sufficient capacity to cope with the relentless increase in the refuse generated, Singapore is building its fourth incineration plant. The new Tuas South Incineration Plant will cost $1 billion and be one of the largest in the world. The plant will have six incineration/boiler units capable of incinerating a total of 3,000 tonnes of refuse a day. The waste heat from the incineration process will be used to generate about 80 MW of electricity, of which 20 MW will be consumed by the plant and the remainder sold to Singapore Power. The incineration plant is expected to commence operation in the year 2000.

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APPCED/7/GA/country rep. 19

Thailand
Mr. Pisit Na Patalung
Member of the Senate of Thailand

Distinguished Delegates,
Ladies and Gentlemen,

It is a great honour for me to have an opportunity to participate in this important conference and to share ideas and views with distinguished participants in the areas of environment and development in the Asia-Pacific region.

In Thailand, our Government has presently adopted the twenty - year Plan for the Enhancement and Conservation of National Environmental Quality, 1997 - 2016 which covers various sectors as specified in Article 36 of the Enhancement and Conservation of the National Environmental Quality Act B.E 2535 (1992). Also, the Environmental Quality Management Plan has been emphasized on this plan for government agencies, state enterprises and relevant parts of private sector as well as indicating the implementation of environmental conservation at the provincial level.

According to the twenty - year Plan, appropriate ways and means to cope with environmental problems should be accelerated. Environmental awareness and the use of appropriate technology should be emphasized. A sense of responsibility and ownership should be created in order to extensively raise public awareness and participation.

At the institutional level, government agencies and relevant sectors responsible for the environment and natural resources must be reformed in order to improve their efficiency and effectiveness. It is also vital to renew and adjust outdated laws, regulations, and rules which obstruct the conservation and sustainable development of natural resources and environment.

Thailand has implemented a positive approach on environmental management focusing on the prevention and control of the cause of environmental degradation with concrete measures and principles. It is obvious that although Thailand attempted to maintain its remaining forest resources by banning logging concessions in 1989, there has been little variation in deforestation rates following this ban. The biological diversity contained in forests has declined and their ecosystems degraded through agricultural, commercial, and tourism uses, and other development projects.

In the past decade, Thailand has faced with various environmental problems which mainly caused by institutional failure. The policies, rules, and organizations created to protect the environment have not performed with a great deal of success. As a result, Thai governments have committed themselves in passing various environmental laws and regulations to cope with problems concerned, most significantly, the Environmental Act of

1992 has increased authority in environmental management. Also, the government has come up with a practical policy and announced the use of the Polluter-Pays-Principle, however, the protection of the environment can not rely merely on a single principle. Additional examples include the Beneficiary-Pays-Principle and Precautionary approach must be applied in conjunction. These principles are preventive as opposed to corrective measures for environmental protection.

Most importantly, public participation inevitably plays a crucial role on environmental management at many levels, from the right to receive information to the right in participating in decision-making process on large scale projects which has an impact on the environment. At the same time, the government should use educational approach as well as public relation mechanisms to raise the public awareness of their responsibilities and rights.

The economic crisis will continue through the next few years. The protection of the environment is crucial for sustainable development. The government should use the crisis as an opportunity to adjust management strategies and weed out unproductive bureaucratic elements. Budget constraints will drive the State to replace expensive engineering 'solutions' with other practical alternatives. Innovative mechanism should be applied to pull Thailand out of both the economic and environmental crisis simultaneously.

I wish you all a very pleasant stay in this wonderful, friendly and historical city. I hope that at the end of your stay, you will like Chiang Mai, as much as we love it.

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APPCED/7/GA/Country rep.20

The United States of America
Hon. Sandra Romero
State Representative
State of Washington, United States of America

In many areas of the United States of America, we are experiencing very rapid urbanization. This has been the source of many challenges for citizens, businesses, and governments.

Yesterday, Senator Karen Fraser referred to recycling as "turning garbage into gold." In this report, I want to talk about preventing "turning gold into garbage." By "gold," I refer to good quality of life in cities, and by "garbage" I refer to overly rapid, disordered growth which results in deteriorating quality of life and environmental resources.

A concept which is "catching fire," becoming a national movement, in the US is termed "growth management." This is a concept being voluntarily enacted into the laws of many of our states, without a national mandate to do so. The policies vary state by state, but reflect similar goals. The core concept of growth management is attempting to plan ahead for future growth---not just to respond to it after the fact. Some call this "smart growth."

Growth management is an attempt to do several things simultaneously:
a) balance environment and growth;
b) integrate environmental policies with growth policies, so environmental protection is not merely an add on at the end of the development process;
c) coordinate between adjacent and overlapping governmental jurisdictions;
d) keep government expenses efficient and manageable.

In the State of Washington, for example, we enacted our "Growth Management Act" about a decade ago, to address issues of rapid growth.

This Act requires rapidly growing cities and counties to develop and adopt a 6 year growth management plan. Citizens must be very actively involved in both planning and implementation.

Our Act requires local plans to:
a) designate urban growth boundaries, provide for protection of our natural resource lands;
b) assure our environmental "critical areas" are protected;
c) assure local government's capital budgets are coordinated with their anticipated growth needs; and
d) assure that adequate infrastructure be built concurrently with urban and suburban growth. Infrastructure refers to major supporting facilities such as roads, sewers, utilities, schools, parks, etc.)

The Act contains strong penalties for failure to comply. Growth is not allowed to occur if infrastructure is not concurrently provided, or if adequate water supply is not assured. A city or county will forfeit significant state shared funds if it does not plan in accordance with general standards set forth in the act.

The Act also requires plans to contain provisions for controlling growth and planning for "essential services." Essential services include landfills, sewage treatment plants, airports, prisons, significant transportation facilities, and housing.

Smart growth recognizes the need to link land use and transportation. Experience has demonstrated that when we build roads, development soon follows. We are trying to improve our transportation policies. We are trying to promote "transit oriented development," in order to significantly reduce air pollution and water pollution resulting from automobile use. We especially are attempting to reduce the high number of "single occupant vehicles" on our congested highways.

I hope to report on successes at future APPCED conferences.

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APPCED/7/GA/Country rep.7

Vietnam
Prof. Dr. Pham Thi Tran Chau
Vice-Chairperson
of
the Committee on Science, Technology and Environment

Honorable Mr. Chairman of the 7th APPCED General Assembly,
Distinguished Delegates,

On behalf of the Delegation of the Committee on Science, Technology and Environment of the National Assembly of Vietnam, I wish to express my deep gratitude to H.E. Mr. President of the National Assembly and the National Assembly of the Kingdom of Thailand for having extended their invitation to the Delegation of the National Assembly of Vietnam to the 7th General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development (APPCED), their excellent arrangements for this General Assembly.

Distinguished Delegates,

The industrialization, together with demographic growth and high rate of urbanization, has made environmental protection in our country become more important and pressing. A number of environmental problems are needed to be tackled, out of which the problem of waste treatment and garbage disposal in urban areas and industrial zones are of the common concern. In this paper, we would like to deal with the followings:

- Current status of the treatment of urban and industrial wastes in Vietnam;
- Policy and the legislation related to the treatment of urban and industrial wastes in Vietnam;
- Monitoring activities on environmental protection of the National Assembly of Vietnam;

I. Present situation of waste treatment in urban areas and industrial zones in Vietnam

1. Urban and industrial wastes in Vietnam

Vietnam has 61 provinces and municipalities under direct State management of the Central Government. There are about 570 large and small cities and 19 are municipalities. According to the forecast, by the year 2000 the urban population will represent about 25% of the total population of the country. Most of industrial production establishments are located in the urban areas. The technology of these production establishments, overall, is backward. With low efficiency in raw material utilization and large amount of polluting wastes, they cause environmental pollution in terms of air, water, solid wastes and noise.

According to the 1996 statistics, the quantity of solid wastes in cities and towns was about 19,000 tons per day. The amount of solid wastes included 10,200 tons of industrial wastes, 250 tons of hospital wastes, and 9,000 tons of garbage from households.

2. Technological measures for the treatment of urban and industrial solid wastes in Vietnam:

At present, most of the garbage dumps in cities are overloaded. The proportion of solid garbage collection remains considerably low (about 40-60%) and wastes are not yet separated. In general, in cities and towns of the country, the collection of solid wastes is organized. Such treatment methods for solid wastes have been applied as landfill, sanitary, compost to produce fertilizer, incineration and anaerobic decomposition, and treatment of organic wastes under high temperature and pressure.

However, at present, in the urban areas the landfill method is used. Certain cities have already had a composting plant for the transformation of wastes to produce fertilizer, for example, in Ha Noi there is Cau Dien Waste Treatment Plant operating since March 1993, with a capacity of 30,000 tons of waste per year. It can process 7,500 tons of fertilizer per year. In Ho Chi Minh City there had been a factory for the production of fertilizer from wastes in operation since 1981. If could treat 240 tons of solid wastes per day and had produced 80 tons of organic fertilizer. However, the factory had ceased to function since 1989. Another example is Hoc Mon Gerneral Fertilizer Plant producings annually 6,000 - 7,000 tons of fertilizer from wastes.

In future, when the economic conditions of the country are available, urban areas will build more solid waste separation establishments to recycle waste into organic fertilizer and hospital wastes will be incinerated. For example, in Ho Chi Minh City there will be 4 establishments for household solid garbage treatment, with a technology in compliance with hygiene and environment standards. Some large hospitals are now disposing their wastes by using incineration method. This indicates an active policy and legislation of Vietnam on the treatment of urban and industrial wastes.

II. The policies and the legislation related to the treatment of urban and industrial wastes in Vietnam

The National Assembly of Vietnam has passed some laws and ordinances on environmental protection. Moreover, the Government has issued legal writings on the treatment of wastes in urban areas and industrial zones in particular, namely:

- The Law on Environmental Protection of 1993 passed by the National Assembly on 27 December 1993, promulgated on 10 January 1994.
- Several Decrees, Decisions of the Government, and Instructions of the Prime Minister guiding the implementation of the Law on Environmental Protection.

III. Supervisory activities of the National Assembly, on the environmental protection

At the annual year-end sitting, the National Assembly reviews report on the implementation of environmental protection and management conducted by the related governmental institutions. Members of the National Assembly question them on how far the situation is improved and the treatment of wastes in urban areas and industrial zones is among the issues.

Parliamentary supervisory groups are organized to work with ministries, branches and regions on environmental issues in general or specified supervisory groups on environmental issues which are seen as pressing problems. This activity may be supervision on treatment of wastes in traditional handicraft villages, factories, industrial zones, and urban sub-areas. Through supervision activities, the Committee has coordinated closely with the Ministry of Science, Technology and Environment in implementing environmental protection in general and management of wastes in particular. In 1999, the Committee worked with the Ministry of Sciences, Technology and Environment to seek solutions recommended by supervisory groups from the Committee.

However, in the years to come, the management of wastes in urban areas and industrial zones in Vietnam needs more attention and supervision from the National Assembly in the following fields:

- To work out plans for construction of hygienic disposal dumps in provinces, cities and nation-wide scale.
- To strengthen State management at the regional level of household and industrial wastes.
- To make recommendations to the Government for further investment to build a system of treatment of household waste water in large cities and urban areas. At the same time, priority is given to garbage collection, transportation including separation of solid wastes in cities and towns.
- To consider carefully the options of solutions for incineration of household solid wastes, as well as wastes from health-care activities and hazardous wastes to ensure that these solutions will not cause secondary pollution from such discharged aerosols as dioxin and dust.

IV. Conclusion

Vietnam is stepping into the period of industrialization and modernization of the country. We are Filly aware of the importance in combining socio-economic development and environmental protection to ensure a sustainable development.

In order to satisfactorily solve these issues, besides efforts made by each nation in the Asia-Pacific region, we believe that their parliaments and the governments will enhance regional and international cooperation in transfering appropriate technology so as to promote efficiently environmental protection in response to the economic development and the settlement of social problems in our rapidly changing world. The cooperation include the transfer of technology of clean production, the production technology using raw material with efficiency, the discharge of hazardous substances, as well as the transfer of technology in the treatment of urban and industrial wastes.

On behalf of the Delegation of the Committee on Science, Technology and Environment of the National Assembly of Vietnam, may I wish you all good health, happiness and every success in your works.

Thank you for your attention.

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Section V

Introduction to Reports on Waste Treatment and Garbage Disposal

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UNEP

The UNEP Regional Representative pointed out that waste disposal systems were inadequate in many urban areas, therefore integrated waste management has been approached to solve the problem. Integrated waste management was a frame of reference for designing and implementing new waste management system and for analyzing and optimizing existing systems. It was based on the idea that all aspects relating waste management system should be analyzed together.

An integrated approach become a key element because the planner could consider all aspects of waste system within one framework and produced a plan which follows the objective of the entire system. It could put all functions relating to waste in the same division or agency. In addition, it could create integrated financial structures by collecting disposal fee to finance material recovery or public education.

The responsibility of all stakeholders from top-down level were important. National or state/provincial governments, municipal/local governments, private sectors companies, residential waste generators, business waste generators, non-governmental organizations, community-based organization and women were expected to participate in the system design.

To achieve integrated waste management, on waste management hierarchy was defined as follows :

1. Prevent the creation of waste, or reduce the amount generated
2. Reduce the toxicity or negative impacts of generated waste
3. Reuse in their current forms the materials recovered from the waste stream
4. Recycle, compost, or recover materials for use as direct or indirect inputs to new products
5. Recover energy by incineration, anaerobic digestion, or similar processes
6. Reduce the volume of waste prior to disposal
7. Dispose of waste in an environmentally sound manner, generally in landfills

The hierarchy was a useful policy tool for dealing with landfill shortages for minimizing air and water pollution.

The Regional Representative also highlighted the UNEP concept of eco-efficiency and clean production, which played a major role in expanding programme of environmental technology transfer. The importance of the concept was that the action programmes complement each other and provide a similar outlook on the best management and regulatory tools to apply. For government, it provides a useful framework that establishes various policy and regulatory tools which the authorities could adapt, and guide the role of support measures, Research and Development policy and voluntary measures. For business sector, it leads to a major changes in the way companies approach their environmental problems. Unfortunately, eco-efficiency and clean product concept does not work well since the government policies send the wrong signal, provide the wrong law and reward the wrong behavior.

Along with the launching of the concept of cleaner production, UNEP also performed the following activities :

- developing practical tools for industry and consultants, as for example the cleaner production assessment procedure;
- outlining policy and strategy options for governments, based on practical experience in a number of leading countries;
- publishing technical guidelines for key industry sectors, and on important procedures;
- establishing with UNIDO a series of National Cleaner Production Centres to assist industries and governments directly in very practical ways;
- running demonstration projects that can be replicated more widely, also in other countries;
- improving commitment by encouraging key players to sign the International Declaration on Cleaner Production;
- producing training manuals;
- encouraging the incorporation of environmental concepts and management tools into the education of future professionals.

These actions would raise awareness, strengthen commitment and provide practical tools for the key stakeholder to undertake the action necessary.

UNEP also encouraged the international community to have a life-cycle thinking, use formal environmental management systems and tools, apply the principles of industrial ecology and put much greater emphasis on resource productivity.

China

Remarks on the Technology Issue

China elaborated on its technological uses for waste treatment. The economic development has inevitably caused the environmental pollution and ecological destruction. China, therefore, has seriously paid attention to the matter of environmental protection by promoting environmentally sound technology for the garbage disposal. Also, the government is looking for an integrated utilization of appropriate technologies to solve the garbage problem in municipalities. Currently, sanitary landfill, compost, and combustion are the three main technologies used in China. However, each technology has its pros and cons. Municipalities need to select suitable technology relative to their economic capacities, land resources, and garbage qualities. Finally, China hopes that garbage volume will be reduced at source and disposed.

China

Actively Encouraging the Public to Participate in the Urban Garbage Disposal Activities

China highlighted its program of encouraging public participation in urban garbage disposal and management. According to the economic development in China, the process of

urbanization had been accelerated. As a result, not only was urban garbage increasing rapidly but the environment was also deteriorating. Therefore, garbage disposal and management were set as a primary goal to protect the environment. In order to minimize urban garbage, public participation was seriously identified by the government as a way to solve the garbage problem, excluding the enforcement of laws, statutes, and regulations. Environmental publicity and education program were realized as effective means to decrease garbage volume through public awareness on environmental protection, particularly urban garbage disposal activities.

Iraq

Waste Treatment and Garbage Disposal in the City

Iraq pointed out that a consequence of development was an increase in municipal wastes which led to environmental and health problems. In this connection, municipal waste management should have been seriously taken into consideration to cope with internal and external complications. Iraq foresaw public participation, financial assistance, and technology transfer as prerequisites to national well-being.

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Section VI

Full Texts of Reports on

Waste Treatment and Garbage Disposal

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Working Groups of Waste Treatment and Garbage Disposal

Working Groups of Waste Treatment and Garbage Disposal

UNEP
Mr. Nirmal Andrews
Regional Director and Representative
UNEP Regional Office for Asia and the Pacific

I wish to draw the attention of the distinguished participants a few facts on the state of waste in Asia and the Pacific from UNEP's recently launched "millennium" publication - the Global Environment Outlook 2000 (or GEO-2000 in short). GEO-2000 states as follows :

The total waste generated in the region amounts to 2,600 million tonnes a year, of which solid waste accounts for 700 million tonnes and industrial activities generated 1,900 million tonnes.

Many urban waste disposal systems are inadequate. High rates of urbanization in the island states of the South Pacific has also resulted in serious waste management and pollution problems, particularly with respect to their impacts on groundwater resources. Environmentally-safe disposal of solid waste and sewage is a major concern for the island states of the region disposal sites are limited and sewage systems are lacking.

Importance of integrated waste management

Waste management can be seen as a set of independent activities or as an arena in which all activities are planned and carried out in relation to each other. I would like to emphasize the importance of integrated approach to solid waste management. Understanding the relationships among many areas is a key element in achieving integrated waste management, a single, overall approach to managing waste in a city, town, or region.

1. Elements of a waste management system

Waste management systems include some or all of the following activities :

- Setting policies;
- Planning and evaluating municipal solid waste management activities by system designers, users, and other stakeholders;
- Using waste characterization studies to adjust systems to the types of waste generated;
- Physically handling waste and recoverable materials, including separation, collection, composting, incineration, and landfilling;
- Marketing recovered materials to brokers or to end-users for industrial, commercial, or small-scale manufacturing purposes;
- Establishing training programs for municipal solid waste management workers;
- Carrying out public information and education programs;
- Identifying financial mechanisms and cost-recovery systems;
- Establishing prices for services, and creating incentives;
- Managing public sector administrative and operations units; and
- Incorporating private sector businesses, including informal sector collectors, processors, and entrepreneurs.

2. What is integrated waste management?

Integrated waste management is a frame of reference for designing and implementing new waste management systems and for analyzing and optimizing existing systems. Integrated waste management is based on the idea that all aspects of the waste management system should be analyzed together, since they are in fact inter-related and developments in one area frequently affect practices or activities in another area.

An integrated approach is an important element of sound practice because:

3. Methods for integrating a waste system

Planners can work toward integrated systems in a number of ways. The first task is to consider all aspects of the formal part of the waste system within one framework and to produce a planed based on the objectives of the entire system.

Second, in terms of jurisdictional and staffing issues, putting all waste-related functions under the same division or agency is an Importuned means of achieving integration. A third way of facilitating coordination and assessing trade-off among all formal aspects of a waste management system is to create integrated financial structures that, for example, use disposal fees to finance materials recovery or public education. More broadly, it is important to assess all municipal solid waste management system costs as well as opportunities for creating revenue.

Jurisdiction, responsibility and stakeholders

All stakeholders are expected to participate in system design for sound practice in waste management.

National or state/provincial governments : Governments will generally have final jurisdiction and responsibility for overall policy and for management of the municipal solid waste management system, whether or not the government itself is performing the waste management functions. The following actors, which include Public health and sanitation departments, Environment departments, Public works departments and Natural resource management departments, all have some important relation to waste management and, in some cases, significant levels of responsibility for policies or operations. Sound practice includes not only setting policies, but putting programs in place to implement them and establish integration consistent with the policies.

Municipal/local governments : In most countries, city or town governments have overall responsibility for waste management operations: ensuring that collection takes place and that the collected materials are delivered to processors, markets, or disposal facilities. Local governments in charge of landfills, incinerators, composting facilities, generally have access to a stream of revenues from fees paid by waste collection companies for disposal.

Private sector companies : Private sector companies tend to be involved in collection of waste, in street sweeping, in the recovery of materials, and, increasingly, in the construction

and operation of landfills, incinerators, and compost plants, as concessionaires or contractors from the responsible government authority. I there is no stream of revenue, it is not reasonable to expect private sector involvement. The necessary revenue stream, however, can come from direct charges or allocations from government.

Residential waste generators : Local resident's preferences for particular types of waste service, their willingness to source separate, and their capacity to move waste to communal collection points all have an impact on the overall waste system. Incentives can affect residents preferences and behavior.

Business waste generators : Business also produce waste, and the business sector can become a significant player in the waste management system, particularly, as is increasingly the case, when business must pay directly for their waste service. As with residents, incentives can play an important role in shaping behavior.

Non-governmental organizations : Non-governmental organizations (NGOs) often have a mission of improving the environment the environment or the quality of life for poor or marginalized groups; as part of this mission, they may stimulate small-scale enterprises and projects. Since waste materials represent, in many cases, the only growing resource stream, these organizations frequently base their efforts on extraction of certain materials not currently being recovered and processing them to add value and produce revenue.

Community-based organizations : In a number of locations where there is insufficient collection or the neighborhood is undeserved, community-based organizations take active role in waste management operations. These organizations, which are smaller-scale or local NGOs, may form primarily as self-help or self-reliance units, but they may, over time, evolve into service organizations that collect fees from their collection clients and from the sale of recovered materials. NGOs working with informal workers and community-based entrepreneurs often seek recognition for these organizations as part of the waste management system.

Women : Waste handling disproportionately touches the lives of women, particularly in some developing and transition countries. Women often collect the waste and set it out or move it to community transfer areas. Women are far more likely to be involved in materials recovery than in other comparable types of physical work. This is perhaps because women tend to be among the most marginalized groups of some societies.

The waste management hierarchy as a tool for achieving integrated waste management

The waste management hierarchy is a wide spread element of national and local policy and is often considered a fundamental basis of sound practice. The hierarchy ranks waste management operations according to their environmental or energy benefits. In virtually all countries, the hierarchy is defined as follows:

1. Prevent the creation of waste, or reduce the amount generated.
2. Reduce the toxicity or negative impacts of the waste that is generated.
3. Reuse in their current forms the materials recovered from the waste stream.
4. Recycle, compost, or recover materials for use as direct or indirect inputs to new products.
5. Recover energy by incineration, anaerobic digestion, or similar processes.

6. Reduce the volume of waste prior to disposal.
7. Dispose of waste in an environmentally sound manner, generally in landfills.

The purpose of the waste management hierarchy is to make waste management practices as environmentally sound as possible. The hierarchy is a useful policy tool for dealing with landfill shortages and for minimizing air and water pollution. It has been adopted in various forms by most industrialized countries. In many developing countries, some aspects of this hierarchy are already in place, since traditional practices revolving around waste prevention, reuse, and recycling are still prevalent.

Public involvement

The public can play a role in promoting efficient, financially sound, technically competent management of waste issues by demanding accountability from the municipal solid waste management system. Although in many countries the public has long grown accustomed to having low expectations of government, the pressing and very visible problems brought about by the absence of effective municipal solid waste management systems may inspire stronger demands for good performance from public managers and any private companies with whom they work.

Public education is important in achieving the goal of public involvement.

Eco-Efficiency and Cleaner Production

I would like to introduce UNEP's activities on eco-efficiency and cleaner production, which could reduce the total burden to the environment. (and reduce waste generation)

Introduction

There has been an evolution in our conception of what constitutes environmental management. We have moved from treatment to prevention, and from technology to management. We now understand better the "whole of life" issues for products and services, and integrated responses. There is greater understanding of the role of co-regulation, voluntary instruments and a broader stakeholder relationships with the wider community. Of special importance has been a greater focus on causal factors so as to be able to address the problem at its source. This in turn has changed the profile of environmental actors.

Responding to the need for eco-efficiency and cleaner production

The UN Secretary-General, in his report to the April 1999 meeting of the CSD, concludes that cleaner production and eco-efficiency have a major role to play in the context of an expanded programme of technology transfer. It calls for greater support for national cleaner production centres, and a greater use of voluntary measures by business. It is significant that the CSD and the UN in general is now focusing attention on what in UN terminology is called "sustainable production and consumption".

Eco-efficiency and cleaner production are generally seen as the best way of achieving such "sustainable" systems. Various sectors have developed their programmes and

terminology around their particular constituency and outlook. The UN System has by and large adopted the term cleaner production as providing governments with a useful framework. The business sector has developed the eco-efficiency concept as being most appropriate to its needs. The Asia-Pacific Productivity Organization prefers the term Green Productivity as expressing the economic advantages of a preventive approach. Everywhere, the earlier term pollution prevention still crops up, specially in general debate.

The differences between terms are less important than the common underlying concept of 'prevention' that unites all these approaches. What is important is that the action programmes complement each other and provide a similar outlook on the best management and regulatory tools to apply.

For governments the cleaner production approach provides a useful framework that readily accommodates the various policy and regulatory tools available to the authorities, and gives guidance on the role of support measures, R&D policy and voluntary measures.

For the business sector the notion of a preventive approach through eco-efficiency has been a powerful concept that has led to major changes in the way companies approach their environmental problems.

When used within the framework also of other principles such as life-cycle management, the precautionary principle etc., the preventive approach can be a powerful too for changing the management landscape in companies and agencies.

What has been achieved so far?

As a global level both cleaner production and eco-efficiency has made important advances in some countries. China has taken the concept seriously at a very high level and has initiated a number of programmes at both policy and plant level. India, likewise, has established high-profile actions, sometimes alone, sometimes with foreign assistance. Of course in both courtries the industry sector is so large that it will be some time before we expect total conversion, but an encouraging start has been made.

Following vigorous promotion by WBCSD, many large corporations and smaller companies have made environmental improvements in the framework of the eco-efficiency concept.

Overall, we understand that in OECD countries, including Australia, the message has been extensively promoted, and many industries have excellent experience with the prevention concept. But no-one is yet ready to claim victory, and much work remains to be done in all countries, especially among smaller enterprises (and sometimes some larger ones too).

In this respect it is interesting to compare the evolution of these concepts in the business sector with that in government. Despite the 'policies and strategies' options being regularly discussed at conferences and workshops, we are seeing far fewer governments actually taking concrete measures. Many administrations see their role as promoting the concept in industry rather than taking concrete action to provide the prevention framework withnin which business must operate. The result is that government policies still too often send the wrong

signals, provide the wrong laws, and reward the worng behavior. This lack of implementation was already noted in GEO.

Other potential partners also sometimes let us down, perhaps in response to the mixed signals we send. R&D in waste treatment is still better funded than in prevention. University courses in waste management are promoted more than those in avoidance. Ministers still prefer to cut the ribbon on a big treatment plant than congratulating an initiative to cut down on waste. Export promotion programmes focus on marketing expensive hardware rather than on building capacity in prevention. Conference and exhibition organizers highlight remediation techniques at the expense of alternatives. UNEP understands the necessity of addressing the wastes we have produced in the past, but we also believe that as a society we have not yet struck a proper balance between addressing historical situations and reducing future damage costs.

What has been the contribution of UNEP?

At the time of the launching of the concept of cleaner production in 1988, UNEP was almost alone as a promoter and catalyst of the 'prevention' concept among the UN bodies. Since then many other organizations have discovered the advantages of prevention. While continuing to promote cleaner production within the UN system and acting as an organizational conscience, we have also since then also worked with WBCSD to link with eco-efficiency, and with APO on green productivity, so as to create the necessary synergies around the world.

Briefly, the main action by UNEP to date have included the following:

- developing practical tools for industry and consultants, as for example the cleaner production assessment procedure;
- outlining policy and strategy options for governments, based on practical experience in a number of leading countries;
- publishing technical guidelines for key industry sectors, and on important procedures;
- establishing with UNIDO a series of National Cleaner Production Centres to assist industries and governments directly in very practical ways;
- running demonstration projects that can be replicated more widely, also in other countries;
- improving commitment by encouraging key players to sign the International Declaration on Cleaner Production;
- Producing training manuals;
- encouraging the incorporation of environmental concepts and management tools into the education of future professionals.

These actions are aimed at raising awareness, strengthening commitment, but also at providing practical tools for the key stakeholders to undertake the action necessary. They are aimed at a worldwide audience, and in view of the small size of UNEP, we have to use to the maximum extent possible other organizations to deliver them. This is the reason for our strong emphasis on partnerships, and a focus on the catalytic approach. But it is also true that with more help we could spread the message and the demonstrations wider still.

In this context it is interesting to recall the recommendations of some of the recent global meetings we have held. In particular there has been a strong call for UNEP to exert more

influence through business and other networks. The effort of UNEP to link more closely the many cleaner production round tables is one example of this. We have also been trying to promote the Cleaner Production Declaration through business channels in order to foster greater ownership by business itself of the prevention principle, and to complement the eco-efficiency approach being adopted by more and more companies.

Within UNEP we do not believe that the job is done. There is still a need to further promote the cleaner production concept in all countries. But the CP concept itself has enlarged to the point where it now incorporates many business management concepts. As we move forward we are encouraging greater us of life-cycle thinking, the use of formal environmental management systems and tools, to apply the principles of industrial ecology, and to put much greater emphasis on resource productivity.

With such an evolution, the Cleaner Production and eco-efficiency concepts will be valid for a long time to come, and provide guidance to the many enterprised that need to move more quickly towards our common goal of sustaninable development.

China
Remarks on the Technology Issue

Professor Shen Jingzhu
Member of the Environmental Protection and Resources Conservation Committee of National People's Congress of China

According to today's topic for discussion, I would like to take this opportunity to brief you on the technology issue of waste treatment in China.

In today's world, fast urbanization process brings about an increasingly serious problem of environment pollution and ecological destruction, an important factor, which hampers the sustained economic and social development of the human race. With a sustainable and fast economic development in China, the urbanization process is picking up its pace, and will continue to do so for a long period of time. It has become a major subject in the environmental protection in terms of providing solutions to the environmental pollution and ecological destruction and exploring an appropriate path of urbanization suitable for the actual conditions in China. Harmless disposal of domestic refuse in municipalities provides the fundamental element of environmental protection in urban areas. It is an important subject that involves protecting and improving living and ecological environment, preventing and controlling pollution as well as changing traditional development models so as to ensure the economic development in harmony with the environmental protection. In purpose of promoting development of urban garbage disposal technology, instructing municipalities in selecting suitable technology policy and seeking fast-track solutions to domestic refuse pollution in municipalities, the Chinese government organized competent departments, enterprises and research institutions to be actively involved in explorations, hence an effective utilization of some suitable technologies. Here is some basic information in this regard.

In China, municipalities vary noticeably in economic capacity, land resources and refuse quality. In accordance with local conditions, three ways of processing waste have been adopted, namely, landfill, compost and burning with each stays at a much different technologic level from the others.

First, land-burying technology. Land burying is the major and indispensable way in processing domestic refuse. In China it has been operated in large scales. There are quite a number of landfill plants with just only in the urban area daily disposal capacity over 1000 tons. Related draining system was established and technology of landfill and manual anti-percolation methods that could tackle the problem of leakage of percolation liquid were well incorporated into the operatins of these plants. Collection and emission technology help reduce the potential dangers caused by methane gas. At present, sanitary landfill technology in China has shifted its focus from pure processing to resource utilization.

Second, Compost technology. Compost is an important way of treatment from the points of

volume reduction and resources renewability. In China, it's more applicable way for the fact of rich content of organic mater in the refuse. At present, compost technology has been employed in scales and kept updated constantly. China possesses the capability of designing and construction of compost plants with daily disposal capacity of 100 to 200 tons. Combination of compost technology with organic compound fertilizer and staving technology helps achieve the goal of harmlessness. Wide use of organic compound fertilizer has given rise to soil amelioration, restoration of ecological environment, and realization of ecological agriculture.

Third, combustion technology. Combustion technology attracts wild attention for its advantages of tremendous volume decrease. Waste transformation in resources and economic exploitation of land resources. Cities such as Shenzhen and Chongqing have adopted the combustion technology. Research on combustion facilities has registered remarkable progress, but some still need to be further improved.

It is recognized that each of these three technologies, landfill, compost and combustion, has advantages and disadvantages. It can be shown in the relations between landfill and compost and between landfill and combustion that they are mutually indispensable and irreplaceable. In the developed countries, there are no cases that one technology could dominate the entire field. In China, municipalities vary sharply in economic capacity, land resources and garbage qualities. Therefore, technology policy on domestic refuse treatment in municipalities should be formulated in accordance with the social, economic, cultural characteristics and even the living habits at local level. Harmless disposal rate in China has reached 58.5%.

In the future, in line with the principle of "suit measures to local conditions and control in a comprehensive manner", the work of garbage disposal in municipalities should proceed from the source and aim at volume decrease, resources transformation and harmlessness. We must carry out the opening-up policy in this field, adopt the market access mechanism of garbage disposal machinery and permit fair competitions between domestic and foreign enterprises to further improve the garbage disposal level in our country.

China
Actively Encouraging the Public to participate in the Urban Garbage Disposal Activities

Mr. Chen Qian
Environmental Protection and Resources Conservation Committee of National People's Congress of China

According to the items on the agenda today, I would like to focus my presentation on China's program of encouraging the public participation in urban garbage disposal.

With a sustained and fast development of China's economy, people's living standards have improved rapidly and the urbanization process is accelerating. But meanwhile we are facing an ever worse problem of environmental pollution, especially the urban garbage pollution. Nowadays, China's per capita annual production of garbage reaches 440 kilograms, In 1998, China's urban garbage treatment amounted 100 million tons at an annual increase of 8% - 10%. The stored-up garbage over the years reached 6000 million odd tons. With high attention attached to the urban garbage and wastes prevention and control, China enacted series of laws, statutes and regulations, such as *Law on Prevention and Control of Environmental Pollution by Solid Wastes, Municipal Garbage Landfill Pollution Prevention and Control Standard,* with which we incorporate into the urban planning and construction the urban garbage prevention and control as one of the important contents. We continue to increase the input and popularize such technologies as the urban garbage landfill compost and incineration, which have already resulted in remarkable achievements. In 1998, the environment friendly treatment rate of urban garbage reached 58.5%. Especially through the efforts of governments at all levels or social organizations the public is mobilized and encouraged to participate in the urban environmental protection activities, thus, playing an active role in beautifying cities, clean and tidy, civilized and modern. The methods China adopts in encouraging the public to participate in the urban garbage disposal are the followings:

First, to strengthen the environmental publicity and education to the public. Environmental publicity and education is an important component of national environmental protection causes. The Chinese government has set as a strategic task to implement environmental publicity and education program and to increase the public environmental awareness of the whole nation. It is therefore listed in the *Ninth Five-Year Plan for the National Economic and Social Development and the Outline of the Long-Term Target for the Year 2010.* Thanks to the past years' efforts, an environmental education system with Chinese characteristics has taken shape including basic, professional, adult and societal education. In the meantime, the Chinese government brings into full play the supervising and instructing function of media, using TV, broadcasting and newspaper particularly on occasion of the International Environment Day of every June 5, the public receives an environmental publicity education. Focusing on the priorities such as eliminating urban *white pollution,*

boycotting the imported garbage from other countries, we launched a strong media offensive to effectively aroused the public awareness of environmental protection and participation, thus, contributing to the control and prevntion of urban garbage pollution.

Second, to guarantee the right of the people to participate in the urban garbage management. The public participation regime is of importance in China's environmental legislation making. There are provisions on the public participation in the relevant laws concerning environmental protection. For example, in *Environmental Protection law of People's Republic of China*, it stipulates: "all the units and individuals have the responsibility of protecting environment and have the right to report to the authorities of file charges in court of the units or individuals who make pollution or damage the environment." In *Solid Waste Environmental Pollution Prevention and Control Law of People's Republic of China*, passed 1995 by the Standing Committee of National people's Congress, it also stipulates clearly: "all the units and individuals have the responsibility of protecting environment and have the right to report to the authorities of file charges in court of the units or individuals who make solid waste pollution or damage environment. Governments at all levels should give award to the individuals or units who make remarkable achievements in the comprehensive prevention and control of solid waste pollution." In accordance with these stipulations the Chinese government guarantees the public right of participating in the pollution prevention and control activities. By establishing dialogue channels between governments and citizens, the public opinions and suggestions on urban environmental construction and urban garbage disposal are heard on the regular basis. Through the environment hotlines, the public is encouraged to report on illegal behaviors and conducts of urban environmental pollution. By bringing the initiative of the masses into full play in urban communities' management, the public participation in urban garbage treatment is advocated so as to maintain cities clean and tidy conscientiously.

Third, to bring into play social organizations and NGOs devoting to environmental protection. For many years, relevant social organizations and NGO have played an active role in urban garbage and waste disposal. Many environmental protection groups are established among students in primary and secondary schools and the institutions of high learning in various cities, engaged all year around in environmental protection activities on campus and in communities. Some social organizations launched campaigns such as "Hand in Hand", "Earth Village" or "Green Family" are widely engaged in carrying out such campaigns as white pollution elimination, garbage recycling, green consumption, which received positive response from the all walks of life, and achieved remarkable results.

Fourth, to mobilize the public devotion to the urban environmental construction. The Chinese government attaches great importance to the public's functions in urban environmental control and construction by organizing green volunteers activities aiming at supporting wastes recycling and utilization, reducing and ultimately eliminating white pollution and building civilized family in every large and medium-sized cities. Some cities installed garbage-recycling bins in public places and communities, distribute free of charge garbage bags and shopping build to urban residents. Whereas, other cities disseminate clean production, and build on green enterprises. Recently, relevant departments of the Chinese government as well as social organizations launched a campaign named "with everyone's participation we build clean cities" in every large and medium-sized cities for the past five years in correspondence with a global campaign to make our world clean. In 1998, 12

million people over 200 cities took part in the clean city campaign, removing 127,000 tons of garbage and cleaning up 76 million square meters public space. With unremitting efforts, cities in China have become cleaner with Dalian Shenzhen Xiamen Weihai Zhuhai and Zhangjiagang emerged as national model cities in the environmental protection.

This is my brief introduction of the urban garbage disposal and management with the public participation in China. At present, China is enjoying fast economic development, which has brought about great changes in cities. According to the forecast of *Report on Human Inhabitat of the People's Republic of China*, the urbanization will pick up speed in coming decades. Urban total population will reach 450 million in 2000, making up 35% of the country's total, 630 million, 45% by 2010. The speedy urbanization will accelerate the social development, which, in turn, pushes further the industrial and economic growth. Nevertheless, the fast urbanization exerts greater pressure on the environment. The environmental protection is one of the China's state policies. We stick to a sustainable development. Garbage disposal and management is always set as a priority of environmental protection. In line with the principles of urban garbage minimization, harmlessness, renewable resources, we are speeding up building harmless garbage disposal factories and installations. We popularize a comprehensive treatment of garbage. With the public participation in garbage management, we will realize a sustainable development of all our causes including the environmental protection, and our people enjoy their life and work.

Urban garbage problem has become one of the most serious environmental problems in the world . It is of crucial importance, we believe, that a proper handling of this issue is directly linked to urban construction and sustainable development of the Asia-Pacific region, and the world at large. We realize that to increase the public environment awareness, deepen their knowledge about the danger of the environmental pollution and garbage, encourage them to change their life values, and mobilize their participation in garbage management is essential to decrease the garbage quantity and to make it harmless and renewable resources. At present, every country has its own successful experiences in urban garbage disposal. As a member of the Asia-pacific region, China is willing to learn from the successful experiences of other countries, and to make unremitting efforts in urban garbage disposal, thus, contributing to green civilization building in the next century!

Iraq
Waste Treatment and Garbage Disposal in the City

Dr. Raja Murad AI-Shawi
Chairman of the Delegation of the Iraq National Assembly

The Cultural, industrial and agricultural development and the expansion of development plans in any countries in the world have resulted in the emergence of the problem of municipal wastes and garbage in such a way as to constitute a grave phenomenon leaving adverse effects on society and the environment in many countries in the world.

Garbage collection, transport and management are the three mains required for solving any problem of this type; and this requires usually considerable financial allocations difficult to collect from the citizens especially in developing countries, constituting additional financial burdens for the governments, and to be specific for the governments suffering from financial difficulties such as debts as well as obstructions of their development projects.

When studying this kind of subject and attempting to come up with solutions for it we should not forget the political aspect, for Iraq specifically is among the countries which attach great importance to the waste and garbage treatment having had big and modern plants for waste recycling and treatment apart from providing hightech modern cars to transport and press the waste and assigned areas for their sanitary disposal or recycling. Baghdad for instance was one of the cleanest cities in the world notwithstanding its population of almost five millions inhabitants. But now Iraq in general is suffering from financial difficulties as a result of the embargo and the economic and technological sanctions imposed on Iraq and still continuing since the year 1990 for purely political purposes whereby all its material assets have been frozen and Iraq's dispensing with its own sums of money substantially restricted. Thus limiting considerably its possibilities of paying for services, transfer of technology, providing necessary means to collect and treat the waste even the difficulty of spare parts for what is available of these means resulting in its accumulation creating very serious environmental and hygienic problems.

It is well known that waste treatment in any country even when all its requirements are provided for remains a cooperative process between different parties and in accordance with the administrative set up of the country in question. In Iraq for example there is cooperation among ministries and various departments in addition to the local peoples councils, mass organizations as well as the NGOs through the Environment Protection and Improvement Board chaired by an official with the rank of a Minister.

Consequently, we are of the opinion that it is necessary for the colleagues parliamentarians participating in this conference to work towards the following;

1. To urge the specialists and experts in the domain of environment protection especially those working in the executive power to present detailed yearly studies on the subject to the specialized committees in their parliaments comprising the planned environmental policies taking into consideration the technological, socio - economic and legal aspects of the issues in order for the parliamentarians to contribute in taking whatever is required with regards to the parliamentary aspect of the issue.

2. To urge the governments and the related parties dealing with environment protection to prepare a yearly report on the state of the environment with the possibility that the environmental policies mentioned in part (1) above becoming a part of this report.

3. Granting the local peoples councils and the mass organizations a bigger role in participating in issuing regulations and instructions and to benefit from the opinions of others enhancing thereby the democratic role in solving the problems facing cities in this regard, and in achieving the goal of public participation making.

4. To call on parliaments and governments in the richer and more advanced states technologically to support the poor, developing countries in contributing to provide them with all that is necessary to solve these problems, so as to protect the world environment through expediting the required technology transfer and other necessary prerequisites like the tools for pressing and transporting waste as well as recycling plants with extending appropriate technical facilities. Definitely all this will lead to the attainment of the objective of the use of green and clean technologies.

5. To ask governments to work for diffusing environmental awareness intensively pointing out to the importance of the best implementation of environmental laws, rules, regulations and instructions in any country.

6. Calling always for the lifting of the embargo and the economic technological and scientific sanctions imposed on countries and peoples for purely political purposes so that this will assist in providing all that is necessary for the treatment of waste and protection of the environment.

Section VII

Appendices

หน้าว่าง

Opening Statement by Dr. Sang - Mok Suh, President the Executive Committee

Opening Statement by H.E. Mr. Wanmuhamadnoor Matha, President of the National Assembly of Thailand

Opening Statement by H.E. Mr. Tanin Kraivixien, Privy Councillor

J-1
APPCED/7/GA/Speech.1

Opening Statement
by
Dr. Sang-Mok Suh
President of Executive Committee

Honorable Tanin Kraivixien, Special Advisor to the President
Honorable Wanmuhamadnoor Matha, President of the National Assembly of Thailand
Honorable Meechai Ruchupun, President of the Senate of Thailand
Honorable Sumit Sundaravej of Thailand, chairman of the Coordinating Committee of the 7th APPCED
Honorable parliamentary representatives and
Ladies and Gentlemen

I would like to extend my sincere gratitude to you for taking the time out of your busy schedule to attend the 7th Asia-Pacific Parliamentarians Conference on Environment and Development. Let me also express my heartfelt appreciation to the Thai National Assembly for hosting the 7th APPCED in this historic town of Chiang Mai.

It is indeed significant that our last conference of the century is held in Thailand. Thailand is one of the founding members of APPCED, sharing the cause that achieving sustainable development is vital to the future of the most dynamic region in the world. Its rich culture and vibrant energy charm visitors. With the renowned Thai hospitality that greeted APPCED members five years ago in Phuket. Thailand is once again welcoming the elected representatives of the Asia-Pacific countries who are committed to addressing environmental and developmental challenges.

In a month we will be entering a new century. The twentieth century will be recorded as one of unprecedented crisis, of conflicts and chaos driving humankind to realize the limits of the earth. Humankind found the wisdom to realize that it shared a common interest and set itself to building a society that allows all to prosper. A case in point is the APPCED. It was established based on mutual understanding that parliamentarians of the region should take upon themselves to play a major role in promoting a cooperative system that would lead to economic growth and sustainable development in all countries.

Starting with eight countries of the region in 1993, the APPCED grew to accept 45 countries in the Asia-Pacific as members. We have deliberated on a wide array of environmental issues including ocean, forestry, environmentally-sound technology transfer and sustainable development of tourism. Our inputs have assisted each government and international organizations to draw up the needed policy responses that would address the adverse effects of environmental and developmental challenges. Among them is the Seoul Statement on Environmentally-sound Technology Transfer that was forwarded to the United Nations Special Session of the General Assembly on the Environment in 1997. With a new

millenium just around the corner, we will see continued increase in the significance and expected role of the APPCED.

The main theme of this year's conference is "Garbage Disposal and Waste Treatment in Urban Areas". Waste generation, both domestic and industrial, continues to increase world-wide in tandem with growth in consumption. In developed countries, per capital waste generation increased nearly three-fold over the last two decades, reaching a level five to six times higher than that in developing countries.

With increases in populations and living standards, waste generation in developing countries is also increasing rapidly, and may double in volume in the current decade. According to the United Nations' estimate, if current trends continue, the world may see a five-fold increase in waste generation by the year 2025. This adds up to big trouble for the environment. Men are generating waste products faster than nature can break them down and using up resources faster than they can be replaced.

Then, how can we find ways to meet our current economic and social needs without compromising the ability of our children to do the same? Our success will depend on understanding the difference between sustainable and unsustainable practices. Sustainable practices are the ones that provide ongoing economic and social benefits without degrading the environment. Meanwhile, unsustainable practices are "quick fixes" that fill an immediate need for resources. Over time, however, these practices deplete or damage natural resources so they cannot be used or enjoyed by future generations.

A high proportion of the waste could be recycled by the urban poor, generating income for themselves and protecting the environment. An integrated approach should be developed where the public, private and community sectors work together to develop local solutions promoting sustainable waste management.

As parliamentarians, we have the possibility and authority to mobilize manpower, funds and resources to promote sustainable waste management, Let us be mindful of the enormity of our task but have the boldness to undertake it. Let us do all we can so that we will not turn a blind eye to future problems. This conference is the start of a new beginning. We hope that it will be a prominent and fruitful conference that delivers your consideration for the 21st century.

Once again, allow me to express my sincere appreciation to the host country for organizing such a wonderful and valuable conference. I would like to take this opportunity to thank all delegates for participating in this conference. Without you commitment and support, our common goal cannot be fulfilled.

Thank you.

J-2
APPCED/7/GA/speech.2

Opening Statement
by
H.E. Mr. Wanmuhamadnoor Matha
President of the National Assembly of Thailand

His Excellency Tanin Kraivixien, Privy Councillor and Representative of Her Royal Highness Princess Chulabhorn Mahidol
Honorable Members of Parliament
Distinguished Guests
Ladies and Gentlemen,

Following the United Nations Conference on Sustainable Development, and the corresponding Specialized Inter-Parliamentary Conference in Brazil in 1992, parliamentarians of the Asia-Pacific region have become aware of the importance of environment as a major regional and global problems deserving attention. The first Asia-Pacific Parliamentarians' Conference on Environment and Development was thus held in Seoul, Korea in 1993, aiming at adopting parliamentary measures for sustainable development in the region.

Key areas of environment in the Asia-Pacific region were stressed at the past six APPCED Conferences. These are the preservation and promotion of culture on environment through parliamentary measures for sustainable development; global climate change and biological diversity; the importance of ocean and coastal areas to sustainable development in the region, and measures to preserve and protect resources through exchanges of knowledge in science and technology, promotion of peoples' awareness about ocean and the detriments of sea and ocean imbalances; the rehabilitation of forests in the global ecosystem; the application of technology to prevent the rapid deterioration of environment and the parliamentary role to develop and improve legal structures for environmental technologies; the role of governments in the region to work for the developments of environmental qualities and regulations governing them; and the importance given to the fast growing eco-tourism industry that helps to create works and cultural exchanges in the region, and which must be developed together with the environment, the utilization of natural resources, environmental protection, as well as the joint protection of resources and environment in the region by concerned authorities.

The title of the Seventh APPCED Conference is Wastes Treatment and Garbage Disposal in the Cities. The title derived from the fact that the increase of domestic wastes is a critical problem stemming from population surge and inefficient management and improper implementation of measures to resolve them. We cannot therefore deny that problems from wastes and garbage affect water, global spheres, environmental conditions, and the qualities of life of the peoples. In fact, they are a stumbling block to national development.

This Conference is thus an opportunity for parliamentarians to exchange their views on the issues, as well as listen to diverse experiences on waste treatment and garbage disposal from concerned peoples and international organizations. Such parliamentary interactions would be beneficial to parliamentarians who are the representatives of the peoples, and the key persons in the legislative process leading to the improvements and standardization of modern environmental laws and regulations that would assist in the preservation and protection of environment in the whole region. Moreover, the Conference would also link parliamentarians, public organizations, and private sectors together and helps to further strengthen their relationship, coordination, and cooperation on environment, as well as establish the information network on environment.

On the occasion of the 72nd Birthday of His Majesty the King, the national Assembly of Thailand has organized an exhibition on environment to honor His Majesty the King. The exhibition will feature the projects of environmental awareness among youths in schools and basic environmental preservation such as garbage processing, garbage recycling, and garbage management.

May I now invite Your Excellency to declare open the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development.

Thank you.

J-3
APPCED/7/GA/speech.3

Opening Statement
by
His Excellency Tanin Kraivixien
Privy Councillor

Excellencies,
Distinguished Delegates,
Ladies and Gentlemen,

In my capacity as the representative of Her Royal Highness Princess Chulabhorn Mahidol, I have the honor to inaugurate the Seventh Asia-Pacific Parliamentarians' Conference on Environment and Development. I wish to extend a warm welcome to all delegates to this regional Conference.

Today, tremendous changes and threats to natural resources and environment have affected the well-being and health of peoples everywhere. Domestic waste and garbage are one of the problems that several cities are facing because no appropriate plans have been improvised to cope with these increasing threats to our environment. It is therefore apt that APPCED has chosen "Waste Treatment and Garbage Disposal in the City" as the title and main theme for this Seventh Conference. I hope that the Conference could be able to focus on all forms of domestic wastes and management of garbage disposal, covering technological, socio-economic, policy, legal, and parliamentary aspects of the issues, and it should not fail to emphasize the role of local governments, municipalities, and city administration in waste management and garbage disposal.

Parliamentarians should take innovative steps to improve laws and regulations for waste minimization and waste management at all levels of metropolitan as well as urban areas, and at the national level, a decentralization of urban decision-making and management should be urgently implemented, since grassroot participation is a key to any improvement of urban living.

With this in mind, I certainly believe that all of you from all countries in Asia-Pacific region will share your concern and wisdom in an effort to overcome the negative effects on environment brought by rapid growth of urban areas, in order to maintain sustainable development. It is hoped that regional level cooperation will complement efforts at the national levels. This important regional meeting will certainly give as great input and insight into the problems that may turn into opportunity for solutions benefiting our region.

On behalf of Her Royal Highness Princess Chulabhorn Mahidol, may I declare open the 7th Asia-Pacific Parliamentarians' Conference on Environment and Development. May all participants meet with success and attainment of their desirable goals.

Thank you

Guest Speakers

1. Mrs. Karen FRASER
   US Senator
2. Prof. Emil SALIM
3. Mr. Takashi KOSUGI
   Former Chairman of GLOBE International
4. Mr. Nirmal ANDREWS
   Director of UNEP
5. Mr. Yoshiro KABURAGI
   Special Advisor to Mr. Takashi KOSUGI
6. Mr. Tim MALONE
   Accompanying person to Delegate No.1

List of Delegates and Observers

1. BANGLADESH

1. Master Mujibur RAHMAN
   Member of Parliament

2. KINGDOM OF CAMBODIA

1. Mr. Vanndy EK
   Secretary of Commission on Economic, Planning, Investment, Agriculture, Rural Development and Environment
2. Mr. Sokun LIM
   Member of Commission
3. Mr. Chat MUY
   Member of Commission
4. Mr. Yusof ISMAIL
   Member of Commission
5. Mr. Ly PENG
   Member of Commission
6. Mr. Song CHHANG
   The Senate
7. Mr. Prak VANNY
   The Senate
8. Mr. Sophona KEM
   Chief of Protocol of Secretariat General of National Assembly

3. CANADA

1. Ms. Isobel FINNERTY
   Senator
   Head of the Delegation

2. Ms. Brenda ROBERTSON
   Senator
3. Ms. Maud DEBIEN
   Member of the House of Commons
4. Mr. Daniel BRASSARD
   Director of Science and Technology Division, Library of Parliament
5. Mr. Leslie FINNERTY
   Accompanying person to Delegate No.1

4. CHILE

1. H.E. Diego VALENZUELA
   Ambassador, Embassy of Chile

5. CHINA

1. Mr. WANG Tao
   Member of the Standing Committee of National People's Congress (NPC)
   Vice Chairman of the NPC Environmental Protection and Resourcees Conservation Committee
   Head of the Delegation
2. Mr. CHEN Qian
   Deputy to the National People's Congress
   Member of the NPC Environmental Protection and Resources Conservation Committee
3. Ms. SHEN Jing Zhu
   Deeputy to the National People's Congress
   Member of the NPC Environmental Protection and Resources Conservation Committee
4. Mr. XU Shi Yuan
   Deputy to the National People's Congress
5. Mr. HUANG Chan
   Vice Chairman of the Standing Committee of Guilin Municipal People's Congress
6. Mr. MENG Wenzhen
   Chairman of the Foreign Affairs Committee of Guilin Municipal People's Congress
7. Mr. CHEN Guomin
   Deputy Director-General of Foreign Affairs Bureau, General Office, NPC Standing
   Committee
8. Mr. HE Jiaping
   Deputy Director-General of the Office of the NPC Environmental Protection and Resources Conservation Committee
9. Mr. ZHANG Ying Bo
   Secretary
10. Mr. LU Jiebin
    Secretary
11. Ms. LIU Yin
    Secretary

12. Mr. LIU Deyu
Secretary
13. Ms. ZHOU Hualing
Secretary
14. Mr.CHEN Xiaoke
Secretary
15. Mr. TANG Chaozhi
Secretary
16. Mr. YANG Xin
Embassy of the People's Republic of China

6. INDIA

1. Hon. Shri G.M.C. BALAYOGI
Speaker of Lok Sabha
Head of the Delegation
2. Shri S.R. BOMMAI
Member of Parliament
3. Col. Sona Ram CHOUDHARY
Member of Parliament
4. Shri B. Nagi REDDY
Member of Parliament
5. Mr. Ramdas AGARWAL
6. Shri G.C. MALHOTRA
Secretary-General, Lok Sabha
7. Shri Busi SAMBOB
Secretary to the Speaker, Lok Sabha
8. Shri B.R. KANATHIA
Director, Lok Sabha Secretariat
9. Mr. Y.P. SINGH
Embassy of India
10. Shri Tapan CHATTERJEE
Deputy Secretary, Rajya Sabha Secretariat

7. IRAN

1. Mr. Manouchehr BENNIA
Member of Islamic Consultative Assembly
2. Mr. Ali GHANBARI
Member of Islamic Consultative Assembly
3. Mr. Abdolreza GHOFRANI
Embassy of Islamic Republic of Iran - Bangkok

8. IRAQ

1. Dr. Raja Murad AL-SHAWI
President of the Committee on Environment of the Iraqi National Assembly
2. Dr. Dhaher Jamil AL-HABBOO
Member of the Committee on Religious and Social Affairs of the Iraqi National Assembly

9. REPUBLIC OF KOREA

1. Mr. Sang-Mok SUH
   Member of Parliament,
   Chairman of the APPCED Executive Committee
2. Mr. Woo-Taik CHUNG
   Member of Parliament
3. Mr. Il-Chyun KWAK
   Professor of Regional Development, Kyungwon University
4. Mr. Chi-Beom LEE
   Resource Person
5. Ms. Amy KIM
   General-Director of the Korean Parliamentary League on Children, Population and Environment
   Secretary, APPCED Secretariat

10. LAOS

1. Mr. Bouasy LOVANXAY
   Member of Parliament
2. Mr. Viseth SVENGSUKSA
   Member of Parliament

11. MEXICO

1. Mr. Leonardo Yanez Vargas
   Senator
2. Mr. Pedro de Leon Sanchez
   Senator
3. Mr. Alejandro Garcia Acevedo
   Senator
4. Mr. Gonzalo Rojas Arreola
   The Mexican Congress
5. Mr. Jorge Alejandro Jimenez Taboada
   The Mexican Congress
6. Mr. Francisco Xavier Salazar Diez de Sollano
   The Mexican Congress
7. Ms. Addy Joaquin Coldwell
   The Mexican Congress
8. Ms. Martha Tamayo Horales
   The Mexican Congress
9. Ms. Juana Rendon de Yanez
   Accompanying Person to Delegate No.1
10. Ms. Eva Victoria Velazquez de de Leon
    Accompanying Person to Delegate No.2
11. Ms. Carlota Gutierrez Espinosa
    Accompanying Person to Delegate No.3
12. Mrs. Angeles RODRIGUEZ
    Accompanying Person to Delegate No. 6
13. Mr. Edmundo FERUANDEZ
    Accompanying Person to Delegate No. 7

14. Mr. Mector King TAMAYO
Accompanying Person to Delegate No. 8

12. MICRONESIA

1. Mr. Claude H. PHILLIP
Vice-Speaker, Congress of the Federated States of Micronesia
Head of Delegation
2. Mr. Joseph J. URUSEMAL
Floor Leader, Congress of the Federated States of Micronesia
3. Mr. Dennis BELCOURT
Legal Counsel, Congress of the Federated States of Micronesia

13. NAURU

1. Mr. Ludwig KEKE
Speaker of Parliament
2. Mr. Ross CAIN
Deputy Speaker of Parliament
3. Ms. Ann KEKE
Accompanying Person to Delegate No. 1
4. Mr. John GARABWAN
Deputy Clerk of Parliament

14. NEW ZEALAND

1. Mr. Denis MARSHALL
Member of the House of Representatives

15. PALAU

1. Mr. Daiziro NAKAMURA
Senator

16. PAPUA NEW GUINEA

1. Mr. John MOMIS
Member of Parliament
2. Mr. John BALAGETUNA
Delegation Secretary

17. PERU

1. Mr. Luis CAMPOS
President of the Environment, Ecology and Amazonia
Commission of the Congress
2. Mr. Santos RETO
Member of Parliament
3. Mr. Samuel REYNAFARJE
Member of Parliament
4. Mr. Alberto SATO
Member of Parliament

18. REPUBLIC OF THE PHILIPPINES

1. Mr. Benjamin S. LIM
   Member of the House of Representatives
2. Mr. Heherson AIVAREZ
   Member of the House of Representatives

19. RUSSIA

1. Mrs. Tamara ZLOTNIKOVA
   Chairman of the Ecology Committee
   The State Duma of Russia
2. Ms. Yulia JOULINA
   Expert
3. H.E. Valery MALYGIN
   Ambassador, Embassy of Russian Federation

20. SINGAPORE

1. Prof. Seow Chay LOW
   Member of the Parliament

21. THAILAND

1. Mr. Sumit SUNDARAVEJ
   Member of the House of Representatives
   Leader of Thai Delegation
2. Mr. Sanit KULCHAROEN
   Member of the House of Representatives
   Delegate
3. Mr. Suchon CHALEEKURE
   Senator
   Delegate
4. Gen. Vichit BOONYAWAT
   Senator
   Delegate
5. Mr. Thawachwong NA CHIENGMAI
   Member of the House of Representatives
   Delegate
6. Mrs. Kingkhan NA CHIENGMAI
   Member of the House of Representatives
   Delegate
7. Mr. Pisit NA PATALUNG
   Senator
   Delegate
8. Mr. Sommai SURAKUL
   Senator
   Delegate
9. Gen. Charan KULLAVANIJAYA
   Senator
   Delegate

10. Mrs. Kirana SUMAWONG
    Senator
    Delegate
11. Mr. Chirayudh VASURATNA
    Senator
    Delegate
12. Mr. Dusit SIRIWAN
    Senator
    Delegate
13. Mr. Surapong TOVICHAKCHAIKUL
    Member of the House of Representatives
    Delegate
14. Miss Charinratana BUDDHAPUAN
    Member of the House of Representatives
    Delegate
15. Mrs. Agripina SUNDARAVEJ
    Accompanying Person to Delegate No. 1
16. Wing Commander Akapan CHALEEKURE
    Accompanying Person to Delegate No. 3
17. Mr. Chumchon CHALERMCHUANG
    Foreign Relations Officer
    Secretary to the Delegation
18. Miss Sirinda JUNTARAK
    Foreign Relations Officer
    Assistant Secretary to the Delegation

22. UNITED STATES OF AMERICA

1. Mrs. Sandra ROMERO
   Member of the Washington State
   House of Representatives
2. Mr. Fred ROMERO
   Accompanying Person to Delegate No. 1
3. Miss Zoe ROMERO
   Accompanying Person to Delegate No. 1

23. VIETNAM

1. Prof. Dr. Pham Thi Tran CHAU
   Vice-Chairwoman of the Committee
   Head of Delegation
2. Eng. Nguyen Tat TAO
   Member of the Committee
3. Eng. Do Thanh LIEM
   Member of the Committee
4. Dr. Le Minh HONG
   Expert of Department of Science, Technology and Environment,
   Office of the National Assembly

5. Mr. Trinh Dinh SON
   Expert of the Department of Foreign Affairs of the Office of the National Assembly
   Interpreter

24. AFPPD

1. Mr. Shiv KHARE
   Executive Director of the AFPPD

25. CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA)

1. Mrs. Rasheda NAWAZ
   Senior Policy Advisor

26. UNICEF

1. Miss Permsiri NITIMANOP

27. OBSERVER

1. Col. Prasit SIRIWAN
   Ministry of Defense
2. Mr. Rittipong TACHAPURT
   Chief of Planning Section
   Chiang Mai Government Office
3. Mr. Niwat KONGSAWAT
   Chiang Mai Governor Office
4. Assoc. Prof. Chalee LATTHI
   Chiang Mai University
5. Asst. Prof. Wasan JOMPAKDEE
   Chiang Mai University
6. Mr. Prasarn TANGSIKABUTH
   Chiang Mai University
7. Ms. Thanaporn SUPRIYASILP
   Chiang Mai University
8. Ms. Anthika SUPRIYASILP
   Chiang Mai University
9. Mr. Claudio DELANG
   National University of Singapore
10. Mr. Montri CHEWAWECH
    Montricont and Mobile Co., Ltd.
11. Mrs. Puangrat VONGPO
12. Mrs. Tuangtip PHOMSON
13. Mrs. Kanyakarn SIRIWAN
    Accompanying Person to Delegate No. 1

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Organizing Committee for the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development

1.	H.E. Mr. Wanmuhamadnoor Matha President of the National Assembly	Chairperson
2.	H.E. Mr. Meechai Ruchupun President of the Senate	Vice-Chairperson
3.	Hon. Mr. Sanit Kulchareon	
4.	Hon. Mr. Suchon Chaleekure	
5.	Hon. Mr. Santsak Ngampiches	
6.	Hon. Mr. Pracha Hetrakul	
7.	Hon. Mr. Sumit Sundaravej	
8.	Hon. Mr. Thawachwong Na Chiengmai	
9.	Hon. Mrs. Kingkhan Na Chiengmai	
10.	Hon. Mr. Amnuay Yossuck	
11.	Hon. Mr. Charinratana Buddhapuan	
12.	Hon. Mr. Surapong Tovichakchaikul	
13.	Hon. Mr. Narong Poo-ittiwong	
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15.	Hon. Mr. Boonchuay Phoogeenaphan	
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17.	Hon. Mr. Kumchung Prapakonkeawrutn	
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19.	Hon. Mr. Apichat Karikanjana	
20.	Hon. Mr. Prasart Tanprasert	
21.	Hon. Mr. Prai Pattano	
22.	Hon. Mr. Thanathep Timsuwan	
23.	Hon. Mr. Ong-Ard Klampaiboon	
24.	Hon. Sub-Lt. Wattana Kaewsiri	
25.	Hon. Mr. Watana Muangsook	
26.	Hon. Mr. Chaiya Sasomsab	
27.	Hon. Mr. Sawat Comwongsa	
28.	Hon. Mr. Poom Sarapol	
29.	Hon. Mr. Teera Sluckpetch	
30.	Hon. Mr. Witthaya Keawparadai	
31.	Hon. Mr. Surasit Nitivutthivorrakar	
32.	Hon. Mr. Kasem Snidvongs	
33.	Hon. Mr. Burapa Attakor	
34.	Hon. Mr. Pisit Na Patalung	
35.	Hon. Mr. Linda Bunnag	
36.	Hon. Mr. Pornthep Pornprapa	
37.	Hon. Mr. Chaichate Soontornpipit	
38.	Hon. Mr. Thawesak Sesavej	
39.	Hon. Mr. Prachai Leophairatana	
40.	Hon. Mr. Paron Israsena	
41.	Hon. Mr. Paiboon Wattanasiritham	
42.	Hon. Mr. Manas Sooksmarn	
43.	Hon. Mr. Sommai Surakul	
44.	Hon. Pol. Gen. Salang Bunnag	
45.	Hon. Mr. Sophon Suphapong	
46.	Hon. Mr. Arun Chaiseri	
47.	Assoc. Prof. Sunee Mallikamarl	
48.	Assoc. Prof. Pichai Tovivit	
49.	Secretary General of the House of Representatives	
50.	Secretary General of the Senate	
51.	Representative of the Tourism Authority of Thailand	

52. Mr. Tinawat Marukpitak
53. Representative of the Ministry of Transport and Communications
54. Governor of Bangkok
55. Representative of Ministry of Science, Technology and Environment
56. Representative of Ministry of Foreign Affairs
57. Representative of Ministry of Industry
58. Representative of Ministry of Public Health
59. Commissioner-General of the Royal Thai Police
60. Mayor of Chiang Mai
61. Governor of Chiang Mai
62. Representative of Tourism Authority of Thailand Northern Office : Regional 1
63. President of Chiang Mai University
64. Provincial Health Officer of Chiang Mai
65. Representative of School of Dramatical Arts of Chiang Mai
66. Representative of Provincial Police Regional 5
67. Head of Chiang Mai Provincial Land Transport office
68. President of Chiang Mai Muslim Association
69. Chairman of Chiang Mai Musilm Committee
70. Representative of Thai Environment Institute
71. Mr. Chinda Chareonpun
72. Mr. Sompol Vanigbandhu — Secretary
73. Ms. Supasinee Khamasundara — Assistant Secretary
74. Mr. Choomchon Chalermchuang — Assistant Secretary
75. Ms. Ranida Wongpanich — Assistant Secretary

Sub-Committee on Academic and Substantive Preparation for the Seventh General Assembly of the Asia-Pacific Parliamentarians' Conference on Environment and Development

1. Mr. Tinawat Marukpitak — Advisor
2. Mr. Kasem Snidvongs — Advisor
3. Mr. Pisit Na Patalung — Advisor
4. Mr. Kamthorn Udomritthiruj — Advisor
5. Mr. Sirithan Pairoj-Boriboon — Advisor
6. Mr. Suvit Yodmani — Advisor
7. Assoc. Prof. Sunee Mallikamarl — Chairperson
8. Mr. Adisak Thongkaimook
9. Prof. Samorn Muttamara
10. Ms. Nitaya Mahabhol
11. Representative of Department of International Organization, Ministry of Foreign Affairs.
12. Representative of Ministry of Industry
13. Representative of Department of Environmental Quality Promotion, Ministry of Science, Technology and Environment
14. Representative of Office of Environmental Policy and Planning
15. Representative of Department of Health, Ministry of Public Health
16. Representative of Department of Local Administration, Ministry of Interior
17. Representative of the Engineering Institute of Thailand under H.M. the King Patronage

18.	Representative of the Association of Environmental Engineering of Thailand	
19.	Representative of Thai Environment Institute	
20.	Representative of the United Nations Environment Programme	
21.	Mr. Ekawan Wongsawatgul	
22.	Assoc. Prof. Wichai Suttimool	
23.	Ms. Suthida Pliankarom	
24.	Ms. Nantanit Kulcharoen	
25.	Ms. Supasinee Khamasundara	Secretary
26.	Ms. Ranida Wongpanich	Assistant Secretary
27.	Ms. Khanittha Chotigavanit	Assistant Secretary

Sub-Committee on Conference Preparation

1.	Mr. Tinawat Marukpitak	Advisor
2.	Rector of Chiang Mai University	Advisor
3.	Secretary General of the House of Representatives	Chairperson
4.	Mr. Chinda Chareonpun	Vice-Chairperson
5.	Director of Finance and Commodities Division, Secretariat of the House of Representatives	
6.	Director of Printing Service Division, Secretariat of the House of Representatives	
7.	Director of Computer Center, Secretariat of the House of Representatives	
8.	Director of Foreign Relations Division, Secretariat of the Senate	
9.	Mr. Sayam Eiampichairit	
10.	Chairman of Chiang Mai Muslim Committee	
11.	President of Chiang Mai Muslim Association	
12.	Mr. Winai Punthurak	
13.	Mr. Prasert Pakdeepanich	
14.	Mr. Sompol Vanigbandhu	Secretary
15.	Mr. Suchana Srisiyawan	Assistant Secretary
16.	Mr. Choomchon Chalermchuang	Assistant Secretary

Sub-Committee on Functional, Recreation and Facilitation

1.	Secretary General of the House of Representatives	Chairperson
2.	Mr. Chinda Chareonpun	Vice-Chairperson
3.	Representative of Office of Police Immigration, the Royal Thai Police	
4.	Representative of the Customs Department	
5.	Representative of the Airport Authority of Thailand	
6.	Representative of the Thai Airways International Public Company Ltd.	
7.	Mr. Jetsada Chavanapak	
8.	Mr. Narong Ratanaporn	Secretary
9.	Ms. Duangdao Johnsuk	Assistant Secretary
10.	Mr. Saravoot Changkaew	Assistant Secretary
11.	Ms. Watinee Chompoopetch	Assistant Secretary

Sub-Committee on Public Relations

1.	Hon. Mr. Pracha Hetrakul	Advisor
2.	Hon. Mr. Damrong Poottan	Advisor
3.	Representative of the Government Public Relations Department	Advisor
4.	Representative of the Communication Authority of Thailand	Advisor
5.	Mrs. Pornpimol Tirakungovit	Chairperson
6.	Mrs. Supharat Wasaphak	Vice-Chairperson
7.	Representative of the Television Pool of Thailand	
8.	Representative of the Foreign Correspondence Club of Thailand	
9.	Representative of the Confederation of the Thai Journalists	
10.	Representative of the Press Association of Thailand under the Royal Patronage of His Majesty the King	
11.	Representative of the Broadcaster Association of Thailand	
12.	Director of Public Relations Division, Secretariat of the Senate	
13.	Mr. Tavorn Jultamara	
14.	Public Relations of Chiang Mai Province	
15.	Mr. Suphapong Kajhonsilpa	Secretary
16.	Mrs. Nusri Chaisuwan	Assistant Secretary
17.	Mrs. Siripun Vanigbandhu	Assistant Secretary
18.	Ms. Sawapat Mongkolchai	Assistant Secretary

Sub-Committee on Traffic and Security

1.	Governor of Chiang Mai	Advisor
2.	Representative of the Royal Thai Police	Advisor
3.	Representative of Central Investigation Bureau Commissioner	Advisor
4.	Representative of Metropolitan Police Bureau Commissioner	Advisor
5.	Representative of Commander of Special Branch	Advisor
6.	Representative of Office of Police Immigration, The Royal Thai Police	Advisor
7.	Representative of Planning and Budgetary Division	Advisor
8.	Representative of Personnel and Logistic Division	Advisor
9.	Representative of Commissioner of Provincial Police Region 5	Advisor
10.	Representative of Provincial Health Officer of Chiang Mai	Advisor
11.	Representative of Mayor of Chiang Mai Municipality	Advisor
12.	Mr. Sirichai Chaitip-arsana	Chairperson
13.	Representative of Chiang Mai Provincial Police	Vice-Chairperson
14.	Representative of Chiang Rai Provincial Police	Vice-Chairperson

15.	Representative of Tourism Police	
16.	Representative of Border Patrol Police Bureau Regional Headquater 3	
17.	Representative of Police Aviation	
18.	Representative of Highway Police Division	
19.	District Chief Officer of Muang Chiang Mai	
20.	District Chief Officer of Mae Rim	
21.	District Chief Officer of Sankampang	
22.	District Chief Officer of Hang-dong	
23.	Representative of Dararatsami Hospital	
24.	Sub-Lt. Samruay Pongnak	Secretary
25.	Mr. Taweekiat Chawalittawil	Assistant Secretary
26.	Mr. Arkom Wattanapun	Assistant Secretary
27.	Mrs. Janchai Baibong	Assistant Secretary

Sub-Committee on Coordination and Evaluation

1.	Hon. Mr. Sumit Sundaravej	Chairperson
2.	Hon. Mr. Suchon Chaleekrue	Vice-Chairperson
3.	Hon. Mr. Sanit Kulchareon	Vice-Chairperson
4.	Mr. Tinawat Marukpitak	Vice-Chairperson
5.	Secretary General of the House of Representatives	
6.	Secretary General of the Senate	
7.	Mr. Sirichai Chaitip-arsana	
8.	Mrs. Pornpimol Thirakhungovit	
9.	Mr. Chinda Chareonpun	
10.	Director of Finance and Commodities Division	
11.	Director of International Relations Division	
12.	Mr. Sompol Vanigbandhu	Secretary
13.	Ms. Supasinee Khamasundara	Assistant Secretary
14.	Mr. Choomchon Chalermchuang	Assistant Secretary

Conference Facilitators

1.	Mr. Chirapol Sintunava
2	Mr. Sutha Khaodhian
3	Ms. Monthip Srirattana Tabucanon
4	Ms. Yuwaree In-na
5	Mr. Yongyuth Mayalarp
6	Ms. Apinya Silpvisuth
7	Ms. Sunee Piyapunpong

Invited Exhibitors

1.	Office of the Royal Project Board
2.	Montfort College
3.	Thanyasitthisin School