# National Assessment Report on the Implementation of Sustainable Development

**May 2002**

**Republic of Korea**

## Table of Contents

## Executive Summary

The Republic of Korea has continually implemented national strategies for sustainable development since Agenda 21 was adopted at the 1992 United Nations Conference on Environment and Development as an action plan to achieve both environmental and developmental goals in the 21st century.

The basis of the strategies lies in institutional development, which includes expanding environment-related institutions, strengthening institutional capacities to improve coordination among agencies, and enhancing the institution as a whole in areas such as comprehensive policy functions.

With such institutions serving as a foundation, an integrated strategic plan and vision for the national environment and sustainable development in the new millennium have been established and pursued.

Korea promotes sustainable development through both comprehensive and sectoral strategic plans. Long-term strategic plans, such as Green Vision 21 and the National Environmental Vision for the New Millennium, provide a holistic environmental framework for the nation's strategy. Based on this framework, the government develops strategic plans in major sectors. These strategic plans are systematically linked to the thematic chapters of the National Action Plan of Agenda 21 and continue to be promoted as such.

A major characteristic of Korea's national strategic plans is the promotion of integrated policies that combine both regulatory elements and market-based measures. Recently, relying more on market forces rather than regulations and standards, the government has striven to internalize environmental costs through both economic incentives and disincentives, thereby encouraging major sectors to operate in an environmentally friendly manner. These efforts have proven to be effective in implementing national strategies for sustainable development.

The government acknowledges that sustainable development can be achieved only with active participation and cooperation from each major group. The roles and participation in the decision-making process by civil society, women, local governments, and the private sector have increased over the years, and this trend is expected to continue.

The results of Korea's implementation of sustainable development strategies are visible in many areas. Most importantly, the ambient air and water quality in major cities have improved drastically over the last ten years. Controlling greenhouse gas emissions and preserving the ecosystem, however, are expected to pose major challenges to Korea in the 21$^{st}$ century.

This report explores both the contributing and restricting factors for sustainable development in Korea. In sum, stable economic growth, increased public awareness, institutional development, and government strategies have constructively contributed to sustainable development efforts, while Korea's environmental endowments, energy-intensive industrial structures and inter-Korean relations have deterred the implementation of national strategic plans.

# I. Introduction

## 1. Significance of the National Assessment Report in the Republic of Korea

The strategies for sustainable development in the Republic of Korea (ROK) focus on the pursuit of a welfare society with a high quality of life. This is achieved by ensuring that all environmental costs are appropriately internalized in the socio-economic policies, and by using environmental factors as the standard in the decision-making processes of each field. Such is the process delineated in Agenda 21.

During the course of rapid economic development, the ROK experienced excessive utilization of natural resources and energy, accompanied by the inevitable degradation of the natural environment. In the 1980s, the country began taking aggressive steps to alleviate the environmental problems that had been neglected during the development period. Since then, the ROK has established a comprehensive legal framework related to environmental conservation and sustainable development, and commenced a full-scale implementation of environmental policies.

Since the Rio Summit in 1992, the Korean government has not only strengthened domestic environmental countermeasures, but also attempted to address global environmental issues. With its entrance into the OECD in 1996, an environmental system much like that of advanced countries was put into place in the ROK. The financial crisis in late 1997 and the subsequent structural adjustments brought sustainability issues to the forefront, especially in the social arena.

In order to fully implement the measures outlined in Agenda 21 in 1992, it was necessary to compare and analyze the contents of each chapter with existing strategies, and then concretize these objectives in the form of government policy. To facilitate this process, the National Action Plan for Agenda 21 was established in 1996.

The 1996 National Action Plan for Agenda 21 is essentially a compilation of the entire set of implementation programs stated in each chapter of Agenda 21. The report presents an overall review and evaluation of the performance in implementing Agenda 21 since 1992. It examines the development of institutional infrastructures, integrated strategic plans, sector strategies and programs, policy measures to integrate environmental and economic considerations, and the role of major groups.

In 1995, a comprehensive and integrated strategic plan for sustainable development was outlined in Green Vision 21. On June 5, 2000, the government instituted a new, integrated strategic plan for sustainable development, the National Environmental Vision for the New Millennium.

## 2. Status of the Economy, Society and the Environment: A Brief Overview of the Republic of Korea

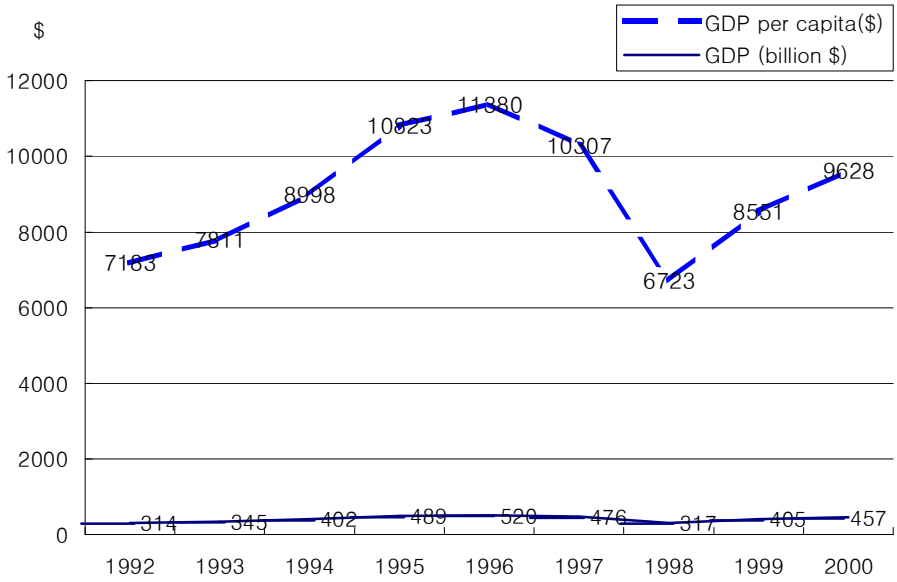
Table 1 gives a brief statistical overview of the ROK's social, economic and environmental conditions. The ROK's population density in 2000 was 472.7 persons per square kilometer, the third highest in the world. The GDP per unit area as an index for potential environmental pressure in 1990 was US$2.46 million per square kilometer, less than that of Japan (US$7.96 million) and Germany (US$4.19 million), but higher than that of the US (US$0.56 million) and France (US$2.17 million). In 2000, the ROK's GDP per unit area was US$4.62 million per square kilometer, roughly double that of 1990 (in constant dollars). The ROK's per capita GDP was lower, but the environmental pressure in terms of GDP per unit area was almost the same as advanced countries. However, the level of environmental investment remains much relatively lower.

$SO_2$ emission per unit area is several times higher than in the major advanced countries such as the US, France, and Germany, while per capita available fresh water is 1,500 $m^2$, an level insufficient for sustainability.

<Table 1> Summary of Statistics on Socioeconomic and Environmental State of the ROK

| | |
|---|---|
| Population<br>(million people) | 47.27 (2000)<br>51.7 (2015, projected) |
| Population Density<br>(2000, person/sq. km) | 472.7 |
| GDP<br>(2000, billion US$) | 457.4 |
| GNP Per Capita<br>(2000, US$) | 8,581 |
| GDP/Area<br>(2000, 103 US$/km2) | 4,620.2 |
| Energy Efficiency<br>(2000, TOE/ US$) | 0.40 |

Source: National Statistical Office and The Bank of Korea




The ROK's GDP had been growing at a rapid pace since 1992, but fell considerably in 1998 with the financial crisis. It began to increase in 1999 and has been growing ever since (see Table 2). Consumption of primary energy in the ROK rose sharply from 116 million TOE in 1992 to 192 million TOE in 2000. Of considerable concern is that energy consumption per GDP has been on the rise since the 1970s, with no signs of declining after 1992. This indicates that the economic structure of the ROK is not transforming into one that is favorable to sustainable development.

# II. Review of National Strategies for Sustainable Development

## 1. Institutional Settings for Sustainable Development

The Ministry of Environment (MOE) and related ministries are the primary government-run institutes for sustainable development. In realizing sustainable development, the most important institutional foundation is the implementation capacities of each ministry.

As the key ministry spearheading the environmental preservation effort, the MOE is not only responsible for the planning, development, and execution of environmental regulations and policies, but also for overseeing and coordinating environmental affairs in other ministries and agencies. Nine agencies, including the Ministry of Construction and Transportation (MOCT), are

implementing environment-related policies or projects that are specific to their own sector. In addition to these, the MOE exercises jurisdiction over provincial governments in matters relating to the environment.

The MOE was upgraded from a vice-ministerial level Office of Environment to a full ministry in 1990. In 1994, during the major government restructuring, the ministry was elevated to the status of the present Ministry of Environment. At this time, responsibility for water sewerage was transferred to the MOE from the MOCT, and drinking water, which fell under the jurisdiction of the Ministry of Health and Social Affairs, was also transferred to the MOE. The Environmental Conservation Act was reinforced and developed into six major laws: Basic Environmental Policy Act, Water Quality Preservation Act, Air Quality Preservation Act, Noise and Vibration Control Act, Hazardous Chemicals Control Act and Environmental Dispute and Settlement Act. In the 1990s, enforcement of Natural Environmental Preservation Act and the Environment Impact Assessment Act were legislated, and the Natural Park Act and the Law on the Protection of Birds, Beasts and Hunting were transferred to the MOE.

In 1985, under the 36th Basic Environmental Policy Act, the Environmental Conservation Committee was established to coordinate and adopt mid- and long-term plans on environmental conservation and improvement. Headed by the Prime Minister, the committee comprised of 23 members, including 13 cabinet ministers. In addition to developing conservation and environmental improvement plans, the committee was responsible for identifying preservation and investment priorities, and serving as the final decision maker for matters pertaining to the environment.

The government's role in contributing to sustainable development is not limited to environmental policy formation and enforcement. Sustainable development is attained by integrating environmental factors into the socio-economic policies of all government bodies. In order to appropriately integrate environmental and social factors into the decision-making process of economy-related functions, it became clear that an established institutional mechanism to facilitate inter-ministerial coordination would be needed. Hence, the Presidential Commission on Sustainable Development (PCSD) was established in September 2000.

The PCSD is responsible for preserving the environment and minimizing the conflicts that could arise during the course of implementation of major environment policy measures by reviewing them at the planning stages. This commission is expected to understand the international status of environmental preservation and consider possible domestic applications or countermeasures. It consists of 33 persons total: 13 ministers and 20 members from civil society, academia and the business sector.

The commission includes six sectoral sub-committees: land conservation, water resources,

ecosystem and public health, energy policy, industry and environment, and international/regional cooperation. Mid- to long-term plans for environmental conservation, important global environmental issues, and other matters are expected to be addressed by this commission, which will also serve a mediating function in resolving conflicting interests among government ministries and agencies, and between the government, NGOs and the industrial sector. As such, the PCSD played an important role in evaluating the sustainability of the controversial Saemangeum Reclamation Project, which had ignited a series of intensive debates throughout the nation for its potentially adverse impact on the environment.

As the main agency for national land use management, the Ministry of Construction and Transportation (MOCT) is in charge of enhancing sustainability in land use planning, urban planning, housing development, and balanced regional development planning systems. It is also responsible administering land development regulations relating to roads, ports, dams, and airports. During the 1999 government restructuring, the Construction Environment Division was instituted in the MOCT to enhance the sustainability of construction projects.

The founding of the Ministry of Maritime Affairs and Fisheries (MOMAF) in 1996 brought together an integrated marine management by combining marine-related functions, previously distributed among other ministries. By entrusting seemingly conflicting functions, such as the development of marine resources and conservation of the marine environment, to the same ministry, a balanced and integrated approach was possible, providing the foundation for marine sustainable development.

The Ministry of Health and Welfare (MOHW), whose responsibilities include managing the social aspects of sustainable development, pursues strategies to combat poverty and disease by overseeing social safety nets and public health infrastructure. With the financial crisis, the importance of a social safety net was highlighted. Unemployment and poverty increased with the subsequent recession and corporate restructuring, while a more flexible labor market was formed in the domestic economy.

## 2. General Strategic Plans for Sustainable Development

### 2.1 National Action Plan for Agenda 21

Agenda 21 was established as the detailed action plan for the agreement reached at the 1992 Rio Environmental Development Conference on sustainable development. Each country has established comprehensive national action plans to bring Agenda 21 to life. The ROK decided to establish its national action plan at the 1993 Ministerial Meeting on Global Environmental Issues,

with the MOE bearing the full responsibility for its management. With participation from each related ministry, the National Action Plan for Agenda 21 was formulated and initiated in March 1996.

Furthermore, in accordance with the post-Agenda 21 plans adopted at the 1997 Rio+5 Conference, various stakeholders from the PCSD are expected to meet to deliberate and establish national objectives and policy directions for sustainable development in the economic, social, and environmental fields. The national sustainable development strategy in land management and 11 other policy areas are scheduled to be developed by the end of 2002.

### 2.2 Strategies and Vision for Sustainable Development in the Environmental Sector

The Basic Environmental Policy Act stipulates that the MOE shall be responsible for the establishment of an integrated long-term policy. Thus Green Vision 21 was established with forward-looking environmental policy objectives and action plans for the next decade. The government has established and launched annual and mid-term action plans in order to achieve these long-term objectives.

The main objective of Green Vision 21 is to improve the quality of life by maintaining the balance between development and conservation, without compromising the well being of future generations. It also deals with the concerns of ministries other than the MOE, in the areas of natural environment conservation, air quality management, water quality management, marine environment preservation, drinking water supply management, waste management, and environmental technology development.

In 1998, following the establishment of a government "for the people," a National Environmental Vision for the New Millennium was promulgated, which envisioned the creation of an environmentally friendly welfare society "where humans and nature co-exist and thrive." The plan is grounded in a number of innovative principles, including a shift in policy emphasis from pollution control to pollution prevention, environmental governance based on market economics and democracy, the integration of environmental and economic policies, and active participation by all stakeholders to preserve the global environment.

The ROK promoted the plan by introducing 22 major programs and 80 individual projects in seven areas: 1) environmental ethics and education; 2) sustainable production and consumption patterns; 3) sustainable land-use; 4) improving basic living conditions; 5) developing environmentally friendly technology; 6) global environmental health; and 7) the greening of the government.

### 2.3 Socioeconomic Development and Strategy for Sustainable Development

In line with the evolving international trends, the ROK incorporated environmental considerations in the 7th Five-Year Socioeconomic Plan (1993-1997). For example, the government initiated a variety of programs to make concrete environmental conservation and improvements in the quality of life, such as the development of an energy conservation/efficiency policy and a long-term plan for clean energy supply.

Following the rapid changes spurred by globalization, most notably the integration of the global economy, internationalization of the financial sector, and expansion of the information society, the ROK established an "open world, abundant society" project known as Vision 2011 to provide a direction for Korea's future socio-economic development. This project supports 16 items in 3 areas: building efficient market systems, rising into a knowledge and information power in Northeast Asia**,** and guaranteeing a dynamic and affluent life for the people.

### 2.4. Mid- and Short-term Strategic Plans

Based on the long-term integrated strategic plan, the government has been promoting the Five-year Mid-term Comprehensive Plan for Environmental Improvement. The current mid-term plan is a government-wide, integrated plan for overall environmental conservation over a five-year period (1998-2002). The scope of the plan is divided into two main categories: environmental policy programs and environmental investment projects. Specifically, the plan initiates such activities as the reinforcement of the environmental management infrastructure, preservation of the natural environment, soil erosion prevention, air quality, water quality and drinking water supply management, hazardous chemical and waste control, marine environment preservation, global environmental preservation, and the strengthening of international cooperation.

In 2001, the government sought to harmonize environmental and economic goals by pursuing the ECO-2 Project. This project is a mix of strategies, policies, and activities that together aim for win-win solutions based on the integration of environmental and economic considerations. Among others, the ECO-2 promotes environmental industry, resource conservation, and waste recycling. It also advances the creation of technologies and markets for water conservation through demand management, the enhancement of the environmental knowledge and information infrastructure, and the development of reliable environment-economy indicators.

### 2.5 Development Indicators of the Nation's Sustainable Development

The previously mentioned integrated strategic plans are designed to materialize the spirit of sustainable development as outlined in Agenda 21, but a system is not in place to explore and evaluate whether they complement each chapter of Agenda 21.

Also, although the National Action Plan for Agenda 21 is an integrated strategic plan to realize the targets set forth in each chapter of Agenda 21, it lacks in practicality and enforceability. Recently, the PCSD has considered writing an updated national action plan for Agenda 21 that will address these shortcomings.

Fifty-three sustainable development indicators were developed in the areas of economy, society, environment, and policy as an objective measurement tool that will establish, enact, and confirm the results of developmental policies such as the National Action Plan. There are plans to further develop so that comparisons can be made with other countries through indexing.

## 3. Sectoral Strategic Plans for Sustainable Development

### 3.1 Land Use Management and Human Settlements

Land use management deals with the direct management of the decisions and regulations on the use of land resources. In order to ensure the sustainable land use, the Korean government has devised two strategies: the Comprehensive Land Use Plan and the National Land Use Zoning System.

#### 3.1.1. The Comprehensive Land Use Plan

The Comprehensive Land Use Plan is the overarching national plan that deals with basic strategies and policy measures on how to use, develop and preserve national land resources. It has gone through four alterations since its adoption in 1962. The plan provides basic directions for and coordinates policies and programs related to land use across agencies, thus laying the basic foundation for pursuing sustainable development strategies nationwide.

In the Third Comprehensive Land Use Plan (1992-1999), the concept of sustainable development was explicitly introduced. It established resource-saving land use as one of its basic goals and strengthened investment in the quality of life and environmental concerns. However, it was with the launch of the Fourth Comprehensive Land Use Plan in January 2000 that the

environment and sustainable development were brought to the forefront and considered the most compelling tasks in land use management.

The current plan lays the integration of environmental and developmental considerations as a basic cornerstone of national land use management from 2000 to 2020. At this point, it is safe to say that sustainable development and environmental factors are the guiding concerns for all areas of national land use management, including regional development, industrial siting, social overhead capital (SOC) construction, tourism, urban management, and other uses of the nation's land resources. More concretely, the current plan introduces environment-friendly development model and guidelines, as well as reasonable environmental review measures, while at the same time building an integrated national land and ecosystem network encompassing major mountain ranges, rivers and coastal areas. In particular, by introducing a strict zoning system that separates development and conservation zones, it is now possible to simultaneously pursue conservation with systematic and environmentally sound development in the ROK.

Regarding housing policy, a greater emphasis is now placed on providing more amenable housing environments rather than just supplying an ever-greater number of dwellings. For this purpose, the MOCT is leading the way in improving the housing environment and in making relevant legal arrangements. In addition, in managing land resources and transportation systems, the government is endeavoring to minimize environmental pressure by adopting demand-side management policies.

The new national land use plans will help realize sustainable development on a national scale by securing a healthy and pleasant environment through the efficient, sustainable use of Korea's land resources.

### 3.1.2 National Land Use Zoning System

The ROK's population density is the third highest in the world, with mountainous areas comprising 65% of the total area. Therefore, the top national policy priority is the efficient use of available land. The zoning system is designed to guide efficient land use for sustainable development by providing clear-cut distinctions between development and conservation zones.

In the zoning system, the entire national land area is classified into five usage zones: urban, semi-urban, semi-rural, rural, and conservation zones. This is anticipated to secure an excellent foundation for improved quality of life, by delineating clear boundaries between conserved/preserved areas and land approved for development activities.

Urban zones, constituting 15% of the total area, are densely populated and are under strict control of the urban planning system, which includes use zones, infrastructure plans and estate plans. The urban planning system is applied to urban zones separate from the land use zoning system.

Rural zones are designated in order to strictly protect and manage prime farmland and productive forests (as opposed to protected forests in conservation zones, etc.), which together comprised 51.3% of the total national land area as of January 2001.

Nature conservation zones are designated to thoroughly preserve areas with outstanding landscape or valuable ecosystems; these areas account for 7.1% of the total land as of January 2001.

Semi-rural and semi-urban zones are essentially non-urban zones, accounting for 27% of the total national land. These areas are maintained as farms or forests but may be relatively easily converted to urban areas when necessary.

Initially, a national land zoning system was introduced in 1972 in order to prevent reckless development and degradation of the natural environment brought on by rapid industrialization and urbanization. However, because of the rigidity of its implementation, the shortages in the land supply led to rising real estate prices and falling industrial productivity. In the early 1990s, the system was restructured to be more flexible, by introducing such new categories as the semi-rural zones. Although this change improved land supply, there was growing concern regarding reckless development with insufficient infrastructure and/or harm to the natural landscape and ecosystems. Thus regulations on construction activities in semi-rural zones were gradually strengthened. In 1995, regulations were tightened for restaurants and lodging facilities in non-urban zones. In 1997, regulations for development projects were likewise strengthened, including a reduction of floor area ratio from 250% to 100% for community dwelling houses like apartments in semi-rural zones.

Since June 1999, full-scale restructuring of the national land zoning system has been under way to make it more environmentally friendly and to improve the sustainability of land management.

A key element in this restructuring is the principle known as Plan Prior to Development, which stipulates that no development of any plots of land shall be carried out unless planned in accordance with the regulations for urban development. It is to be completed in 2001 and enforced by 2002.

In 2001, the Land Pertinence Assessment System was introduced in order to consider environmental, agricultural and urban relevance as well as the physical characteristics of the land in designating the five use zones and in evaluating the availability of land for specific uses.

### 3.1.3. Human Settlements

The ROK's action plans for human settlements include the improvement of housing environments, the mitigation of traffic congestion in major urban areas, and the promotion of a clean ambient environment. To meet the continually increasing demand for land for housing, the government has promoted the planned development of housing and the stabilization of its supply. Also, the government expanded public housing rental programs to meet the needs of low-income families. Since 1990, the government has facilitated the construction of around 600,000 housing units annually, mitigating the housing supply shortage. Recently, the government has shifted the focus of the housing plan toward quality as well as quantity of housing and has amended related laws and regulations in that direction. For this purpose, the government has established policy objectives by using indicators of size, facilities and environment.

## 3.2 Social Welfare

### 3.2.1. Poverty and Public Health

Combating poverty and enhancing public health are one of the basic and essential elements for sustainable development. The ROK's strategy for combating poverty lies in eliminating absolute poverty in the short run and alleviating relative poverty in the long run in due consideration for both economic growth and the environment. Sustainable development is to be pursued by building a viable public health and medical care system that provides people with sufficient and high quality services.

A livelihood protection system has already been implemented and the amount and method of aids have been continually improved. However, livelihood protection was carried out in a manner that merely protects the livelihoods of low-income families. Recently, the system was changed and is now operating as part of the national welfare system, emphasizing the state's responsibility for those in the lowest income brackets. The new system, based on the concept of productive welfare, guarantees basic standard of living for people in extreme poverty. For this purpose, the National Assistance Act was enacted in 1999 and has been enforced starting year 2000.

Free medical care has been granted to those people unable to work but eligible for livelihood protection by the government. Since 1994, the government has invested a large sum of capital to improve the health and medical infrastructure in rural areas and fishing villages, including the upgrading or replacement of facilities and equipment.

The quality of medical service in the ROK substantially improved in the last ten years, contributing to longer life expectancy and sustainable development. Although the incidence of contagious diseases increased after the 1997-8 financial crisis, it is regarded as a transitory phenomenon.

The government established a disease monitoring system and systematic disease control, while promoting extensive immunity programs, resulting in an immunization rate of 90% or higher. Intensive efforts are being made to prevent the outbreak of waterborne and other types of contagious diseases. Major chronic contagious diseases are being controlled to keep the incidence rate below 1%. The ROK is also conducting publicity campaigns to prevent AIDS, encouraging civil society's participation.

The government has largely achieved its planned objectives of a lowered incidence of contagious disease by implementing a disease control plan. Based on the plan, a series of measures were implemented that included streamlining organizations responsible for disease control, intensive training of public health workers, setting up a nationwide monitoring system for contagious diseases, extensive immunization and research of contagious diseases, and an enhanced publicity campaign to educate the public on all aspects of contagious disease.

### 3.2.2. Promotion of Worker Safety

The ROK's strategy for workers and unions to enjoy safety and health involves building a tripartite cooperative mechanism with workers and employers actively participating and the government playing an intermediary role. The National Action Plan for Agenda 21 stipulates several policy measures to enhance worker safety and health including the expansion of an honorary industrial safety supervisor system, strengthening the industrial safety and health committee, promoting labor union activities to prevent industrial accidents, facilitating a "Safety Check Day," and creating plans to expand worker and union participation in maintaining and enhancing safety and health.

In order to adhere to international standards such as the industrial safety and environment clauses of the ILO agreement, the ROK has rearranged institutional bases, including a revision of the enforcement regulation of the Industrial Safety and Health Act. Environmental collective bargaining and the facilitation of bipartite and tripartite bodies are being explored autonomously. The government also endorses development and distribution of voluntary improvement programs for calamity-prone sites.

The Minister of Labor entrusts an honored industrial safety supervisor, selected out of experts in worker organizations, employer unions, and industrial safety institutions, to promote participation and support for industrial safety activities. Employers are expected to operate a voluntary decision mechanism that includes the following: establishing committees on industrial safety and health comprising of equal numbers of representatives from labor and management, setting up industrial accident prevention plans, enhancing worker safety and health education, and evaluating and improving the working environment. Thanks to these efforts, the calamity rate per worker fell from 1.52% in 1992 to 0.74% in 1999.

After the financial crisis, investments in industrial safety notably dropped due to deteriorating business conditions. The government is developing countermeasures by providing financial incentives for industrial safety expenditures.

### 3.3 Industrial Sectors

Based on the Act to Promote Shifting to an Environmentally Friendly Industrial Structure (enacted in 1995, revised in 1997 and 1999), the government plans to contribute to balanced economic development by shifting to an environmentally friendly industrial structure by actively promoting energy conservation and resource-saving industrial activities.

The act stipulates measures aimed at adopting an environmentally friendly industrial structure and the certification system for environmentally friendly enterprises. According to the act, comprehensive policy measures are to be established every five years to accelerate the restructuring. These policy measures include evaluating the current industrial structure and its outlook, setting targets, developing clean production technology and processes, support for environmental industry, and finally, promoting environment-oriented business administration.

The Clean Production Technology (CPT) project is designed to support the development and distribution of economically efficient and environmentally friendly technology that will enable companies to minimize environmental stress and reduce production costs. The project also promotes industrial development by helping to sharpen the competitive edge of Korean businesses in the global arena. In 1999, this project yielded 27 new patent registrations and 279 research papers.

The CPT has produced a number of achievements. They include the widespread diffusion of the clean production concept, voluntary participation by business enterprises, establishment of a basis for greening industry via technological improvements at individual firms and technology

transfers, case studies of advanced clean technology, and development of appropriate technologies for small and medium enterprises.

The government had supported firms that manufacture or install environmental facilities or clean production facilities by providing special loans of 295 billion won between 1995-2000. To help stimulate the demand for recycled products, the government extended a number of items applicable for recycling certification and expanded the standard rules. In 2000, the number of applicable items was 166, with 116 standards, ranking the ROK ninth in the world.

At the same time, the government has been encouraging enterprises to become qualified for ISO 14000; as of the year 2000 the number of enterprises so qualified has reached 544. Also, the government is encouraging the standardization of environmental management systems, including the development of environmental indicators for materials, manufacturing processes, and transportation.

### 3.4 Development of Environmental Science and Technology

From 1992 to 2001, the government introduced a three-stage Environmental Engineering Technology Development Program to upgrade the ROK's environmental technology to the level of advanced G7 countries. Along with this, a joint program with public-private sectors has been implemented. From 1992 to 2000, 325 billion won was invested in 306 research projects, such as desulfurization and denitrification, of which 199 have been completed.

The program originally envisaged developing and applying advanced technologies by 1997, and developing purification, restoration, and recycling technology by 2001, with the goal of nurturing cutting-edge environmental industry. However, the project's status in 1998 showed that some of these objectives were not fully attained.

The government plans to set up a combined program for integrating and coordinating various programs individually planned by various ministries in order to enhance efficiency and avoid investment overlaps in the public and private sectors. For that purpose, in February 2000, the government amended the Act Concerning Development and Support for Environmental Technology.

In 1999, by amending the Special Act for National Science and Technology Innovation, the government established the National Committee for Science and Technology, which is mandated to examine and deliberate on the investment priorities in the field of science and technology, including environmental technology.

The demand side should be considered in designing policies to develop environmental

technology, since the technologies may remain largely unused unless supported by relevant environmental policies. For this reason, 10 major objectives have been established for the distribution of environmental technology and products.

In February 2000, a national environmental technology assessment system was legislated to drive the development and distribution of new environmental technology, and in 2001, the government launched a program to develop cutting-edge environmental technology. Known as Eco-technopia, this program will invest 100 billion won during the decade (2001-2010) in 22 major projects in four areas: integrated environmental technologies, ecosystem conservation and rehabilitation, pollution prevention, and technologies for global challenges such like climate change.

### 3.5 Agriculture and Rural Development

Agricultural activities can have diverse positive environmental effects such as flood prevention and water buffering capacity, land conservation, maintenance of outstanding natural landscapes, and preservation of biodiversity. To enhance this multifunctional character of agriculture, the ROK has promoted sustainable agriculture and rural development by making environmentally friendly agricultural policies and measures a priority. In this respect, the government is reducing production-linked agricultural support that has an adverse impact on the environment and is shifting to non-production-linked and environmentally friendly forms of support such as direct payments.

The strategy for sustainable development in the agricultural sector and in rural communities can be summarized as follows: efficient use of product resources, agricultural technology development, sustainable production and resource use, promotion of environmentally friendly agriculture, and participation from community members.

In particular, sustainable farming has been sought through the restoration of soil quality, enhancement of soil fertility, and integrated pest and nutrient management. The government has promoted comprehensive measures based on the results of the survey on restoration of impoverished land, efficient use of land resources, and enhancement of soil fertility. Concerning integrated pest management, the government promoted the development and dissemination of an integrated management technology by which the costs of pest control can be maintained at a minimum level while using a minimum quantity of insecticide and preventing the decrease in crop yields. Regarding integrated nutrient management, the government promoted policies to minimize the use of chemical fertilizers by developing technology that ensures adequate fertilization based

on test results by soil type. Furthermore, the government continues to facilitate technological development to improve livestock breeds, automate facilities, and enable low-impact farming.

The consumption of fertilizer and pesticide, a major indicator of sustainable agriculture, has been declining since 1992, as shown in Table 5.

<Table 5> Annual Consumption of Fertilizer and Pesticide

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| Pesticide (tons) | 26,718 | 25,999 | 26,282 | 25,834 | 24,641 | 24,814 | 22,103 | 25,837 | 25,917 |
| Fertilizer (1000 tons) | 936 | 974 | 970 | 954 | 908 | 882 | 860 | 842 | 798 |

Source: Ministry of Agriculture and Forestry

The Ministry of Agriculture and Forestry is efficiently applying international trade standards and promoting the development of environmentally friendly agriculture. Its policies of coping with difficult issues such as food security have been viewed favorably as well.

### 3.6 Forests

To promote afforestation and sustainable utilization and conservation of forest resources, the government formulates the Basic Forest Plan every 10 years for all forests across the nation. The plan's implementation and progress is evaluated every 5 years, in accordance with the Forest Act. This plan includes the National Forest Program, which is formulated based on forest management plans of private forest owners and regional forest management plans of local governments, mainly for afforestation and the use, protection and development of forest resources, forest lands, and forest ecosystems across the country.

The government successfully implemented the First and Second Basic Forest Plans, which were mainly for afforestation and reforestation, and rehabilitated much of the tree cover affected with serious forest degradation in the first half of the 20$^{th}$ century during the Japanese colonization and the Korean War.

After the first two plans, the Third Basic Forest Plan (1988-1997) was undertaken to establish the foundation for forest resource development. Among the major achievements are: 1) by amending the Forest Law in 1996, the legal basis for sustainable forest management was provided,

including 7 criteria for sustainable development of forest resources; 2) based on functions and purposes of forests, the classification scheme of forests was revised in 1997 for more efficient management of forest lands; 3) by formulating the Forestry Development and Promotion Law in 1997 and amending the forestry tax system, the institutional basis was provided to encourage more professional management practices in private forests; 4) during the implementation of the third plan, roughly 330,000 ha of commercial forests were established and silvicultural practices were applied to over 3 million ha of forests, resulting in a timber volume increase from 31 $m^3$ per ha in 1987 to 52 $m^3$ per ha in 1997; 5) about 110 forest recreational sites and facilities, including 70 Recreational Forests, were established to meet the ever increasing demand for forest recreation and tourism; and finally 6) by designating 372 wildlife sanctuaries, wildlife density in forest habitat increased from the wildlife population of 18.76 per 100 ha in 1987 to 21.3 per 100 ha in 1997.

The Fourth Basic Forest Plan (1998-2007) is now in effect. Its major goal is to improve and expand the infrastructure for sustainable forest management. Major achievements from 1998 to date include: 1) introduction of the Green Forest Lottery System in 1998 to secure investment funds for maximizing forest-generated public benefits; 2) formulation of the Basic Forest Law in 2001 to guide forest policy, focusing on sustainable forestry; 3) establishment of the National Arboretum in 1999 for systematic conservation and management of Korea's flora and the formulation of the Arboretum Establishment and Promotion in 2001 for the conservation and utilization of the genetic material of plant resources; 4) innovative and/or experimental management of about 1.2 million ha of forests alongside 5 major rivers with a view to improving the water quality; and 5) introduction of forest tending projects to establish ecologically sound forests. From 1998-2001. about 0.4 million ha of forests were through investments of over 600 billion won.

The public benefits and environmental values generated from all forests in Korea rose from 17.7 trillion won in 1987 to 50 trillion in 2000, an increase of 2.8 times over the 13 year span. However, it is expected that a certain portion of forests will be converted to meet the demand for various uses, including housing development caused by continued urban migration, industrial sites due to diverse industry development, and non-forest leisure space for the public. To address these issues, the government is now considering the formulation of the Forest Land Control Act, which will include feasibility studies on forest development in an effort to administer more stringent conservation and management practices on Korea's remaining forests.

### 3.7 Nature Conservation and Biodiversity

A major survey shows that as of 2000, there are 18,029 species of animals, 8,271 species of plants, 1,625 species of fungi, 736 species of protista, and 1,167 species of prokaryotes in the Republic of Korea; a total of almost 30,000 species. However, the extinction rate for many of these species are being accelerated from extensive deforestation and development, urbanization, reckless hunting and excessive use of pesticides. Tigers, leopards, foxes and wolves are not reported recently in Korea. Gorals, musk deers and Asiatic black bears are on the verge of becoming endangered.

For these reasons, the government has enacted and is enforcing the Natural Environment Conservation Act for the protection of endagered or protected wild fauna and flora, the Cultural Heritage Protection Act for the protection of natural monuments, and the Wildlife Protection and Hunting Act for the protection of wild mammals and birds. In 1997, the Natural Environment Protection Act was amended to include clauses for the protection of endangered species, which formed the basis for the government's designation of 43 wild fauna and flora as endangered species and 151 wild fauna and flora as protected species. Since 1992, the government has implemented the Basic Plan for Natural Environment Conservation, based on the Natural Environment Conservation Act. The government then formulated the Basic Directions for Natural Environment Conservation in 1998, and in May 1999 established a five-year action plan known as the National Natural Environment Conservation Plan.

The government regularly conducts natural environment surveys, and designates and supervises so-called Ecosystem Conservation Areas. There are seven sites designated as National Ecosystem Conservation Areas, including migratory waterfowls habitats found at the Nakdong River estuary. Eight other areas have been designated as Provincial Ecosystem Conservation Areas, including rare plant growing areas of Mt. Baekwoon in Kwangyang County.

Such strategies on nature and biodiversity preservation are being carried out in relation to Korea's responsibilities as a party to the Convention on Biological Diversity.

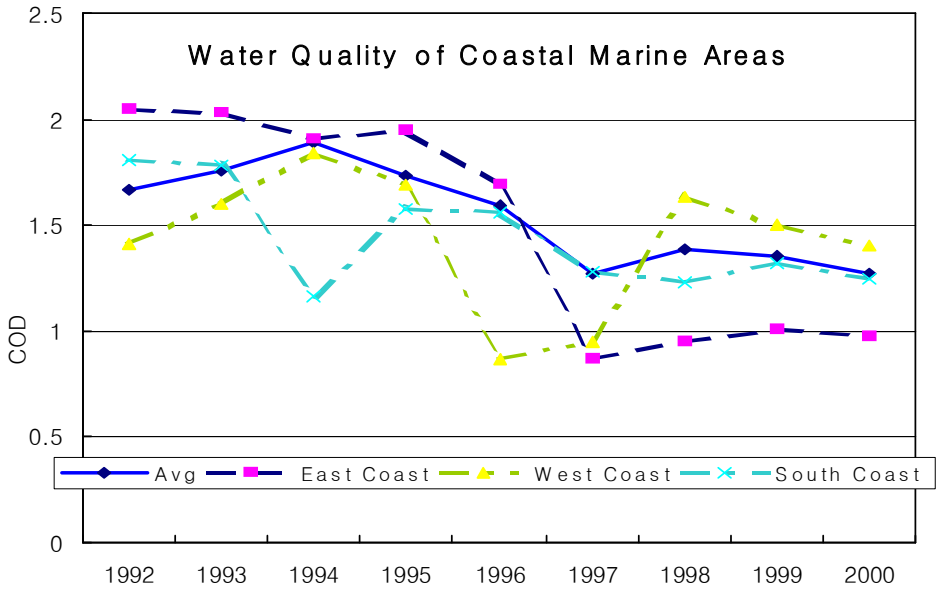
### 3.8 Marine Sector

The creation of the Ministry of Maritime Affairs and Fisheries (MOMAF) in 1996 has enabled the government to implement integrated marine policy measures.

The ROK has been pursuing various policies for the integrated management of coastal areas, establishing a basis for the systematic management of various marine pollution sources. In 1999, the government enacted the Coastal Zone Management Act and amended the Marine Pollution Prevention Act. Since 1995, the government has also been expanding basic

environmental facilities in coastal zones. Most recently, policy measures have been introduced based on the Integrated Coastal Zone Management Plan, established in 2000. Since pollutants from land affect a significant part of the marine environment, the government designated marine protection areas to facilitate the implementation of effective and integrated protection measures. To date, the government has designated nine marine areas totaling 4,791 $km^2$ as "protected marine areas". By doing so, the government has laid an institutional basis for introducing management policies based on complete prior reviews of environmental and socio-economic characteristics of designated marine areas. Furthermore, active participation from stakeholders, including local residents, is encouraged by a policy of support prior to regulation.

In 1998, the ROK established a management system for the sustainable utilization of fishery resources and adopted a total catch quota system to limit the size of catches. Fisheries may be closed on a rotating basis to prevent excessive contamination.




Thanks to these marine environmental conservation strategies, marine water quality in coastal areas has improved since 1992 (See Table7). Since 1992, however, the incidence of red tides, an important indicator of marine pollution in coastal areas, has been increasing each year, only recently showing a reversal in this trend.

### 3.9 Water Quality Management

Water quality management is one of the most important problems in the ROK. Since the supply of drinking water depends heavily on rivers, it is critical to preserve the quality of the water in rivers, as it is directly linked to human health and the quality of life.

Since the sources of pollution are geographically dispersed and originate not only from industry and residential areas, but also from agriculture and livestock farming, water pollution is not easy to control. It is directly linked to the daily lives of inhabitants and the usage of land. As such, water quality management faces many difficulties including limitations to property rights.

Despite such difficulties, the water quality figures of the two largest major rivers, the Han and the Nakdong, have been maintained at the status quo (see Table 6). This is due to the establishment and implementation of comprehensive plans for water quality management for the major rivers used as primary sources of potable water.

<Table 6> Changes in Water Quality: the Han and Nakdong Rivers

Unit: BOD (ppm)

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| Han R. (Paldang) | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.4 |
| Nakdong R. (Mulkeum) | 3.3 | 3.4 | 4.6 | 5.1 | 4.8 | 4.2 | 3.0 | 2.8 | 2.7 |

Source: Ministry of Environment

In 1991, the government partitioned the national territory into four large zones and 11 medium-sized zones, based on the basins of the four largest rivers (Han, Nakdong, Keum, and Yeongsan Rivers) in order to effectively improve water quality.

The Comprehensive Measures for Clean Water Supply was launched in 1993 in order to promote integrated water management policy. Formulated as a five-year-plan with a budget of 15.9 trillion won, these measures concern water quality control, water resources management, and potable water supply. In 1996, these measures were succeeded by the Comprehensive Measures for Water Management, which constituted a long-term plan for water management with a 10-year program for water quality and a 15-year program for water resources.

In 1996, the Water Quality Improvement Task Force was founded by the Office of the Prime Minister to improve the water quality in the four major rivers. Its responsibilities include: integrating and coordinating water management policies; directing, supervising and coordinating related government agencies; devising policies to protect drinking water sources and improve water quality; addressing matters relating to the installation of basic environmental facilities; addressing and mediating conflicting interests while implementing measures for improving water quality; directing, supervising and coordinating the jurisdictions of the central government and local governments; and lastly, conducting performance reviews of the water quality measures.

Despite the aggressive policies and investments following the Comprehensive Measures for Clean Water Supply, the ROK's water quality improvements did not meet the expectations because of the large demand for economic development in the Suwon area. In 2000, the quality of the water in the Paldang, Taechung area, and the regional water supply was level 2, while the water quality in the lower part of the Nakdong River lingered at level 3, requiring intense purification during the dry season.

From 1998 onwards for three years, the local civil society, NGOs, and autonomous local bodies cooperated to establish the Special Comprehensive Program for Water Quality Improvement for each of the four major river systems. This program includes a new water use charging system, pollution quota system, and designation of waterside zones and forest buffer zones. For the Han River, a voluntary pollution quota system was in place since 1999, and for Nakdong, Keum, and Youngsan rivers, a mandatory pollution quota system will be enforced by late 2003. As a result of these and similar programs, the water quality in the major tributaries of the four largest rivers is gradually improving.

### 3.10 Air Pollution Control and Transportation

The ROK's air pollution control policy includes institutional measures such as the introduction of ambient air quality standards, control of pollution sources, operation of the Air Quality Monitoring Network, and the designation of special air quality regulation zones. It also includes pollutant-specific measures to control sulfur dioxide ($SO_2$), particulate, odors, volatile organic compounds (VOC), and acid rain, as well as measures for reducing atmospheric pollution from motorized vehicles.

Thanks to the wide distribution of clean fuels, the air pollution in large cities has substantially declined in the last few years. The concentration of $SO_2$ in some major cities, especially in Seoul and Ulsan, is decreasing year after year; the current level of annual average $SO_2$ concentrations in the two cities are well below 0.02ppm, fully within the national ambient air quality standard. Air quality is improving considerably in terms of $SO_2$ and total suspended particulates (TSP) concentrations.

<Table 9> $SO_2$ Concentrations in Seoul and Ulsan

(Unit: ppm)

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| Seoul | 0.035 | 0.023 | 0.019 | 0.017 | 0.013 | 0.011 | 0.008 | 0.007 | 0.006 |
| Ulsan | 0.031 | 0.032 | 0.03 | 0.028 | 0.022 | 0.019 | 0.015 | 0.017 | 0.013 |

Source: National Statistical Office

The transport sector has become one of the most troubling areas in the ROK, as it has an impact on the related issues of securing amenable housing, land-use, air quality management, energy consumption, and the efficiency of industrial activity. As the transport sector has continuously expanded since 1980, the size of the automobile fleet increased from 2 million in 1988 to 11 million by October 1999. Consequently, the partial improvement in air quality has been outpaced by the explosive jump in the automobile use and the subsequent air pollution. This causes health problems, air quality deterioration and traffic congestion.

The government's policies for mitigating environmental damage from the transport sector entail two approaches: reduction of auto emissions and demand- side management.

The policy measures to reduce emissions include applying stricter auto emission and fuel quality standards and strengthening auto emission inspection. In addition, the government is replacing diesel-powered buses with CNG-powered ones in major cities by 2007, starting with the 2002 World Cup host cities.

The demand side policy includes encouraging public transportation use and infrastructure build-up (i.e., expansion of subways and the introduction of bus-only lanes), as well as economic instruments such as raising parking fees and fuel prices. By adopting a gasoline mileage charge (a high fuel price policy) in late 1996, Seoul's driving speed increased by 15.9% in downtown and by 26.7% in suburbs by January 1998, showing the remarkable effectiveness of economic incentives.

## 4. Policies for an Integrated Environment and Economy

Sustainable development can only be attained when environmental costs are fully considered in economic decision-making processes. This can be accomplished by establishing and promoting strategic-level plans. But at the public policy level, it can also be achieved through direct regulations such as land-use zoning, licensing and permits, economic instruments or other market-based measures, provision of relevant information, or voluntary participation. The ROK is active in all these areas. Specific policies discussed in this section include charges and fees, impact assessment systems, and voluntary environmental measures.

### 4.1 Emission/Effluent Charges and Environmental Improvement Charges

### 4.1.1 Emission/Effluent Charges

The Effluent Charge System was first introduced in accordance with the provisions of both the Air Quality Preservation Act and the Water Quality Preservation Act of 1983. Until 1996, charge was levied only on manufacturers that released more effluents than were permitted under the environmental standards. However, in 1997 a minimum charge system was introduced in which even the manufacturers discharging pollutants below the allowed levels were required to pay a basic fee. This system enhanced the efficiency of environmental policy measures by functioning as an environmental tax. The current emission/effluent charge system in the ROK, however, still contains provisions of penalty.

The charges imposed grew sharply in 1997 but declined in 1999, which may be interpreted as a decrease in the number of violators since the maximum level permitted was expanded.

### 4.1.2 Environmental Improvement Charges

An environmental improvement charge system was initiated in December 1991 based on the Environmental Quality Improvement Charges Act. The system was designed to reduce pollution by requiring those who caused pollution through production, distribution and consumption activities to bear the cost of treating the effects (in accordance with the Polluter Pays Principle), and to finance environmental investments. Facilities and/or equipment defined in the relevant regulations, as well as diesel-powered vehicles, are subject to these charges.

While the system has proved helpful in financing environmental investments, collecting around 300 billion won in 1999, its environmental and economic efficiency is somewhat in doubt. The linkage between the policy tool and policy target is weak, since the owner rather than the user of the facilities and/or equipment is charged. Moreover, efficiency remains low because the charge is levied on particular facilities based on the amount of water and fuel consumed, rather than their actual emission quantity.

### 4.1.3 Deposit-Refund System for Solid Waste

The Deposit-Refund System for Waste, based on the Promotion of Saving and Recycling of Resources Act, is designed to promote waste recycling from products consumed in large quantities that are easily collectable and recyclable. It requires the manufacturers or the importers

of the products to deposit funds covering the cost of collecting and recycling the used products or containers. Once collected, the money is returned, thereby encouraging recycling. Currently there are 6 types of paper containers and 12 items in this program. This system has contributed to the securing of financial resources for the government recycling program, but has been criticized for not providing sufficient incentives for recycling. However, the system has recently shown signs of improvement in efficiency as the recovery rate has increased.

### 4.1.4 Waste Disposal Charge System

The Waste Disposal Charge System was launched to capture the environmental costs of products and reduce their environmental impact by imposing a disposal charge on the products, materials, or containers that contain toxic materials or which are unable to be collected for recycling. This system was established under the Promotion of Saving and Recycling of Resources Act.

The system covers 32 items in 12 different product groups that include pesticides and containers for toxic chemicals. However, the system has room for improvements in item selection and in better defining the linkage between policy measures and policy targets.

### 4.1.5 Water Resource Usage Charges

The Water Resource Usage Charge System is designed to impose the cost of supplying water, incurred in the upper portion of Han River, on people residing in the lower stream of the river in accordance with the User Pays Principle. The charges are now being imposed in addition to the tap water tariff. Areas in and around Paldang Lake were designated as a Water Supply Source Protection Zone in 1975, and as a Special Reserve Zone in 1990, in which land-use is severely restricted. In 1999, a Waterside Zone and a Buffer Forest were designated as a reinforcement measure, and the Pollution Quota System was introduced the same year. A charge of 110 won per ton of water supply is imposed on those living in the lower stream of the river. The collected money is transferred to a local autonomous body in the upper stream for constructing environmental infrastructure, and for providing financial support to the residents living in the Waterside Zone. The Water Resource Usage Charge system has been implemented as water quality and supply management policy and is expected to provide incentives to technology development as well.

### 4.1.6 Traffic Load Charge System

The Traffic Load Charge System is a policy measure aimed at reducing traffic by enforcing the originator of the traffic to provide a partial payment of funds equivalent to the social costs of the increased traffic. This charge is applied to the owners of facilities with a total area larger than 1,000 $m^2$ in cities with populations exceeding 100,000 people. The revenue collected is to be used for public transportation programs in the respective city.

The current revenue amassed from the charge, approximately 70 billion won from the 33 cities where the system is being enforced, is used for programs for the expansion and improvement of operations, such as the regulation of bus-only lanes and a management information system for bus networks.

### 4.1.7 Volume-based Waste Collection Fee System

The Volume-based Waste Collection Fee System was initiated in 1995, requiring waste to be packed in a standard disposal bag that has been purchased from a local vendor. Rather than charging according to size of building or property taxed, this system charges for the actual waste disposed. With the system, waste disposal fell by 23%, from a daily volume of around 58,118 tons in 1994 to around 44,593 tons in 1998. Based on these figures, the daily waste disposal per person in 1994 was 1.3 kg and in 1999 was similar to England and Germany at 0.97 kg. Recycled items rose 74%, from 8,927 tons per day in 1994 to roughly 15,566 tons in 1998. Expressed in terms of economic value, this figure would amount to almost 2.9 trillion won.

## 4.2 The Environmental Impact Assessment (EIA)

### 4.2.1 Environmental Impact Assessment and the Prior Environmental Review

Although the System for Environmental Impact Assessment (EIA) was initiated in 1981, the actual supporting policies and actions began after the Environmental Impact Assessment Act was enacted in 1993. Activities requiring EIA consist of 62 project types in 17 fields that include urban planning, industrial park development, public road construction, and public or private sector development projects.

The EIA System has played a key role in sustainable development in the ROK. However, the system needs improvement in terms of the timing of the assessment, coordination between relevant authorities, and the implementation of consultation results for the assessment. The EIA System will need to follow up on these problems.

Those who are planning a project that is subject to an EIA are expected to hold a public hearing on the project, and the authorities responsible for project approval should consult with the Ministry of Environment.

The System for Environmental Impact Assessment is carried out for larger development projects at the project execution stage or after the final plan is confirmed. Its scope is limited to examining the measures for emissions reduction and other environmentally friendly developments. In order to address these problems, the Prior Environmental Review System (PERS), based on the Basic Environmental Policy Act, was devised in 2000. The PERS aims to ensure the environmental friendliness of development projects by considering their environmental impact at the initial stages of planning through feasibility studies and evaluations. Among others, the system evaluates the environmental adequacy of the proposed site and the appropriate scale of the project.

### 4.2.2 Traffic Load Impact Assessment

The Traffic Load Impact Assessment System, introduced in 1986 with the enactment of the City Traffic Regulation Act, is a policy measure to secure the smooth flow of urban traffic and the public's demand for pleasant commuting. It is designed to improve traffic flow inside business sites or facilities as well as in adjacent areas by reviewing and analyzing the traffic load created by new activities or facilities with sizes exceeding a certain level.

To address the severe traffic problem due to rapid urbanization and the dramatic increase in the number of motor vehicles, the government introduced the relatively broad City Traffic Regulation Act. However, local traffic problems generated by new development projects needed separate measures. Therefore, a pressing need was expressed for an effective and sophisticated method by which the government agencies could examine and analyze overall transportation problems and traffic load induced by the individual activities or facilities, thereby allowing the agencies to minimize congestion on adjacent main roads.

From then on, considering the reality of traffic congestion, accidents, and environmental problems generated by the rapid increase in automobiles and further urbanization, there was concern that a serious situation might occur even in non-transportation sectors. The Traffic Load Impact Assessment System was introduced against this backdrop.

Under the system, those who operate activities or facilities over a certain size are to submit a report of the traffic load impact assessment to the Minister of Construction and Transportation or to the head of the province or the metropolitan city. The Traffic Load Impact Assessment Committee examines the report and may ask for supplements or revisions. Submission of a revised traffic improvement plan, responding to the request of the committee, is required to obtain permission for the project.

The Traffic Load Impact Assessment System greatly contributes to minimizing the impact of traffic at apartment complexes and department stores from early project planning stages.

#### 4.2.3 Integrated Impact Assessment

Apart from the EIA and the Traffic Load Impact Assessment System, the Calamity Impact Assessment System is also being implemented. Although these impact assessment systems are contributing to the minimization of the adverse impact of development programs at early stages, problems of duplicate procedures and excessive costs have been pointed out. The government enacted an integrated law in December 1999, the Impact Assessment Act on the Environment, Traffic Load, and Calamities, to ameliorate the situation.

### 4.3 Voluntary Environmental Measures

#### 4.3.1 Environmentally Friendly Business Designation Scheme

The Environmentally Friendly Business Designation Scheme, introduced in 1995, is a policy measure by which a given enterprise voluntarily endeavors to improve the environment by assessing the environmental impact of the entire processes of business activities and setting concrete environmental improvement goals. Under this system, 107 firms have been designated as Environmentally Friendly Businesses as of 2001. For the designated firms, the government waives regular direction and inspection, replaces permission for emission facilities with reporting, and, in the case of small-medium enterprises (SMEs), offers priority in obtaining loans.

Moreover, the private sector has made an effort to satisfy global standards for environmental management. The number of sites awarded ISO 14000 (Environmental Management System) certificates in the ROK reached 544 in 2000, ranking 9$^{th}$ in the world. It is understood in the ROK that ISO 14000 not only contributes to environmental improvements, but also plays a

positive role in marketing and business management by improving productivity, which outweighs the additional costs to the enterprises involved.

### 4.3.2 Eco-labeling System

The Eco-Labeling System was introduced in 1992 based on the Environmental Technology Development and Support Act. The Korea Environmental Labeling Association, whose members include the government, industry, and consumers, has been in charge of awarding environmental labels. In the first year of application, four product groups, including recycled paper products and tissues made of recycled paper, were deemed eligible for the labeling program. Gradually, this increased to 62 product groups, many of which are durable goods, now eligible for the labeling program as of May 2001. In February 2001, the government introduced the Type III environmental labeling system of the ISO 14000 series, which certifies the environmental performance of the product.

### 4.3.3 Target Recycling Ratio, Workplace Waste Reduction Program, and Producer Recycling Liability System

Based on the Promotion of Saving and Recycling of Resources Act, the Target Recycling Rate scheme was introduced in 1993. It was intended to raise the recycling rate of resources like waste paper and iron scrap. The targets are set up by consultation between the government and the business organization and are expected to be carried out by firms voluntarily.

The Workplace Waste Reduction Program was introduced in 1996 under the Guidelines for Workplace Waste Reduction, which was derived from the Waste Management Act as amended in 1995. Under the program, applicable workplaces may draw up and implement a reduction plan. After a careful analysis and assessment of the performance of the plan, the business organization has until March the following year to request that the workplace be designated as a "good workplace."

The Producer's Recycling Liability System, introduced in 2000, is a program in which producers form an organization that conducts recycling of waste generated from the use of their products at its own expense. The system has an incentive effect for firms to improve the designs and materials of products so that they generate less waste and make recycling easier. The system

works on the basis of voluntary agreements with business groups of home appliance manufacturers, fluorescent light bulb manufacturers, and glass bottle manufacturers.

### 4.3.4 Voluntary Agreements in the Energy Sector

The Voluntary Agreement scheme in the energy sector was first introduced in 1998. 15 agreements between government and firms were signed in 1998, 52 in 1999, and 145 in 2000. The total number of firms that have signed agreements so far is 212.

By signing and implementing the voluntary agreements, these firms are expected to save 830 billion won per year through efficiency improvements resulting from the total investment of 2.7 trillion won. In 1999, the amount of energy consumed by 176 firms that signed the agreement with the government was 39.4 million TOE, approximately 40% of the 99.7 million TOE for the entire industrial sector.

Based on the survey and assessment of 46 firms, who together invested a total of 269 billion won in 1999, energy savings reached 775 thousand TOE, or 142 billion won, and CO2 emissions were reduced by 7.8% in 1999. In 2001, around 150 firms are expected to sign Voluntary Agreements. By the end of 2001, the number of firms is anticipated to reach 362 if the program is implemented as intended.

Voluntary Agreements in the energy sector are a newly introduced environmental measure in the ROK, and have significantly contributed to energy savings and reduced CO2 emissions.

## 5. Participation of the Public and Private Sectors and the Local Government

### 5.1 Civil Society

The ROK's environmental movements have gone through four stages of development: The infant stage (1960-1970s), the anti-pollution stage (1980-1987), the proliferation stage (1988-1992), and the stage of expansion (1993- present). The 1992 Rio Summit and the following development of international environmental movements exerted an impact on the growth of environmental NGOs in the ROK.

The number of environmental NGOs has risen sharply since the 1990s; there were only 33 before 1980, most of which did not have legal approval from the government. In 1985, the figure grew to 47, to 194 in 1994, 339 in 1996, reached 489 in 2001, and continues to increase. On the other hand, environmental NGOs' activities were confined at the early stage to actions responding

to environmental accidents such as illegal waste dumping or illegal emissions. Now, the movement has expanded to cover a wide range of issues, including production and consumption patterns, quality of life, and environment.

As a result, there is a sharp increase in the demand for reliable, timely environmental information. In response, a website called Sustainable Development Network, or SDN opened in 1994. Moreover, the Federation of NGOs for Environmental Policy was established to effectively incorporate civil society's opinions and participation in the policy-making processes.

Recently, major decision-making related to sustainable development in the Republic of Korea is in many cases influenced by public opinion formed through the leadership of social organizations and the press.

NGO activities have served as a driving force for promoting sustainable development in major fields. Meanwhile, the press has not only contributed to enlightening the general public on the importance of environment preservation, but also played a significant part in encouraging people to form an environmental value system. The media has played a decisive role in promoting the sustainable development concept in major decision-making processes.

In particular, the very recent cancellation of the Dong River dam construction plan in June 2000 is a case where the NGOs and the press played major roles in impacting national decision making processes related to sustainable development. The dam was to be constructed as a multi-purpose dam to secure water supply, to control flooding, and to generate electricity. The plan was discussed over a long duration, and its basic and detailed designs were already complete in 1996-97.

An organized movement against the construction plan was led by NGOs to preserve the ecosystem around the Dong River basin. The media gave their full support for these activities and helped form public opinion in favor of canceling the dam. Responding to this, the government established a joint investigation committee comprised of NGO representatives and officials from the government agencies concerned. After reviewing the conflicting positions of the construction plan, the committee ultimately determined that the plan should be cancelled. The Dong River dam will remain a good example of the positive role that NGOs and the media can play in promoting sustainable development. However, the incident brought to light the failings of institutional decision-making mechanisms by not having various stakeholder opinions reflected in the final decision.

### 5.2 The Youth

To assure opportunities and expand participation for youth activities and to build awareness of environmental conservation, the government has developed and offered youth training programs and has established and implemented a medium and long-term plan for the youth. The government has helped disadvantaged youths secure their livelihoods and participate in environment-related activities, and widened opportunities for their receipt of social services and participation in society. In addition, channels for exchanging information on environmental conservation have been established and an international exchange program was promoted to upgrade environmental awareness among youth.

### 5.3 Women

To integrate the perspectives of women into the national strategy for sustainable development, the Ministry of Gender Equality was founded in January 2001, succeeding the function of the Special Committee on Gender Affairs, and integrating gender-related functions from existing ministries. From then on, the Ministry of Gender Equality has assessed government policies from a gender perspective and has provided a basis for the concrete analyses of the effects public policies have on women. Moreover, the Ministry of Gender Equality has urged the appointment of more women in various government committees as constituted by laws and ordinances of central and local governments in an attempt to accelerate women's participation in policy-making. As a result of such efforts, the share of women committee members has almost doubled, from 12.4% in 1998 to 23.6% in 2000, while their representation on environment-related committees rose to 25%.

### 5.4 The Private Sector

The Federation of Korean Industries and the Korea Chamber of Commerce and Industries have been promoting publicity and education on environmental management and have also taken initiatives to identify outstanding management practices. Similarly, the Korea Accreditation Board has been reinforcing environmental management certification systems.

The Korea Chamber of Commerce and Industries established the Environment and Safety Committee in 2000. This committee has contributed to sustainable development by inducing voluntary and consistent improvements on environment and safety and by seeking ways to maximize eco-efficiency through the integrated management of the economy and the environment. The committee promotes the Business Environmental Policy Consultation Committee as well as the

Environment and Safety Forum. The committee also builds partnerships with the press, conducts studies, and proposes policies related to industrial, environmental, safety, and health issues, and operates an extended industrial environment information system.

With the Environmental Committee, the Federation of Korean Industries established the Korean Business Council for Sustainable Development (KBCSD) to be the voice of the private sector on the current situation of sustainable development. Through the council, policy development is expected to reflect the interests of the private sector and also induce advanced environmental management schemes.

The Business Environmental Policy Consultation Committee was established in June 1998 and is currently in operation to exchange views and reinforce cooperation between the government and the business community. Although the committee was initially organized as an unofficial body, it successfully enabled the interested parties to participate in policy-making from the very beginning, contributing to the effectiveness of environmental policy measures. By July 2000, the committee became an official organization and was enlarged to oversee a regional sub-committee throughout the nation.

### 5.5 Local Governments and People

In the Republic of Korea, Local Agenda 21 has been promoted since 1997, as a way to introduce sustainability concepts to towns and villages. As of January 2001, a total of 193 out of 248 local governments are promoting Local Agenda 21, and 144 (74.2%) have fully adopted Local Agenda 21. Furthermore, local leaders have established action committees to implement programs in 159 local governments. In June 2000, the groups who initiated and promoted the Local Agenda 21 movement created the Korea Council for Local Agenda 21. This council is leading various activities that include the formation of the Local Agenda 21 Network of World Cup Host Cities, and the establishment of the Preparatory Subcommittee for Rio+10. The Local Agenda 21 efforts in Korea have provided new opportunities for greater civil participation in administrative processes and the creation of partnerships for sustainable development.

Each autonomous body establishes and implements an integrated plan for environmental conservation linked with the overall development plan. As of January 2001, 136 autonomous bodies have adopted basic environmental regulations providing responsibilities and duties related to the environment.

Although an increasing number of autonomous bodies are pursuing environmental objectives, local environmental offices are still lacking sufficient capacity to effectively implement environmentally friendly policy measures at the local level.

Sustainable development in the ROK is in many respects promoted by the local communities, composed of residents and local autonomous bodies. The active participation of local residents and environmental NGOs plays an important role in contributing to sustainable development by countering the local autonomous bodies' inclination to cater local development interests.

## III. Assessment and Future Challenges

### 1. Assessment of the Implementation Progress of Sustainable Development

#### 1.1 General Assessment

Assessment of sustainable development performance has two sides. One is to determine the extent and effectiveness of the integration of environmental factors into socio-economic policies in both public and private sector decision-making. The second side is to assess sectoral strategies (water quality, air, biodiversity, etc.) and their performances.

##### 1.1.1 Environmental Investments and Budget

The ROK has made a great advances since 1992 in environmental investments and budget as well as in strengthening legal and institutional capacity, especially in comparison to the statistics at the time of the 1992 Rio Summit. The overall environmental budget grew sharply from 352 billion won in 1992 to over 2.2 trillion won in 2000.

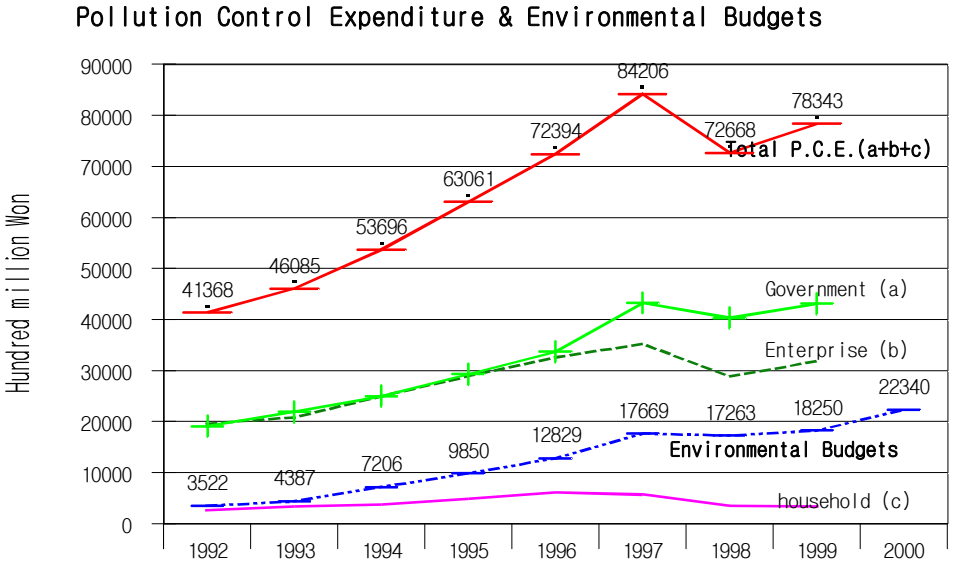
<Table 12> Environmental Budgets

(Unit: 100 million won)

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| MOE Budget | 1,396 | 1,887 | 4,716 | 6,729 | 8,851 | 10,802 | 11,131 | 11,536 | 13,023 |
| Allowance for Water Quality Improvement | 2,126 | 2,500 | 2,490 | 3,121 | 3,978 | 6,867 | 6,132 | 6,714 | 9,317 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total (Environmental Budget) | 3,522 | 4,387 | 7,206 | 9,850 | 12,829 | 17,669 | 17,263 | 18,250 | 22,340 |

Source: MOE




Total environmental expenditures grew gradually from 1992 until the end of 1997, and decreased in 1998 (just after the financial crisis). However, as of 1999, expenditures reverted to 1.6% of the GDP (7.8 trillion). The government's total environmental expenditure was hardly impacted by the economic crisis. As the economic situation worsened, private expenditures for the same period fell drastically in 1998, and showed no sign of quick recovery in 1999. Few improvements in private environmental investments are expected unless the economy stabilizes.

### 1.1.2 Stakeholder Participation in the Decision-making Processes

The ROK has made remarkable progress in building institutional capacity and securing investments in environmental conservation. As seen by the Dong River Dam cancellation, the environmental awareness of the public has grown dramatically. Nevertheless, the overall state of the environment has steadily deteriorated due to the rapid increase of environmental pressure generated by economic growth (and economic crisis, as seen above) and changes in industrial structure.

Most noticeable in the course of promoting sustainable development since 1992 is the improvements in the public decision-making process, particularly in relation to the participation of

NGOs. For example, the Presidential Commission on Sustainable Development is headed by a NGO leader with NGOs participating in the commission.

The government expanded the coverage of activities requiring environmental impact assessment and prior environmental impact review (see earlier sections on the EIA System and PERS). They have also strengthened their procedures, which has contributed to minimizing environmental degradation from major development projects. Prior consultation and participation of diverse stakeholders including residents and NGOs in the decision-making process have been institutionalized. Despite these institutional developments, however, communities have not been effectively included in the decision-making process, as seen in the Dong River dam case.

### 1.1.3 Global and Regional Environmental Cooperation

The Republic of Korea has participated in major international environmental agreements such as the Framework Convention on Climate Change and the Kyoto Protocol, the Convention on Biological Diversity, the Montreal Protocol, and the Basel Convention. The ROK also has actively participated in negotiations for emerging efforts to adopt agreements in the areas of bio-safety, international forest conservation, and controls on the movement of hazardous chemicals. The ROK's current state of accession to international environmental agreements is shown in Table 10. The ROK has also participated in activities of UNCSD, UNDP, and UNEP.

<Table 10> ROK's Participation in International Environmental Agreements

(as of 2000)

| Types | Total | Air/ Climate | Water Conservation | Marine/ Fishery | Nature/ Wild Life | Nuclear Safety | Hazardous Wastes | Others |
|---|---|---|---|---|---|---|---|---|
| Adoption | 216 | 12 | 15 | 86 | 50 | 13 | 11 | 29 |
| Effectuation | 164 | 10 | 9 | 66 | 40 | 12 | 8 | 19 |
| Entry | 40 | 6 | - | 13 | 7 | 6 | 1 | 7 |

Source: Ministry of Environment

By hosting international conferences and seminars, the ROK has raised and addressed sustainability issues in a global dimension. Amongst these was an international workshop to promote the transfer of publicly owned technology related to sustainable development and a workshop on sustainable consumption patterns.

In addition to contributing to and participating in international environmental protection efforts, the Republic of Korea takes part in offering financial assistance related to global environmental issues to developing countries. For the GEF Replenishment Phase I (1995-1997), the ROK contributed 5.5 million USD over a three year period, and committed to contributing 5.5 million US$ for Replenishment Phase II (1998-2002). Moreover, the ROK has gradually increased grants and soft loans to developing countries. ODA in 1999 amounted to 317 million USD, recording an increase of 73% from 1998 when the ROK entered financial crisis. However, the ROK's ODA is far short of the 0.7% of GNP demanded by Agenda 21, particularly the portion devoted to environment related assistance in the ODA. However, there are plans to increase this. For example, the Korea International Cooperation Agency (KOICA), which supervises ODA, established five training courses on the environment, which have instructed 87 attendees from 28 countries.

The ROK took a leading role in establishing sub-regional environmental co-operative bodies such as the Northeast Asian Sub-regional Programme for Environmental Cooperation (NEASPEC) and the Northwest Pacific Action Plan (NOWPAP), and is actively participating in environmental programs under the umbrella of those bodies. Moreover, by hosting expert group meetings that address the long-term vision and the institutional and financial mechanisms of these bodies, the ROK also endeavors to have them function as effective environmental cooperation systems in Northeast Asia.

The ROK has made efforts to reduce greenhouse gases voluntarily. In 1999, at the Fifth Conference of the Parties in Bonn, the ROK announced to the international community that it would continue voluntary and non-binding reduction efforts.

## 1.2 Contributing Factors

### 1.2.1 Growth of Income: The Environmental Kuznets Curve

Income growth may be one of the most important factors in sustainable development in the ROK. The increased preference toward environmental protection facilitated by the growth in per capita income, and greater environmental investments enabled by enhanced financial capacity, are positive factors for sustainable development. It is known that increases in per capita income may have an adverse effect on the environment in the beginning, but as shown in the Environmental Kuznets Curve, will soon result in positive effects as the level of income exceeds a certain point.

The financial crisis at the end of 1997 demonstrated that stable economic growth is an important prerequisite for sustainable development. Although urban air quality improved

temporarily after the crisis, economic recession brought about more adverse affects such as industrial waste abandoned by bankrupt small and medium enterprises, increased environmental pressure in rural areas, and generally reduced environmental consideration in the industrial structure.

### 1.2.2 Increasing International Commitment to Environmental Conservation

Another factor that helped to promote sustainable development in the ROK may be the international community and participation in international agreements. International emphasis on environmental issues, acceptance of international standards, and expansion of international activities in the ROK itself occurred during the course of negotiating and signing international environmental conventions and implementing the responsibilities of the agreements. The Montreal Protocol for protection of the ozone layer provided an impetus for Korean observers to realize that international environmental conventions might be closely linked to economic interests and enforced by trade measures. In the course of joining the OECD and throughout the preparation of an action plan for Agenda 21, the ROK has been trying to accept international environmental agreements as guides for domestic environmental policies. In particular, the accession to OECD in 1996 greatly contributed to the development of environmental policies and their implementation, as well as the refinement and articulation of the ROK's overall sustainable development strategy.

### 1.2.3 Enhanced Public Awareness

In March 1991, Nakdong River, a major source of drinking water for millions of people, was contaminated by phenol discharged from an electronics company upstream. This incident provided a lesson to the business community that environmental conservation efforts may make a critical difference in securing profitability, firm value, and a positive business image. In 1994, people again were reminded of the importance of environmental health as the serious pollution of the Sihwa Lake, which was formed by building a tide embankment for converting seawater to freshwater, received full coverage in the local papers.

### 1.2.4 Increased Industrial Efficiency

As the information technology industry (IT) has been growing and flourishing after the 1997 financial crisis, it is anticipated that it will generate positive impacts toward sustainable development and the implementation of Agenda 21. The expansion of the IT industries may lead to an increase in efficiency of energy usage and production, thus increasing eco-efficiency on the production side of all industries. Additionally, energy use and pollution intensity will be lowered, as the information industry grows to occupy a greater portion of the GDP.

## 1.3 Restricting Factors

### 1.3.1 Low Environmental Endowment

The main restricting factors for the ROK's sustainable development are due to the fact that the population pressure and high population density, energy intensive industrial structures, and the downturn during the economic crisis have lowered the priority of environmental investments, especially in the private sector.

Since the ROK's population density, in particular population per inhabitable area, is known to be one of the highest in the world, the pollution intensities per area both for air and water are much higher than in other countries at a comparable development stage and living standard. For this reason, the environmental stress level is extremely high in the ROK.

### 1.3.2 Industrial Structure and the Transport Sector Problem

ROK's industrial structure is characteristically energy-intensive. Such an energy-intensive industrial structure, along with the traffic problem, will be the main cause of growing atmospheric pollution

The traffic problem is structural in nature and causes socio-economic inefficiency from traffic congestion and contributes the greatest share of emissions such as CO2 and NOx. Explosive increase in the use of passenger cars in large cities combined with traffic congestion increases the generation of air pollutants and accelerates deterioration of the living environment.

### 1.3.3 Limited Financial Resources

The most realistic restraint is financial. Financial matters relating to the environment have two components. Environmental investments fell after the financial crisis in 1997. The decreasing trend was more conspicuous among private enterprises. The decrease in private sector environmental investments is clearly due to the exacerbated business situation after the financial crisis. While government investments in the environment are implemented considering public needs, private business investments fluctuate with government policies and economic conditions. But the government's environmental investments, expressed as a portion of GDP, is low when compared with the amounts invested by major advanced countries. Korea's figure is just over 3 trillion won for the whole government (1.3 trillion won for MOE), or 2.32% of the government budget and 0.5% of GDP.

### 1.3.4 Interest of the Local Governments and Local Autonomy

Another obstacle to sustainable development is that with the establishment of local autonomy, developmental causes took precedence over environment protection causes. After the establishment of local autonomy, incidents where local governments have asked the central government to relieve restrictions on land use have frequently arisen. Often, elected heads of local autonomous bodies are inclined to support their local development interests. Another handicap is that although environmental organizations frequently played an important catalyst role, they have generally failed to convince politicians, including members of the National Assembly, of the importance of environmental concerns.

## 2. Challenges for Further Implementation of Sustainable Development

### 2.1 Internalization of Environmental Costs

The ROK's achievement in sustainable development is not as satisfactory as desired. This lack of progress is basically due to the fact that economic development has proceeded by means of the excessive exploitation of natural resources in a small and densely populated area.

To assess the situation correctly and to help devise the proper policy mix, the government intends to determine environmental standards or investment levels based on statistics by pollution per area, instead of pollution per capita income. By doing this, implementation of sustainable development strategies should be at the top of the nation's strategic priorities. At the policy level, the level of environmental expenses accrued in economic activities regarding environmental

pollution should be strengthened and reflected accordingly. In other words, the ROK's various environmental regulations and economic instruments need to be adjusted to a level that can internalize environmental costs.

Of course, policy measures are needed to create a situation in which compliance of environmental regulations and environmental investments enhances business competitiveness. Environmental targets should be strengthened while boosting industry efficiency through voluntary participation in environmental conservation programs. When direct regulations or economic instruments are used, it is desirable for the government to draw up specific, precise details such as methods and extent of regulations and time frames. They must also implement the measures accompanied by the programs for developing technology to minimize pollution and enhancing economic efficiency.

At the national strategic decision making process level, it is important to integrate environmental and socio-economic elements in an efficient and participatory way. It is necessary to improve the participation of environmental institutions in the decision-making processes of economic institutions to increase efficiency. The roles of the PCSD are very important in this respect.

### 2.2 Enhancing Environmental Technology Development Policy

In establishing an environmental industry and technology development strategy, technology, environmental regulation, and environmental industry development policies should be linked to one another and implemented simultaneously. A coherent sustainable development path requires developing environmentally sound technologies. Emphasis should be placed on the demand side and the diffusion effect during the course of technology development rather than on the technology development target itself.

### 2.3 Financial Resources and Demand Management

Many measures must be sought to ensure that issues of securing financial resources do not become an obstacle to implementing sustainable development. The problem of the funding shortage stems from a strategy that neglects the demand factors as is, and tries to solve with investments on the supply side. In this respect, the recent shift in emphasis of water policy from the quality and resource supply of water to demand management is on the right track.

### 2.4 Enhancing Partnerships

Although both national awareness of the environment and environmental investment growth have been elevated, as indicated earlier, the establishment of partnerships among various sectors of society is still very weak. Enhancements of such a partnership will serve as a major driving force for sustainable development.

### 2.5 Long-term Challenges: Economic Restructuring and Inter-Korean Issues

There are two long-term challenges on the horizon of the next ten years with regard to sustainable development in the ROK. The first challenge is that economic restructuring, initiated as a solution to the financial crisis that began at the end of 1997, has yet to be completed. The second revolves around the uncertainties of the direction and speed of Inter-Korean cooperation.

Financial restructuring will contribute to sustainable development by enhancing the efficiency of resource allocation. Moreover, regarding business restructuring, further institutional improvements are needed to facilitate the exit of firms from markets, and to encourage the observance and internalization of business' environmental liabilities

The development of Inter-Korean cooperation economically, politically, and socially will profoundly affect the environment, either positively or negatively. Therefore, to enhance sustainability in the future, various countermeasures should be prepared in advance. It is also recommended that the environment be adopted as a priority issue in the cooperation dialogues.