Green Korea 2001

In pursuit of economic and environmental sustainability

Ministry of Environment
Republic of Korea

Preface

The past century has witnessed humankind benefit from the material progress made possible due to scientific and technological achievements. At the same time, however, we saw our planet come under ever-increasing stress that now challenges its ability to provide for future generations.

Human activities are causing climate change; oceans are rising and threatening entire societies. Seemingly everywhere around us we see greater water and air pollution, growing waste, and shrinking green space. If this situation continues, our ways of life and possibly our very survival will not be sustained.

It is time for us to re-evaluate the lifestyles of the past century and harness all the wisdom we have, as a nation and as a community, to find ways to achieve a balanced coexistence between human activities and the ecosphere. The Earth is the source of life for all and is where our children and their children will live. It is imperative that we serve as good stewards and bequeath the planet to them in a better state than it is now. Maintaining sustainability is, at its essence, both a survival strategy and an obligation we have towards future generations, as a government, as businesses, and as individuals.

The Korean government, in keeping with the demands of the times, has been pursuing environmental policies based on sustainability. On World Environment Day (June 5, 2000), President Kim Dae Jung announced his environmental vision of expanding the meaning of peace to include the concept of genuine harmony and reconciliation between human societies and nature. The President's vision, which articulates an environmental policy framework that emphasizes the precautionary principle, is based on market economics and democracy, and attempts to integrate environmental and economic goals. Along with this vision, the Presidential Commission on Sustainable Development was formed in September 2000, with broad participation from the private sector, to help maintain balance between economic development and environmental conservation. And the Ministry of Environment has already begun to promote the Eco-2 Project, which seeks to achieve both environmental conservation and economic development goals in a unified manner. Eco-2 activities focus on developing environmental industry and technology, strengthening resource conservation and recycling, applying demand-side water management, enhancing the environmental information infrastructure, and creating a sustainable development indicator. Taken together, I believe that these project components will improve the ambient environment while strengthening economic and ecosystem health. The Ministry also continues to introduce or revamp advanced policies and administration across environmental media. Finally, the Korean government is striving to preserve the global environment for people the world over, and is emphasizing international cooperation in addressing environmental problems among neighboring countries.

I sincerely hope that this publication will serve as a helpful introduction to Korea's environmental policies, experiences and activities, so that the international community may

better understand Korea's and the Ministry of Environment's perspective, expectations, and vision.

Minister of the Korean Ministry of Environment

The Eco-2 Project

Introduction

In the 20th century, a significant portion of humankind achieved remarkable economic growth, which brought great material abundance. In the new century, however, new focus should be placed on the quality of national development and a quality of life that matches economic gains. Meeting these challenges, the President declared a National Environmental Vision for the New Millennium on Environment Day (June 5th) last year and proclaimed that the Republic of Korea will create a community where both humans and our life-giving environment thrive. The declaration included a convergence of economic and environmental policies and the new principle of "plan first and develop later". It made clear that the government will break away from the outdated policy paradigm which placed priority on economic growth at almost any cost. To execute the national environmental vision successfully, the government identified 80 projects in seven major areas, including land use, the ambient environment, and environmental education. In 2001, the government started to implement the projects in earnest.
For its part, the Ministry of Environment (MOE) is focusing this year on the Eco-2 Project, which seeks to identify strategies designed to produce mutually beneficial outcomes for both the environment and the economy. There are five main activity areas under Eco-2 which will be explained in the next few pages: development of environmental industry and technology, resource conservation and recycling, demand-side water management, expansion of the environmental information infrastructure, and creation of Korea's first sustainable development index.

Key Features of the Eco-2 Project

This year, Korea is faced with the daunting challenge of overcoming economic difficulties by completing the ongoing political, economic, social, and cultural reforms. However, economic development need not result in sacrificing environmental integrity. The view that economic development and environmental integrity cannot be pursued simultaneously is an anachronism. There is now emerging a clear understanding that a clean and healthy environment is an important source of national competitiveness and that without it, economic development cannot be sustained. In other words, we understand that economic development and environmental protection are complementary. In this regard, environmental policies must help create a "virtuous cycle" where good policies help overcome economic difficulties while a vibrant economy, in turn, spurs environmental protection.
Based on this idea, the government established the Eco-2 Project to bring a new impetus for national development.

Environmental Industry, a New Engine for Economic Development

First and foremost, the Eco-2 Project devises and executes strategies and measures to develop environmental industry and technology. The environmental technology (ET) industry, along with information technology (IT) and bio-technology (BT), has emerged as one of the most promising industries in the 21st century. In 2000, the market for the ET industry was estimated

at 11 trillion won in Korea and $528 billion in the world. Through 2005, the market is expected to experience annual growth of 15% domestically and 6% globally.

In January 2001, the MOE formulated the ET Development Strategy to nurture Korea's ET industry into a highly competitive strategic export-oriented industry. The strategy will be funded with around 2 trillion won for three years and will engage eight government agencies, including the Ministry of Finance and Economy, in 54 strategic tasks in five main areas. It aims to lay a firm foundation for the Korean ET industry to reach the level of advanced countries by 2010.

According to the ET Development Strategy, an investment fund of 10 billion won will be established this year with help from government, the environmental industry, and the financial sector, to assist environmental venture businesses. An incubation center for new environmental technology start-ups will be set up under the National Environment Institute to provide office space, management know-how, technology, and capital-intensive equipment and machinery.

The Eco-2 Project also includes the Eco-technopia 21 program, which, with a 2001 budget of 50 billion won, will develop environmental technology essential for the growth and competitiveness of the ET industry. The plan aims to develop new technology expected to be in high demand. At the same time, medium-high technology already in use will be improved to create additional value and to minimize technological reliance on other countries.

There are ten local Environment Technology Development Centers to promote cooperation and build research capacity of universities, research institutes, and businesses. The centers help examine local environmental issues and work on devising technology-based solutions. This year, eight more local centers will be established. Environment technology support units will be set up in the centers to strengthen the function of supporting environmental SMEs with necessary technologies, which will also help revive local economies and communities.

Many brilliant new technologies are not in use because of financial or other reasons. The MOE has devised measures to stop such inefficiency. The government will adopt a scheme in which, if a business builds environmental infrastructure within its plant and reduces the environment impacts of its operations, the government will reimburse the cost. The government will also put in place a system to evaluate newly developed environmental technologies and promote the use of promising technologies.

In addition, the government will invest 5.5 trillion won in building the environmental infrastructure, including wastewater treatment plants and waste incinerators, to help create market demand for ET. Major environmental requirements will be strengthened step-by-step to expand the ET market while giving businesses enough time to cope with the strengthened requirements by informing them of changes five to ten years in advance.

There are also plans to enter international environmental markets, including those of China and Southeast Asia. A permanent exhibition center is being built in Beijing for Korea's environmental industry and technology. The center will serve as a springboard for the entry of Korea's environmental industry into the quickly emerging Chinese market. In June 2001, Korea will host the Korea-China-Japan Environmental Industry Roundtable Meeting and hold the Green Business Expo, to promote Korea's environmental industry and advanced technology. Private and government delegations will be sent to various countries to facilitate market entry by Korea's environmental industry. Lastly, tapping into the economic cooperative fund, the government will help businesses win contracts for constructing environment facilities in international markets.

Resource Conservation and Waste Recycling

The Eco-2 Project aims to establish an economic system of cyclical resources, where waste generation is minimized through resource conservation and efficient resource use, and where

the generated waste is recycled as much as possible. To that aim, the Extended Producers Recycling System (EPRS) will be introduced, in which product manufacturers will take full responsibility for the recycling and disposal of the products that it produces and sells. This year, a pilot project for the EPRS will be launched for home appliances and fluorescent light bulbs. Three major home appliance manufacturers and fluorescent light bulb manufactures will collect and recycle their products after consumers use and discard them. This measure will not only promote recycling but also force manufacturers to improve product design so that waste generation is minimized and recycling becomes easier. The EPRS will be expanded to include product packaging, batteries, and tires. If the EPRS is officially launched nationwide, 400 billion won is expected to be saved in waste treatment and industry costs.

The Eco-2 Project will also create new jobs by developing recycling technologies and supporting the recycling industry. The government will invest 12.7 billion won in "the 21st Century Frontier Research & Development Project" to develop recycling technologies. It will provide recycling businesses with 60 billion won in long-term loans at low interest to help develop technologies and build recycling facilities. In order to increase the demand for recycled products, more public institutions, including the central government, local governments, and public corporations, must buy recycled products. Measures will also be taken to facilitate the use of online recycling markets.

Korea does not have abundant natural resources and thus imports most of its resources and energy. In this light, recycling is a good way to address the current difficulty of high oil prices. The MOE plans to launch a nationwide program called "Recycle 2001" to collect and recycle waste in conjunction with private organizations, industry, and local governments. "Recycle 2001" will also support the recycling business since waste paper, beverage cans and plastic bottles at homes, schools, offices and military camps will be collected and delivered to recycling businesses.

In addition, methane gas from landfills will be utilized to generate power or to provide heat. As the first step, power plants (50MW) will be constructed by 2004 within the Sudokwon Landfill site in Incheon and Gimpo. It is expected that the power plants will generate power equal to some 900,000 barrels of heavy oil per year, thus saving 20 billion won in energy imports. In addition, various benefits are expected, including odor reduction, landfill safety enhancement, and improvement in the ability to observe the Climate Change Convention agreements.

Water Management Focused on Demand Control

Korea is no longer a nation with abundant water resources. In 1997, the UN designated Korea as a water-stressed country. Population growth and economic development have increased demand while the water supply cannot be easily expanded because of difficulties in siting dam construction and strong public opposition to new dams. Eco-2 aims to decrease water demand and conserve water resources in order to save money, create a new market for water-saving facilities, and help revive the economy.

Public institutions must set water conservation targets and install water-saving devices or facilities. By the end of 2001, every elementary, middle, and high school will be installed with water-saving devices. Last year, 18% of all households had water-saving devices installed and this year the figure will rise to 31%. Hotels, department stores, other large buildings, and industrial plants that produce more than 1,500 tons of waste water are all required to install facilities to reuse wastewater for flushing toilets and for landscaping. The water-saving companies (known as WASCO) will install the facilities or devices and get reimbursed when the cost-savings are realized. Through these measures, Korea hopes to secure its water needs while promoting economic development.

Expansion of Environmental Knowledge and Information

Eco-2 also includes the More from Less project. The goal is to minimize the use of resources such as fuel and energy while maximizing productivity, customer satisfaction, and environmental integrity. Some examples include home appliances with high energy efficiency, environmentally benign but powerful detergents, and power plants that utilize the waste heat of cement production plants. In other words, More from Less aims to establish a production and consumption system that conserves and recirculates resources.

The Eco-2 Forum will be held to establish an environmental knowledge and information network which connect the government, industry, and consumers. Policymakers, CEOs and civic groups will be invited to participate in the forum, which will serve as an opportunity for businesses to put environmental management into practice, for consumers to buy green products and participate in conservation efforts, and for the government to develop supporting policies and initiatives.

Also, the government will encourage businesses to practice environmentally friendly management. Such businesses will be designated as environmentally friendly and will be rewarded with benefits. The Environmental Performance Rating System will evaluate and note the environmental impacts throughout a products lifecycle, from production, to use and ultimate disposal. The Green Building Certificate will be introduced to recognize environment-friendly buildings in a manner similar to the Environmental Performance Rating System. These measures will encourage industry to make products and buildings that are much less environmentally harmful.

Development of a Sustainable Development Indicator

A sustainable development indicator is being created to help quantify the economic value of environmental impacts. We hope to show that money which goes to improve environmental quality should be regarded as a capital investment rather than an expense. For example, if there is 1ppm improvement in water quality as a result of environmental investment, the index will show the economic value of the investment by quantifying the effects, such as an increase in usable water resources and a decrease in water treatment cost in industrial complexes. Additionally, Green GDP will be phased in to reflect environmental factors such as pollution reduction and environmental improvements in gross domestic production.

These efforts are intended to enhance the efficiency of industry's investment in the environment and to help drive the economy while maintaining environmental integrity.

Path to economic and environmental sustainability

The government has discarded the growth-driven policies of the past. It now strives to achieve sustainable development that pursues environmental preservation and economic development simultaneously, to ensure everyone a high quality of life. The government is fully committed to reviving both the economy and the environment and to marking 2001 as the year that Korea embarked on its path to economic and environmental sustainability. The Eco-2 Project will hopefully prove itself to be an efficient tool in achieving this objective.

A Green World Cup 2002

General Environmental Management Guidelines

Korea and Japan will jointly hold the 2002 FIFA World Cup from May 31 to June 30 in 10 cities in each country. The two countries will each host 32 final games 64 games in all. About 13,000 people are expected to come to see the games. The matches held in Korea will be in Seoul, Incheon, Suwon, Daejeon, Jeonju, Daegu, Gwangju, Ulsan, Busan and Seogwipo.

Korea decided to draw up environmental management guidelines for the 2002 World Cup as well as the Asian Games. The guidelines focus on tackling problems that received attention during previous game preparations. Korea is placing a great emphasis on hosting an environmentally-friendly and efficient World Cup, which will contribute to heightening Korea's image abroad. Basic directions and strategies, step-by-step measures, and environmental guidelines for each sector will be set up to manage the international events in an environmentally sustainable manner.

Basic Directions

Environmentally-friendly design and construction of game facilities

All game facilities, such as the main stadiums and players accommodations, should be located, designed, and constructed to minimize impact on the environment. The designs should make the utmost use of natural landforms, and include facilities that utilize natural resources such as solar power, natural sunlight and wind. Measures to reduce water use, noise pollution and dust should also be included.

Improve the environments of the host cities ahead of the World Cup

Improve each city according to its historical, cultural and environmental characteristics, by recovering waterways, planting trees, and organizing signals and mileposts.

Pursue a pollution-free World Cup

Introducing no or low pollution vehicles such as compressed natural gas (CNG) buses and minimizing emissions through controlling pollutant discharge are some of the measures needed to achieve improved environmental performance during the games. An environment-friendly resource management system should be established by reducing waste, improving recycling, and reducing packaging material and disposable goods.

Development of various environmental programs for the public

To successfully run a green World Cup, various events for citizens, as well as environmental and civic organizations, will be planned ahead of the games. The events include eco-tourism packages, environment education and publicity programs, painting exhibitions and festivals introducing local products.

Step-by-step Measures

Selection of the sites

Various environmental factors were considered in choosing the sites, which are in areas selected to minimize environmental damage. Buffer zones, such as reservoir protection areas and natural ecosystem conservation areas, were set up near the stadiums.

Setting up operation plans
Construction was carried out with the intent of utilizing existing facilities to the fullest, and the natural environment was kept intact as much as possible, to be used as resting areas and cultural venues. Environmental design was incorporated into all new venues developed for the games with an emphasis on water and energy conservation, passive solar design, and recycling.

Construction of stadiums
Inspections were carried out to check whether environment-related regulations were followed in the construction process. Environmental damage resulting from noise pollution, scattered dust and soil erosion were minimized.

Management of the games
With active participation of citizens, the government will manage the air, water, and waste at the stadiums and surrounding areas according to established environmental principles.

After the games close
A thorough environmental assessment will be conducted of the games, to be used as reference for future domestic and international events.

Environmental Guidelines for each Category

The design and construction of game venues
After conducting an assessment of the suitable size of the venues, existing facilities should be utilized to minimize the construction of new buildings. All construction must abide by environmental regulations and various factors considered when designing and building the facilities, such as selecting buffer zones, promoting water and energy conservation, available public transportation, as well as reductions in noise pollution, soil erosion, and dust.

Management of pollutants
For maintaining good air quality, programs to conserve energy should be drawn up, such as those involving renewable energy and energy-efficient devices, as well as policies to curb vehicular emissions. Water usage can be regulated by recycling rainwater and sewage water while emphasizing water conservation. To effectively manage water resources, water quality inspections should be strengthened at hotels and wastewater systems should be improved. In waste management, efforts must be carried out to control the amount of garbage produced at stadiums and to encourage recycling while cutting down on the use of disposable goods.

Measures in restructuring the cities
Environmental activities include re-coloring, improving signals, and planting trees. Cleaning up rivers and creeks and preparing spotless public bathrooms are also some of the environmental projects currently in process.

To heighten environmental awareness
For publicity, various activities such as designing environmental symbols, staging photo exhibitions, and promoting eco-tourism will be considered.

World Cup host cities' examples of environmental management

Seoul
Seoul's World Cup stadium is located at Sangam-dong, Mapo-gu, the site of the closed Nanjido landfill. Through staging the World Cup, the wasteland will be reborn as an ultramodern city that leaves a lasting legacy of environmental achievement for the global community.
Measures include restoring the natural environment of the surrounding rivers, such as the Nanji River, and conducting a land remediation project for the entire Nanjido area. The building of the Peace Park in the area, as part of the Millennium Park project currently in process, will make significant gains in improving the environmental quality of the region. Also, by building a state-of-the-art city in the Sangam-dong area, development of the northwestern Seoul area will match levels of Seoul's other districts.

Busan
Busan is promoting efforts in a number of areas such as construction and management of venues. The VIP parking lots around the venues will be made of grass blocks and clay pavement, and passageways will be built for native animals to move about the area in their natural habitats. Solar powered lights will be installed and venues designed with an emphasis on improved water and air quality. Special attention will be also given to improving the city's appearance by preparing flower gardens, setting up parks and playgrounds, building natural waterways and creating eco-tourism packages.

Incheon
Through the opening of the Incheon International Airport in March, 2001, as well as hosting the World Cup, Incheon plans to promote a new image of an environment-friendly city through various improvement projects. Incheon will take on strong environmental initiatives as part of World Cup preparations, such as securing clean and safe drinking water, renovating sewage systems, afforestation, and clean-up campaigns.

Daegu
Noting the fact that the ambient environment is closely related to athletic performance, Daegu aims to highlight the city's image as a "Green Forest City" during the World Cup. In 1996, the city initiated a five-year management plan to achieve specific environmental outcomes. Activities included tearing down walls, building parks, strengthening air and water quality monitoring, and enhancing public bathrooms. The city also decided to restructure the city landscape and emphasize environment-friendly management throughout the games.

Gwangju
Gwangju is aiming to build sporting venues that deliver both ecological and economic benefits. Recycled water will be used for toilets, watering gardens and parks, as well as for cleaning bathrooms. In addition, venues will use renewable energy sources such as solar power.
The 4th Gwangju Biennale that is set to be held from March to June during the same year will be coordinated with events related to the World Cup. The city will continue to work on "Green Gwangju 21", part of the city's Local Agenda 21 initiative, which includes creating parks, tree planting, and environmental photo exhibitions.

Ulsan
Ulsan is especially concentrating on shedding its image as an industrial city through successfully staging the World Cup with a high priority on the environment. The main preparations include conducting energy-saving programs and minimizing environmental damage during the construction of the stadiums. The city has also established separate

departments in charge of environmental matters to cover areas such as air quality, waste management, and afforestation.

Daejeon
Promoting the motto Fresh Air, Sparkling Water, Spotless Streets and Green Space, Daejeon is getting ready to be reborn as a green city through hosting the international event. Preparations include introducing compressed natural gas (CNG) city buses, staging bicycle-riding campaigns, improving sewage systems and public bathrooms.

Suwon
Suwon is striving to become a world-class city through achieving major environmental initiatives during the planning and implementation phases of the World Cup. The city is constructing an eco-friendly stadium, staging various environment-related events, planting trees, and redecorating city streets.

Cheonju
Cheonju is preparing various programs to stage a green World Cup. The city is planning to plant 600,000 trees, introduce CNG city buses and promote greater use of bicycles. The city's sewage treatment plant will be renovated to effectively reduce water pollution, and the Cheonju and Sam Rivers will receive remediation. Other environmental projects include improving the water quality of rivers nearby the World Cup stadium, securing water supply, remediation of the Seoshin-dong landfill, and enhancing public bathrooms.

Seogwipo
The sole island city among the host cities, Seogwipo is aiming to connect the environment with tourism while managing the games. The city is preparing to reduce on pollution by staging a local clean-up campaign, improving public bathrooms, renovating sewage disposal systems, setting up pollution-minimized hog farms, creating an attractive coastal environment, and managing nearby waterways.

Ecosystem Preservation near the DMZ

Ecological Value and the Need for Preservation

The establishment of the De-militarized Zone (DMZ) and the Civilian Control Zone (CCZ) following the Korean War marked a great tragedy for the Korean people but, at the same time, prevented development in the area, creating a sanctuary for wild plants and animals. The DMZ and the CCZ areas, alive with the bustle of human activity before the war, are now cited as a precious area where rare flora and fauna are kept intact. Being Korea's last haven for indigenous animals, plants, and microorganisms, the DMZ and the CCZ have become a globally renowned reservation for biodiversity. These areas, with their high economic potential and academic and environmental value, need to be permanently preserved with both domestic and international efforts.
The DMZ is a 4km-wide and 250km-long strip, covering 907.3 square kilometers from coast-to-coast. Satellite photos show that it is the only ecosystem on the Korean Peninsula that is not crosscut by roads. As for the CCZ, it is located 8-12 kilometers away from the southern limit line of the DMZ. Although agriculture is allowed in the CCZ, mountain ecosystems in the far northern areas of eastern Gangwon Province are as well preserved as those in the DMZ.

There are two misconceptions about the DMZ. The first one is that since the DMZ area has been off limits to the public for nearly 50 years, it is covered with thick primary forests. This, of course, is not true. The area is set on fire every year for military purposes, which causes the ecosystem to remain at an initial stage of secondary succession with sparsely planted trees and grasslands. In some parts of the DMZ, there are so few trees that the landscape resembles African savanna. The second misconception is that the area is ripe for development for it is destroyed by forest fires and has no preservation value. The fact is, however, that those very forest fires have created very rare natural grasslands not found anywhere else in Korea. Forest fires keep shrubs from growing, while helping nutrients to circulate. This boosts the productivity of herbaceous plants, which, in turn, results in an increased number of herbivores. A rise in the density and diversity of herbivores also increases the possibility of survival for tigers, leopards, and other carnivores in the area.

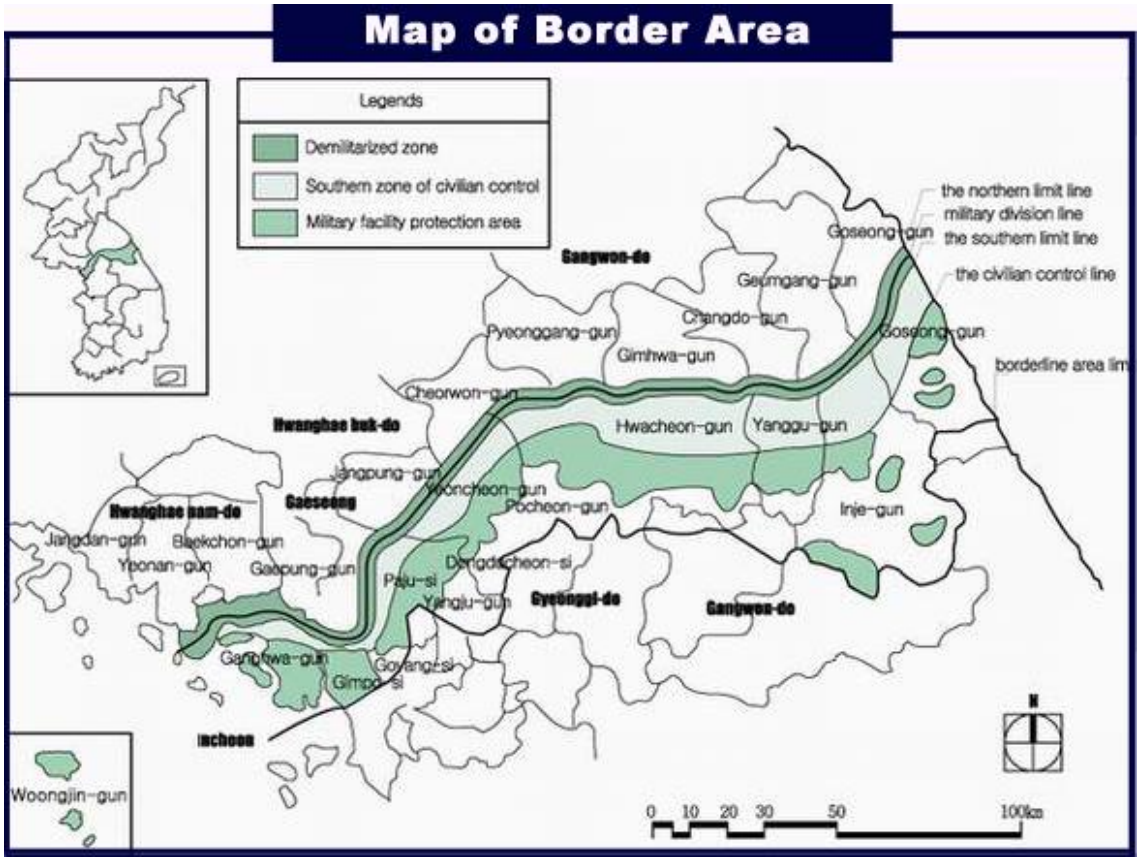
Meanwhile, along with the DMZ, the CCZ also has a larger proportion of relatively intact ecosystem than do other parts of Korea. It has less space devoted to roads, residential districts, and factories, and also has fewer ranches and plantations. The fact that a number of rare or endangered species of plants and animals live there implies that a healthy secondary forest in this area could emerge within a short period of time if it remains protected after the reunification of the Korean peninsula. Therefore, the CCZ, along with the DMZ, should be preserved as a buffer zone surrounding the DMZ.

Of ecosystems in the border area, five areas need most urgent protection: the Hyangnobong Mountain Range area, Mt.Daeam-Duta area; the Cheorwon plain area; wetlands of the Imjin River and the Han River estuary; and tidal-flats in the Gangwha Island area. As for the Hyangnobong Moutain Range and the Mt. Daeam area, the forest ecosystems in these areas are in good shape and worth preserving for their plants and animals. The Cheorwon plain is a valuable winter habitat for migratory birds, including cranes. In the meantime, wetlands in the Imjin River, an estuary of the Han River, and Gangwha Island host important fresh water and sea water wetlands.

Current Ecosystems in the Border Areas

The Hyangnobong Mountain Range

Most of the rugged mountainous areas of Hyangnobong are included in the DMZ and the CCZ and are off-limits to civilians for military purposes, which explains why the area is famous for well-preserved nature and has a greater variety of wild flora and fauna than do other parts of Korea. For that reason, Hayngnobong and the area around Mt. Gunbong were together designated in 1973 as the 247th natural sanctuary, under the Cultural Asset Management Act. The border area’s rough geographical features have provided a haven for wild plants and animals, including endangered antelopes, otters, and wildcats of Korea.
In addition, the Hyangnobong Mountain Range hosts Russian Ginseng, Hangyeryeong grass, and Korean sophora, which are included in 52 protected wild plants designated by the Ministry of Environment (1997), along with 34 Korean endemic plants such as the Geomgang bell flower.



Mt. Daeam and the Duta tarn Area

This area is ecologically very important for two reasons. One is that the Hyangnobong Mountain Range serves as an ecological link between Mt.Seorak and Mt. Geomgang. The other is that the Hyangnobong Mountain Range itself is directly linked to the Mt.Geomgang area through Mt. Mu (1,319m) and Mt. Maebong (1,290m), both located on the northern side of the truce line. This area is worth preserving in its own right since it carries a great botanical significance in that all species of plants from other areas grow here. On top of that, the Duta tarn area has Yongneup, a high moor, with the most unique flora and fauna in South Korea.

The Duta tarn is a vast and deep pond, including a 20m waterfall formed with water flowing in from valleys in Mt. Geomgang. The habitat for black eagles, a natural monument, is also found on the cliff wall. Other natural monuments, atehemab and fresh-water salmon, live in the Duta tarn, an area widely known as the nation's largest fresh-water salmon habitat. In addition, in the vicinity, various Korean endemic and rare plants, such as utricularia japonica, lilium callosum, and the Geomgang bell flower, grow along with natural monument mammals including otters, antelopes, and Eurasian flying squirrels.

Ranunculus kazusensis, which the Ministry of Environment included in the list of 6 endangered wild plants (1997), also grows in the area. Also, three additional protected wild plants including lilium cernuum are found along with 19 Korean endemic plants such as polygonatum lasianthum.

Mt. Daeam is a natural sanctuary that was designated as the 246th natural monument in 1973 and is located to the east of the Doota tarn in the southern-most part of the coastal basin. The Yongneup moor is found almost at the top of Mt. Daeam (1,312m), and has already been designated as the natural ecosystem sanctuary by the Ministry of Environment and is on the list of the Ramsar Convention on Wetlands. At the high moor, it is so cold that snow and ice

remain until May, when flowers finally start to bloom. The cold spell continues to the early part of June and even during summer, when the area remains cloudy and windy. The moor is divided into two parts: Major Yongneup and Minor Yongneup. Minor Yongneup turned into scrub long time ago, while Major Yongneup covers almost 3.2 hectares and is South Korea's largest high moor, estimated to be 400 years old, according to a pollen analysis. At the bottom of the moor, there are peat deposits as high as 180 centimeters; these are reddish brown sediments which were formed as microorganisms slowed down their activities due to low temperature. About 200 types of native vascular hydrophytes grow in and around the Yongneup moor. A number of rare and endemic plants are found around the moor, the nearby wetlands, and at the top of Mt. Daeam.

The Cheorwon Plain

Cheorwon Plain is in the Gangwon Province highlands, and is a habitat for migratory and other wild birds and a winter habitat for cranes. Cranes are a rare species and there are only a few thousand of them living in the world, under global protection and attention. Approximately 10% of the worlds crane population pass the winter in Cheorwon, which explains why the area is more well-known overseas than in Korea. The larger region contains a diverse ecosystem including wetlands, along with grassland and forests in the DMZ. Moreover, abundant nutrients from rice farming makes Cheorwon a paradise for winter migratory birds. In order to protect birds in Cheorwon in a different way from eastern part of Gangwon Province, however, different farming methods should be used. For example, a ban on or strictly limited use of pesticides and fertilizers should be enforced to bring back the cranes. In this sense, cooperation from residents and the local government in Cheorwon is essential in ensuring successful preservation of diverse birds.

Wetlands in the Imjin River and the Han River Estuary

Wetlands in the area are formed along Sacheon on the Jangdan peninsula in the Gyeonggi Province, to the west of the DMZ, and ends at the Imjin River. The Sacheon area of the DMZ was mostly used for growing rice but has been abandoned for nearly 5 decades. As a result, the original vegetation is again thriving instead of old rice paddies. Due to tidal currents from the Yellow Sea, there are wetlands that sink under water at full tide during the summer rainy season. In the past, swamp was reclaimed as rice paddies, but now the DMZ area will play a crucial role in research on the nation's original vegetation. In addition, since wetlands that sink under water on a temporary basis have disappeared, Sacheon provides a valuable habitat for migratory birds. Furthermore, a salt marsh has also been formed along the Imjin River and the Jangdan peninsula. In some parts of the wetlands, plants like calamagrostis epigeios live in bunches, creating a unique spectacle. Diverse species of birds including both summer and winter migratory birds along with resident birds visit the areas. Predatory birds are also easily found in the area while cranes and white-naped cranes pass the winter here.

Campaign for Designating the DMZ as a Trans-boundary Biosphere Reserve

Biosphere Reserves: Special Places

To put it simply, a Biosphere Reserve is a "special place for people and nature". As part of the Man and the Biosphere (MAB) project led by UNESCO, the Biosphere Reserve denotes designated areas of terrestrial and coastal ecosystems with an aim to promote solutions that reconcile the conservation of biodiversity with its sustainable use. Each biosphere reserve

should contain one or more core areas, a clearly identified buffer zone, and a flexible transition area. Reserves are intended to fulfill functions of conservation/ preservation, development, and logistics support.
At present, there are 391 biosphere reserves in 94 countries worldwide. They are closely linked through an international network. Korea has two biosphere reserves in Mt. Seorak and Mt. Baekdu while preparation work is underway to designate Mt. Halla and nearby volcanic cones (oreom in Korean) as biosphere reserves.

Trans-boundary Biosphere Reserves

A Trans-boundary Biosphere Reserve (TBR) is a biosphere reserve established across international borders. As borders between states are political, not ecological, ecosystems often exist across national borders, meaning that protecting these ecosystems requires cooperation between the countries concerned. In particular, during the partnership process of trans-boundary ecosystem preservation, conflicting nations can reduce political tension and hostility and further develop a peaceful atmosphere. Currently, there are five trans-boundary biosphere reserves around the world: Poland/Slovakia; the Czech Republic/Poland; France/Germany; Rumania/Ukraine; and Poland/ Slovakia/ Ukraine.

Preservation of Ecosystems in the DMZ and the CCZ

It is not easy for neighboring countries to reach agreement on TBRs, as demonstrated by the fact that there are only five worldwide. Furthermore, given the fact that the DMZ and the CCZ are result of the division of the Korean Peninsula, there will certainly be a bumpy road ahead before the two Koreas jointly designate their border as a TBR. Nevertheless, if and when these areas become a TBR, it will greatly contribute not only to the preservation of biodiversity from east to west along the central line of the Korean Peninsula, but also to the promotion of peace between the two sides. Recognizing that the DMZ is not the exclusive property of one side and that it is an eternal asset which should be passed down to our children, both South and North Korean governments, international organizations, and civic groups need to jointly establish proper measures to preserve the area and put policies into practice.

Environmental Cooperation with the Private Sector

A Paradigm Shift in Environmental Policies

Increasing Public Awareness

Industrialization in Korea started in the 1960s. The government's insufficient monetary resources did not allow balanced investment in economic development and environmental facilities. As a result, environmental problems have expanded in proportion to economic growth. Major environmental disasters began to occur from the late 1980s and warned the public of the gravity of environmental degradation. Heavy metal water pollution in 1989 and a phenol spill in the Nakdong River in 1991 served as a wake-up call for the seriousness of environmental deterioration. The public then began to demand their participation in developing environmental policies. A growing need emerged to establish channels for public participation in decision-making processes.

Explosive Growth of Civic Society

In the 20th century, civic society around the world continued to place checks and balances on governments and industries and initiate or further the democratization process. During this period, civic society experienced explosive growth and played a significant role in driving political development and addressing economic inequality, to which Korea was no exception.
The main interest of Korean civic groups during the 1980s was democratization. In the 1990s, however, they started to extend their interests to various social issues. Currently, there are approximately 480 environmental groups in Korea working on a range of issues, such as water, air, waste, consumption, and lifestyle.

Global Issue: the Environment

Environmental issues are global. Pollutants generated in one region do not stay within that region. Instead, pollutants spread far from their origins, requiring global measures to deal with environmental issues.
However, governments around the world are often unwilling to exert joint efforts in solving the issues because of national economic interests. This is why civil society has taken on the task of resolving global environmental issues. The Rio Conference and the Davos Forum were excellent turning points for environmental groups from around the world to form alliances and share information. NGOs have wielded significant influence on governments decision-making processes. Faced with such changes, governments must broaden their cooperation with civil society.

The Role of Civic Groups

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Participation of Civic Groups

Civic groups assist governments in recognizing important social issues and help establish appropriate policies. As in the case of environmental issues, civic groups raise important issues and urge governments to come up with concrete measures.

Women Leaders' Meeting

The purpose of the Women Leaders Meeting is to encourage women's participation in the environmental policymaking process since they are key players in solving environmental issues. In most households, women are the final decision-makers on household purchases and have the responsibility for disposing waste generated. Therefore, environmental issues cannot be solved easily without women. With the clear understanding of women's roles in environmental issues, the government held talks with leaders from 23 major women's groups, such as the Consumer's Union of Korea. The government is now working to establish communication channels to increase the rate of women's participation.

Civic Participation in Environmental Policies

Participation in Policymaking

Participation of Civic Groups

Civic groups take part in public policymaking and have discussions with the government on various issues. In doing so, civic groups enhance transparency in the policymaking process and encourage the public to participate in devising policies. Civic groups also invite experts to make suggestions to governments based on their in-depth knowledge and expertise. They also

draw up sound measures through monitoring, research, information sharing, and other activities and recommend them to the government.

Policy Council of Private Environmental Groups

The Policy Council of Private Environmental Groups is a consultative body between the government and private environmental groups that promotes sharing of opinions and helps develop proper policies and measures for environmental issues. In March, 1994, the Council was established with 23 environmental groups including the Korean Federation for Environmental Movement. As of March 2001, the council has held 28 meetings to discuss its concerns and devise countermeasures.

The government will continue to encourage public participation in developing environmental policies and to strengthen cooperation with the environmental groups through joint research on environmental issues.

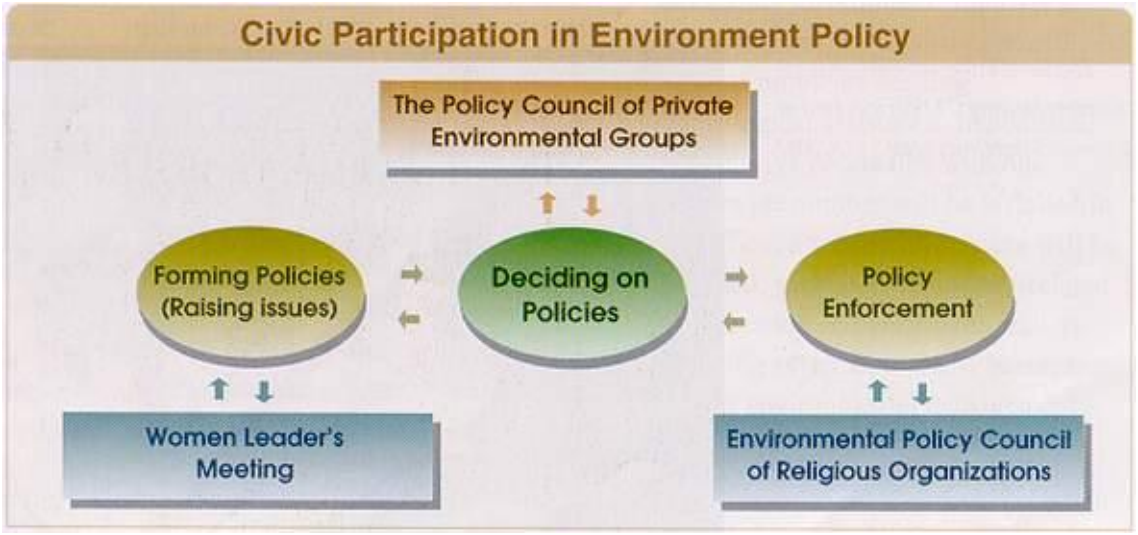
Participation in Policy Enforcement

Civic Groups

Civic groups help execute policy by monitoring implementation. They can create a favorable environment for the government to implement necessary environmental policies by establishing visions and mobilizing public support. Civic groups make significant contributions to raising public awareness of civic responsibility, encouraging green consumer behavior, and promoting environmental ethics.

Environmental Policy Council of Religious Organizations

In January 2001, the Environmental Policy Council of Religious Organizations was established to discuss environmental issues and seek solutions. Seven religious groups including Christians and Buddhists are members of the council. The council is expected to lead to tangible results in environmental protection in everyday life.



International Environmental Cooperation

Korea-China-Japan Environment Ministers Meeting(TEMM)

The 3rd TEMM in Tokyo

The Third Tripartite Environment Ministers Meeting (TEMM) was held in Tokyo from April 7 to 8, 2001, hosted by Minister KAWAGUCHI Yoriko of Ministry of the Environment of Japan, attended by Minister KIM Myung Ja of the Ministry of Environment of the Republic of Korea and Minister XIE Zhenhua of the State Environmental Protection Administration of the People? Republic of China.

The Ministers exchanged views on various issues covering regional and global environment, including formulation and implementation of the TEMM projects, environmental projects to be reported to the Trilateral Leaders Summit this year and various issues of common concern, such as climate change and ecological conservation in Northwest China, and released the Joint Communique.

The Ministers reviewed the activities of the first cycle of TEMM and noted with appreciation that TEMM has contributed to facilitating mutual understanding and to promoting environmental cooperation among the three countries.

Especially, the Ministers expressed a great concern about the degradation of natural conditions in Northwest China and affirmed their recognition to formulate and implement projects to address this concern as one of the TEMM projects, which are expected to contribute to the ecological conservation in this area and in all Asian region, following a step by step approach.

The Ministers also shared the recognition that the three countries should promote cooperation for systematic studies on sand dust (yellow sand or kosa), which is exacerbated by soil degradation in order to find out better ways to solve this problem.

Responding to the request by the Trilateral Meeting of Leaders to relevant Ministers to report on environmental projects to the next Trilateral Meeting, the Ministers decided that they would report the initial achievements of the TEMM projects, and that they would further develop projects, for promoting various exchange programmers on environmental awareness, for building networks of environmental industry and business and for ecological conservation in Northwest China, and report the results to the Meeting.

The founding of the TEMM was a turning point for environmental cooperation in Northeast Asia, being the only venue for the region's environmental ministers to come together to coordinate efforts through action plans and discussions, and to outline a long-term vision for regional environmental sustainability.

Korea, China, and Japan have high hopes for the future of TEMM as an invaluable mechanism to advance and enhance coordinated efforts to protect the region's shared resources, and to provide a model of regional cooperation that produces concrete outcomes.

The official website can be viewed at www.temm.org.

Cooperation with Southeast Asian Nations

Based on its experiences with the founding of TEMM and other environmental partnership efforts in Northeast Asia, from 2000, Korea has been expanding its scope of cooperation to ASEAN nations.

First of all, with the support of 2.5 million USD from the Korea-ASEAN special cooperation fund, Korea is in charge of the Research Project to Restore the Damaged Forest Ecosystem in

the Southeastern Tropical Region, from 2000 to 2005. Ten ASEAN member countries, including the Philippines, Vietnam, and Indonesia, will take part in this project.
In August 2000, the 1st Korea-Vietnam Environment Ministers Meeting was held. This was the first such meeting with an ASEAN country, and the resulting environmental cooperation pact specified the principles of bilateral environmental cooperation and identified key areas for cooperation and major activities. The meeting was the first between Korea? and Vietnam? environment ministers; it proceeded on the basis of the first Korea-Vietnam Meeting of Senior Officials on Environmental Cooperation, held in Seoul in May, and came in the wake of the 1998 Korea-ASEAN Summit. At that summit, the environment was cited as a priority cooperation area. The ministers meeting was also marked by an invitation from the Vietnamese Minister of Science, Technology, and Environment.
In the 1st Environment Ministers Meeting, the two nations exchanged ideas on major environmental policies and discussed key areas of cooperation and implementation methods. The ministers concurred on the selection of an agency in charge of cooperation on environmental technology and industry, the support of technology training and benchmarking in the private sector, and the exchange of information needed for companies to international business. Other projects, such as the designing of an eco-city to help solve urban environmental problems, the joint inspection and restoration project for ecosystem preservation, the environment management knowledge transfer project, and the support for the environment training program and capacity building, are to be worked out in working-level meetings. It was also decided that a regular Korea-Vietnam Environmental Cooperation Meeting be held every other year and that preparatory working-level meetings be held in between. In addition to the ministerial meeting, the Korea-Vietnam Environmental Industry and Technology Cooperation Seminar was held to discuss concrete cooperation activities in the field of environmental industry and technology and to showcase Koreas environmental technology.
Through the Korea-Vietnam Environmental Ministers Meeting and the conclusion of the Korea-Vietnam Environmental Cooperation Agreement, the basis for more practical cooperation with the ASEAN nations has been formed. Korea plans to expand the scope of exchanges and cooperation with Malaysia and other ASEAN nations.

Climate Change and the Kyoto Protocol

The Problem Faced

Extreme weather events such as floods, typhoons, and droughts are occurring with greater frequency in all parts of the world. These phenomena are often attributed to the excessive use of greenhouse gases (GHGs) such as carbon dioxide and methane, which exacerbate the greenhouse effect. According to the 1995 report of the Intergovernmental Panel on Climate Change (IPCC), the Earth's average temperature is expected to rise between 0.8-3.5 degrees celsius and the ocean level, by 15-95 cm if the current level of emissions persist. As for Korea, the Meteorological Research Institute confirmed that the average temperature of the Korean peninsula has risen 1.1 degrees celsius over the past 75 years. In 2060, temperatures are projected to increase as much as two degrees from the current level.

UNFCCC and the Kyoto Protocol

The international response to climate change took shape with the development of the United Nations Framework Convention on Climate Change (UNFCCC) in June, 1992. Korea joined the convention on Dec. 14, 1993, as a non-Annex I country, and has participated actively ever since.

Starting with the first Conference of the Parties (COP1) in Berlin in March 1995, eight open-ended ad-hoc meetings were carried out until 1997, when the landmark Kyoto Protocol was agreed upon at COP3 in Kyoto, Japan. Under the protocol, 38 countries-the vast majority of industrialized countries - together made up the so-called Annex I parties, and agreed to cut their emissions by an average of 5.2 percent below 1990 levels, with each country's individual targets ranging from8 to +10 percent.
Korea signed the protocol on Sept. 25, 1998. During the COP6 held in The Hague in November 2000, Environment Minister Kim Myung-ja expressed her willingness to constructively participate in international community's efforts to ratify the Kyoto Protocol in 2002, which was also affirmed by international leaders during the UN Millennium Summit last September, 2000.

Korea's Present Situation

The government plans to participate in global efforts to reduce greenhouse gas emissions according to Korea's social and economic conditions, in line with the principle of "common but differentiated responsibilities as stated in the protocol.
In this view, during COP5 in Bonn, 1999, Korea pointed out the importance of exploring new modalities that can help developing countries curb emissions without compromising economic growth. By conveying wishes to participate in GHG emission cuts through voluntary and non-binding reductions, Korea expressed to the international community a strong desire to tackle global warming.
Korea welcomes any open discussions on early voluntary action of developing countries after the resumed COP6 sessions are held this July in Bonn. To generate further discussions, Korea plans to host an international meeting on the issue in Seoul in 2001, with specialists from around the world.

Korea's Measures

To effectively deal with climate change, the Government Body on Measures for the UNFCCC was established in Korea in April, 1998. With the Prime Minister serving as the committee head, related ministries and professionals from academia and industry implemented the Comprehensive National Action Plan in December, 1998.
The plan was supplemented in February 2000 and now includes the following activities to combat climate change:

 The government is actively concluding voluntary environmental agreements with major Korean companies and expanding certification of companies that practice green management.

 Voluntary pacts to emissions are being concluded between energy-intensive companies and the government. Products found to be surpassing minimum levels of energy efficiency are banned from production and use.

 To curb the alarming level of GHGs discharged from vehicles, the government is introducing vehicles with high fuel efficiency, and is promoting the use of renewable energy sources. Compressed natural gas (CNG) buses are already starting to replace diesel versions nationwide. A total of 5,000 CNG buses will have been introduced in World Cup host cities in 2002, and 20,000 buses will be replaced by 2007.

 A 10-year technology development plan is being conducted to enhance energy efficiency, promote the development of new and renewable energy sources, and facilitate the collection and reuse of various GHGs.

 More than 225 civic organizations are working together in conducting national energy conservation campaigns and engaging efforts to reduce greenhouse gases at the grass-roots level.

To more actively address global environment issues such as climate change, the Presidential Commission on Sustainable Development (PCSD) was launched on Sept. 6, 2000, and will help advise the President on measures to support international activities to combat global warming.
Additionally, the Korean National Assembly established in December 2000 a special committee on climate change to collaborate with administrative agencies, NGOs, and industry. The committee drafts legislation, if necessary, reviews government policy, coordinates opinions from throughout society, and establishes linkages with national assemblies, congresses, and parliaments abroad.

Strengthening NEAC and NEASPEC

Since 1992, many channels of cooperation opened in Northeast Asia, such as the Northeast Asian Conference on Environmental Cooperation (NEAC) and the Meeting of Senior Officials on Environmental Cooperation in Northeast Asia (NEASPEC), to look for ways to tackle environmental problems in the region.

NEAC, Environmental Symposium
The NEAC is an expanded and developed form of the Korea-Japan Environmental Science Symposium held from 1988 to 1991. The meeting is a symposium-type gathering where environmental officials from Korea, China, Japan, Mongolia, and Russia come together to discuss environmental conditions, policies and other environmental issues in the region.
The 1st NEAC was hosted by Japan; since then, Korea, China, Japan, and Mongolia took turns hosting the annual conference. Korea hosted the 2nd NEAC in Seoul, the 4th NEAC in Pusan, and the 7th in Cheju.
The 9th NEAC was held in Ulan Bator, Mongolia, where discussions were held concerning water contamination and ecosystem preservation, protection of forests, and

the establishment of a network of experts. The participants also exchanged ideas about the achievements and evaluation of regional environmental cooperation efforts and future cooperation prospects. The members agreed that the NEAC should be developed into an open policy forum where a range of environmental issues can be debated among not only central government officials but also other interested stakeholders, such as local governments and NGOs.
In addition, it was decided that the 10th NEAC will be held in Incheon, Korea, in October 2001.
The NEAC has been an influential force in heightening mutual understanding and offering opportunities for regional environmental cooperation by introducing the policies of member nations and exchanging ideas concerning such regional issues as preservation of biodiversity, acid rain, ocean contamination, toxic chemicals, green technology and production, and other issues. Based upon the conference, a number of developments in environmental cooperation were possible, including the conclusion of an environmental pact between Japan, China,

Mongolia, and other nations in Northeast Asia, implementation of joint cooperation projects, and the TEMM.

NEASPEC, Meetings of Senior Officials

NEASPEC, which includes the Republic of Korea, China, Japan, Mongolia, Russia, and North Korea, was first hosted in Seoul in February,
1993. Since then, six meetings were held with the last one being held in Seoul in March, 2000.
This meeting was instituted at the 5th Annual Meeting of the Korea-ESCAP Cooperation Fund, held in July, 1992. There, the participants agreed to hold the environmental cooperation meeting for Northeast Asia under the auspices of ESCAP. Thus ESCAP also serves as the interim secretariat for the Senior Official's Meeting.
At the 6th meeting, hosted in Seoul in March, 2000, several agenda items were on the table, including the institutional and financial framework for sub-regional environmental programs, evaluation of projects, contributing factors for the 4th Asian-Pacific Ministerial Meeting on Environment and Development, and other policies and issues concerning the environment and sustainable development in Northeast Asia. At the same meeting, the participants also adopted a vision statement that set the future direction for environmental cooperation efforts.

Northeast Asian Center for Environmental Data and Training

The members decided on the name's northeast Asian Center for Environmental Data and Training for a regional data center that would be established at Korea? National Institute of Environmental Research at the 4th meeting. The purposes of the Center are to monitor and analyze the movement of air pollutants in the region, and to nurture the environmental capacity of each country in the region. It was agreed that the official activities of the Center will be supported by the Asian Development Bank.
The purpose of NEASPEC Subregional center is to contribute to environmental protection and recovery in the Northeast Asian subregion through coordination for exchange of information on environmental monitoring and data comparability. It was ageed to be located in National Institute of Environmental Research, Republic of Korea under the relation with the project?, "environmental Monitoring, Data Collection".
Subregional center will have it's own homepage and it's own e-mail system from this year. All NFPs of participating countries can join this tele-communication system.

- http://www.nier.go.kr
- http://www.neaspec.go.kr

Water Quality Preservation Measures in the Four Major Rivers

Establishing Water Quality Preservation Management Areas

In accordance with the Water Quality Preservation Law, watershed regions are classified into 4 large and 11 medium areas, as an effort to improve management.
The Han River area includes the Han River itself, the east coast watershed (the Gangwon area), and the west coast watershed (Anseong River and others in the Gyeonggi area). The Nakdong River area encompasses the Nakdong River basin, the east coast watershed (southern and northern Gyeongsang areas) and the south coast watershed (Busan and southern Gyeongsang areas). The Geum River, the west coast watershed (northern Chungcheong area), Mangyeong River and Dongjin River watersheds comprise the Geum River area. The Yeongsan River area consists of the Yeongsan River itself, Seomjin River, and watersheds in the west and south coasts.

Major Water Quality Preservation Measures

Water quality preservation measures for each watershed were established in 1991, followed by detailed management measures. Together, these are codified in the 1992 Comprehensive Measures to Supply Clean Water.

The first watershed measure was completed in 1997, and the second measure is now in the planning stage. The Special Comprehensive Measures for Water Quality at the Supply Source in Paldang Lake and Other Areas in the Han River Watershed was set up on November 20, 1998. The Comprehensive Measures for the Nakdong River Watershed was established on December 30, 1999. Similar measures were put in place for the Geum River and the Yeongsan River watersheds on October 24, 2000. In 1993, the Comprehensive Measures to Supply Clean Water was altered to manage water quality, water resources, water supply, and other water management matters in a unified manner. This is a 5-year plan with a total project budget of 15.9 trillion won.

Investment and Comprehensive Measures to Supply Clean Water						
Category		Overall Plan		Investment Mode(1993-1997)		Notes
		Projects	Project Cost (in hundred million won)	Investment Amount (in hundred million won)	Investment Rate	
Total		-	159,788	172,013	108.0%	
Improvement of Water Source Quality	Subtotal	-	78,158	80,127	102.0%	
	Sewage Treatment Plants	295 units	50,539	49,159	97.3%	Ministry of Environment
	Human Waste Treatment Plants	86 units	1,876	1,736	92.5%	``
	Livestock Waste Water Treatment Plant	84 units	3,504	2,268	64.7%	``
	Industrial Waste Water Treatment Plants	142 units	3,510	2,729	79.2%	``

	Cleanup of Streams	82 streams	1,891	1,825	96.5%	``
	Sewage Maintenance	7,500 km	15,000	19,511	130.0%	``
	Geumho River Measure	53 km	10,864	1,905	103.0%	Ministry of Construction and Transportation

Category		Overall Plan		Investment Mode('93-'97)		Notes
		Projects	Project Cost (in hundred million won)	Investment Amount (in hundred million won)	Investment Rate	
Improvement of Waster Supply System	Subtotal	-	81,603	91,886	113%	
	Muti-Purpose Dam	8 dams	14,620	13,125	89.8%	Ministry of Construction and Transportaion
	Broad Area Water Supply System	21 systems	19,047	18,592	97.6%	``
	Advanced Water Purification	18 systems	3,493	3,237	92.7%	Ministry of Environment
	Local Water Supply System	26,762 km	44,443	56,932	128%	``

The Comprehensive Measures to Supply Clean Water was followed up by the Comprehensive Measures for Water Management in 1996. This is a long-term water management plan, which includes a 10-year water quality improvement plan and a 15-year water resources plan. The measures aim to upgrade the water quality of all water supply sources to above grade two, expand the usable water reserve rate up to 9%, and raise the percentage of the water supply system up to 65%. To improve the water quality with these measures, 26.9 trillion won will be invested by 2005 in the expansion of sewage treatment plants and other basic environmental facilities.

Improvement Goals for Key Indicators of the Comprehensive Measures for Water Management			
Category	1996	2005	Notes
Sewage Treatment Percentage	50	80	Treatment Percentage by population
Livestock Waste Water Treatment Percentage	42	74	Public Treatment Percentage
Percentage of Industrial Waste Water Treatment	73	90	Percentage of end-of-pipe treatment form industrial waste water

Investment in Basic Environmental Facilities by Watershed

Up until 1998, approximately 10 trillion won was invested in accordance with the 1993 Comprehensive Measures to Supply Clean Water and the1996 Comprehensive Measures for Water Management.

Investments Made in Basic Environmental Infrastructure (1993-1998) (in hundred million won; 1,000 tons/day)							
Category		Total	Han River	Nakdong River	Geum River	Yeongsan River	Other Watersheds
Total	Investment Amount	101,813	26,125	23,646	7,819	4,544	39,679
	Number of Facilites	426	102	90	55	22	157
	Capacity	17,351.5	8,116.1	3,250.4	1,111.0	706.4	4,167.6
Sewage Treatment Plants	Investment Amount	61,648	15,333	16,700	4,005	2,887	22,773
	Number of Facilities	114	45	20	10	5	34
	Capacity	16,617.6	8,097.0	2,913.6	995.0	7000.0	3,909.0
Sewage Maintenance	Investment Amount	31,785	9,499	5,283	2,045	1,369	13,589
	Length(km)	21,668.0	4,808.7	2,918.4	1,179.9	2,056.3	10,704.7
Human Waste Treatment Plants	Investment Amount	2,442	459	356	382	93	1,152
	Number of Facilities	183	45	32	20	8	78
	Capacity	28,4	10,6	3.6	1.5	1.0	11.7
Industrial Waste Water Treatment Plants	Investment Amount	3,823	197	978	1,035	27	1,586
	Number of Facilities	119	7	36	24	9	43
	Capacity	702,5	6,6	329.9	114.2	5.4	246.4
Public Livestorck Waste Water Treatment Plants	Investment Amount	2,115	637	329	352	168	629
	Number of Facilities	10	5	2	1	0	2
	Capacity	3,0	1,9	0.3	0.3	0.0	0.5
Clean-up of Polluted Rivers	Investment Amount	2,283	459	587	226	120	891
	Number of Facilities	90	13	15	22	9	31
Note: The number of facilities and capacity are those of the facilities completed as of the end of 1998.							

In 1999, 2.4 trillion won was invested in 314 environmental infrastructure construction projects to help preserve water quality of the four major rivers. Among those projects, 32 basic environmental facilities were completed with the capacity to treat 1.6 million tons per day. The largest investment was made in the Nakdong River area among the four major river areas due to the implementation of the Nakdong River Water Quality Early Improvement Measures.
12.8 trillion won has been invested through the various measures since 1993. Four hundred sixty-nine basic environmental facilities have been built and are now in operation.

Investments Made in Basic Environmental Infrastructure (1999)

(in hundred million won; 1,000 tons/day)

Category		Total	Han River	Nakdong River	Geum River	Yeongsan River	Other Watersheds
Total	Investment Amount	24,488	4,879	6,409	1,640	1,245	10,316
	Number of Facilites	36	16	8	4	2	6
	Capacity	1,582.75	862.51	363.40	166.14	11.00	181.11
Sewage Treatment Plants	Investment Amount	13,228	2,490	4,404	441	524	5,369
	Number of Facilities	21	10	7	2	1	1
	Capacity	1,578.6	861.0	362.0	165.0	11.0	180.0
Sewage Maintenance	Investment Amount	9,150	1,933	1,660	574	649	4,334
	Length(km)	4,121	693	806	263	323	2,035
Human Waste Treatment Plants	Investment Amount	440	87	9	168	3	173
	Number of Facilities	7	3	0	2	0	2
	Capacity	1.21	1.00	0	0	0	0
Industrial Waste Water Treatment Plants	Investment Amount	665	123	128	280	0	134
	Number of Facilities	1	0	1	0	0	0
	Capacity	1.84	0	1.84	0	0	0
Public Livestorck Waste Water Treatment Plants	Investment Amount	550	173	54	119	34	179
	Number of Facilities	7	3	0	0	1	3
	Capacity	1.10	0.65	0	0	0	0.40
Clean-up of Polluted Rivers	Investment Amount	455	73	153	58	35	136
	Number of Facilities	23	4	7	5	1	6

Note: The number of facilities and capacity are based on those of the completed facilities as of the end of 1999.

Operational Status of Basic Environmental Facilities by Watershed
(as of the end of 1999, 1,000 tons/day)

Category		Total	Han River	Nakdong River	Geum River	Yeongsan River	Other Watersheds
Total	Number of Facilities	469	108	95	61	31	174
	Capacity	18,446.8	8,262.7	3,433.8	1,082.1	749.4	4,888.9
Sewage Treatment	Number of Facilities	150	48	25	16	13	48

Plants	Capacity	17,712	8,243	3,100	996	743	4,630
Human Waste Treatment Plants	Number of Facilities	183	45	32	20	8	78
	Capacity	28.4	10.6	3.6	1.5	1.0	11.7
Industrial Waste Water Treatment Plants	Number of Facilities	119	7	36	24	9	43
	Capacity	702.5	6.6	329.9	114.3	5.4	246.4
Public Livestorck Waste Water Treatment Plants	Number of Facilities	17	8	2	1	1	5
	Capacity	3.9	2.5	0.3	0.3	-	0.8

Water Supply Management

Background

The average annual precipitation in Korea (1,274mm) is 1.3 times that of the world (974mm). Because of high population density, however, average precipitation per capita of 2,755m3 is only 12.5% of the world average of 22,096m3 . As such, Korea is quite short on water resources. As for the usable water resources, per capita usable water in Korea is merely 1,470m3. In 1993, the Population Action Institute (PAI) of the United Nations classified Korea as a water-stressed nation along with South Africa and Libya. The Ministry of Construction and Transportation also projects that at this rate Korea will face annual water shortage of 400 million tons starting from 2006 and 2 billion tons from 2011.

Despite such grave outlooks, the amount of supplied water per person in Korea stands at 395 liters per day (as of 1998), much greater than that of advanced nations, and the waste of water resources has reached a critical mark. As shown in the case of the Dong River dam in Yongwol, dam constructions in general are experiencing difficulties because of increased cost, insufficient number of sites for dam development, and strong opposition from local residents, all of which could lead to more serious water shortage.

The government therefore decided to switch its water resource management policy from the previous supply-oriented approach to demand-management. Comprehensive water conservation measures such as the installation of water-saving devices and intermediate water supply, introduction of a water-saving pricing system, replacement of old pipes, and other water conservation methods are being promoted. In this way, it is expected that 790 million tons, or 13.5% of the entire water production (5.8 billion tons by 1998 standards), can be saved by 2006. When these water-saving goals are met, it is estimated that a roughly 400 billion won savings in water production cost and some 80 billion won reduction in sewage treatment costs can be realized.

Key Elements

Setting Basic Objectives for National Water Conservation

The government will drive 15 policy tasks as part of the comprehensive water conservation measures. When the objectives are met, it will bring greater benefits than building two dams the size of Seomjin River dam, which by itself has the capacity to supply 350 million tons of water annually. The project scale and conservation goals by policy task are listed in the chart below.

In order to achieve these goals, the government will compare and evaluate every month the year-on-year results of water-saving efforts, such as water production of each water supplier, water usage by industry, and per capita water usage for everyday use. Based on the results, monitoring of local agencies will be strengthened and those local bodies that are falling short of the goals will be provided with consulting services, such as encouragement and on-site confirmation of water demand management efforts by experts from the Korea Water Resources Corporation, the Environment Management Corporation, the Water Service Association, and academia.

Water Conservation Goals by Policy Task			
Category		Scale of Projects	Conservation Goals (1,000tons/year)
Total		-	790,000
Installation of Water-saving Devices	Subtotal	-	290,000
	Residences	11,63 million households	250,000
	Businesses and Others	11,500 businesses	40,000
Improvement of Water Pricing System		Due for improvement by 2001	200,000
Replacement of Old Water Pipes		27,000 km	240,000
Installation of Water Reuse System		300 units	30,000
Reuse of Water by Industries		Conserving 10% of industrial water	30,000

Introduction of Demand Management Goal System by Water Suppliers and Public Institutions

The government will take institutional measures which will allow public institutions to lead the water-conservation efforts so all residents can become more aware of the need to save water. The Water Service Law will be amended this year to allow mayors and governors to set up five-year comprehensive plans on demand management; these will include water demand management goals, reduction of yearly leakage, and water-saving device distribution goals. These plans will be carried out with approval from the Minister of Environment.
Mayors, county heads, and district heads will be in charge of detailed action plans. In addition, central administrative offices, autonomous local government offices, local public institutions, educational organizations, government invested institutions, and other public organizations will be at the forefront of a move to cut 15% in water usage (1999 standard) by following Water Conservation Guidelines for Public Organizations.

Installation of Water-Saving Devices in All Homes and Businesses

To prevent waste, new buildings have been required to install water-saving toilets since March 1998, and water-conserving faucets and shower heads from January, 2000. For existing buildings, which are exempt from this obligation, water-saving devices are installed free of charge as a part of public labor services. Up until 2004, 76.7 billion won will be invested in the installation of water-conservation devices in 11.63 million Korean households.
Businesses with high water usage, such as hotels, public baths, and golf courses, will have to install water-saving toilets, water taps, and shower heads, in compliance with this year's revision of the Water Service Law. Environmental grades or certification will be given to high-performance water-saving devices to encourage their adoption.

Yearly Investment Plan (in ten thousand households, hundred million won)						
Category		Total	1999	2000	2001	2002-2004
Total	Number of Households	1,163	55	242	223	643
	Budget	767	25	153	148	441
Water-Saving Devices for Toilets	Number of Households	470	39	128	85	218
	Budget	282	17	74	51	140
Water-Saving Devices for Water Foucets	Number of Households	693	16	114	138	425
	Budget	485	8	79	97	301

A New Water Pricing System

Water prices in Korea are set at a very low level, representing only 70% of the production cost. Such a minimal water charge rate encourages waste, impedes the spread of water-saving devices, and exacerbates the fiscal difficulties of local governments by worsening the debt of water suppliers.

Moreover, it delays improvements of old pipes and deteriorated facilities, which results in inefficiencies and poor water service. Therefore, the government will reinforce the progressive rate system so that people who use more water will have to pay more. In addition, a seasonal pricing system will be introduced which will impose additional charges during the summer months when water usage is at its peak. The water-saving pricing system will be strengthened and a water rate calculation model will be developed which will include all costs related to water supply at the time of cost calculation for water production.

Water services will either be privatized or consigned to private businesses so that water suppliers will voluntarily pursue water conservation, downsizing, and reasonable water rates.

Increased Installation of Intermediate Water Facilities

Since 1991, the government recommended that large buildings install intermediate water facilities for more efficient water use. However, the cost of installation and operation was too high, inhibiting full implementation of the policy. The government is thus planning to mandate all new buildings that exceed average water usage to install intermediate water facilities after the Water Service Law is amended.

Simultaneously with the obligation to install water reuse systems, a variety of economic incentives are being introduced (i.e., installation financing, tax benefits, and discount on water rates) to businesses to encourage adoption of water reuse systems.

Mandated Buildings (Amendments to the Water Service Law, as of Nov. 2000)	
Category	Scale Specification
Large hotels and department stores	Building area of more than 60,000 m^2 (400-500 rooms)

Factories	Waste water discharge rate of more than 1,500 tons a day (all type 1 Businesses, some type ^{2} businesses)
Other buildings	Buidling area of more than 60,000 m^2 to 70,000 m^2

Incentives to Businesses with Water Reuse Systems		
Category	Current	Improved Plan
Tax Deduction on Installation Cost	5%	Maintain current rate
Installation financing	None	2 billion won per unit
Water Rate Discount	10-65%	50-70%
Discount on Sewage Producer Surcharge	None	50% of faculty capacity
Environment Improvement Discount	None	25% discount

Replacement of Deteriorated Water Pipes and Improving Water Provision

Due to inefficiencies in water pipe networks and management, the water leakage rate as of 1998 reached a national average of 18.1%, much higher than that of advanced nations. In 1998 alone, about 1 billion tons of water was lost, causing approximately 500 billion won in financial losses. Additionally, inappropriate water meters that fall short of measurement standards or that have an incorrect diameter have failed to detect 540 million tons of water usage in 1998, resulting in about 270 billion won in losses for water suppliers.

Thus the government initiated the inspection of old water pipes and has begun to replace those pipes with high leakage rates and low financial burden. Over 3.1 trillion won (50% of the total project cost will be covered by special financing) is set to be invested in replacing almost 36,000 kilometers of old water pipes from 2000 to 2011, and improving the leakage rate to 12% by 2011.

For better prevention and detection of water leakage, the block system will be introduced. This system divides the drainage area into blocks, each of which includes a local meter system. Meanwhile, the map of the underground water pipe network will be updated and an electronic management system will be implemented. Pressurizing pumps and pressure valves will be installed to maintain proper water pressure and tonnage, taking a more scientific approach to installation and management of water pipes and steadily reducing leakage. Up until now, users paid for the leakage but from now on water providers will pay a certain portion of the cost, which will encourage the providers to take part in leakage reduction and reduce the burden on users.

All water meters in Korea are scheduled for inspection and unfit meters will be either repaired or replaced gradually, so that the percentage of inaccurate meters will be reduced to the 3% level of advanced nations by 2010.

Yearly Investment Plan				
Category	Total	1997-1999	2000	2001-2011

Project Cost (in hundred million won)	38,319	6,866	2,374	29,079
Old pipes (km)	42,757	6,942	2,585	33,230
Number of Water Collection and Purification Facility	2,124	368	74	1,681

Sewage and Wastewater Reuse

Sewage and wastewater are reliable sources of water in times of shortage for it is discharged at a constant rate. Therefore the government will intensify the obligation and incentives to reuse treated water, thereby inducing more widespread reuse of sewage and wastewater. If just 5% of the sewage treatment water is reused, about 320 million tons of usable water could be supplied to the entire nation, surpassing the comparable water supply of one large-scale dam.
With the amendment of the Sewage Service Act, new sewage treatment plants will be required to reuse treated water. In case of violation, the plants will be ordered by the Minister of Environment to observe the law. If the plant fails to follow the mandate, forceful means such as the discontinuation of subsidy on local grants-in-aid will be imposed. Moreover, local grants-in-aid on sewage treatment water reuse plants, including highly-advanced treatment facilities, discharge pipes, pipes for treated water, and buffer tanks, will be subsidized to ease the burden placed on local government agencies to establish the reuse system for sewage water.
To urge the reuse of wastewater, the government will amend the enforcement ordinance of the Water Quality Preservation Law, which will encourage businesses to reuse wastewater by exempting the basic fee from the discharge dues. As for the businesses of certain scale, discharge dues will be levied progressively based on the amount of discharge, convincing the businesses to voluntarily cut down on the amount of wastewater produced.

Utilization of Rainwater and Subway Pumping Wells

Bracing against water scarcity, the government plans to secure clean water without going through difficult processes or high costs by reusing rainwater and subway pumping wells. Stadiums with over 5,000 seats, baseball parks, and gymnasiums are appropriate for rainwater reuse because the facilities are not used very often and have large surface areas for collecting rainwater. The Water Service Law will be amended this year to obligate these facilities to install rainwater reuse equipment. At present, rain water reuse facilities in six World Cup stadiums (Seoul, Incheon, Daejeon, Suwon, Jeonju, Seogwipo) out of 10 are already under construction.
In addition, exclusive pipes for the reuse of subway pumping wells will be laid in consultation with the subway management agencies in Seoul, Busan, Daegu, and Incheon. Water collected in the subway stations will be reused for cleaning the stations, flushing the toilets, and maintaining the water level of small streams around subway stations.

Water Conservation and Supply Measures for Habitual Drought Areas

In 1999, the water supply rate rested at a mere 25% for rural and fishing villages and 15% for islands. These regions experience severe water scarcity and limited water supply even during very short droughts. As such, the government will invest 315 billion won through 2003 to complete ahead of schedule the 24 projects currently underway in the habitual drought areas.

Furthermore, habitual drought areas will receive priority in budget subsidies when implementing water demand management projects, such as installation of water-saving devices and replacement of old water pipes.

Status of Water Supply Projects in Drought Areas				
Category	Total	Completed in 2000	Completion in 2001	2002-2003
Total	24	9	9	6
Water Supply System in Rural and Fishing Villages	11	4	5	2
Water Supply System in Small and Medium Cities	6	1	2	3
Development of Drinking Water Sources on Islands	7	4	2	1

Introduction of the Water Conservation Investment Specialty Agency System

The government has encouraged the installation of water-saving devices and intermediate water supply facilities and bolstered the water demand management policy in order to prevent waste and enhance efficiency. However, most builders still lack fluent knowledge in the installation of water-conservation facilities, which obstructs their widespread adoption. Thus the government plans to introduce the specialty agency system that sets up water-saving facilities for builders. With this system, the agency will pre-pay for the cost involved in the installation and operation of water-saving devices, water reuse systems, and other systems, and then recover the investment and operation costs from the profit generated from using the water-saving facilities.

In support of this system, the government plans to provide installation fee financing and other financial incentives to building and business owners as well as the professional installation agencies.

Once this system takes root, it will enable builders and business owners to install water-saving facilities without the initial investment cost and allow professional agencies to secure installation fees at low long-term interest rates. The system is expected to receive a positive response. When water service rates become more reasonable, the system will be expanded to include small buildings and businesses since the economic efficiency of the system will again be enhanced. Moreover, technological development can gain momentum because the agencies will try to come up with more efficient water-saving devices to recoup their investment earlier.

Promotion of Water-Saving Technology Development

Development of water-saving technology rests at a minimal level since there is no incentive to save water when water service rate is so low. From now on, measures such as more frequent meter checks, establishment of water quality standards by intermediate water supply type, and mandated installation of water-saving devices and water reuse systems are expected to increase

the demand for water conservation capacity. Outstanding water-saving products will receive environmental marks and public organizations will set an example by procuring these products as soon as possible, spurring the development of water-saving technology.

Development of a Water-Saving Education Program

Like other environmental issues, water conservation is directly linked to the concern and ethics of people across society. It is necessary to instill in people a lifelong commitment to save water by providing continuous education and publicity programs on conservation. Topics of water shortage and its causes as well as water-saving activities should be included in school textbooks, and discussions about how to overcome the water crisis should be encouraged in classrooms. The development and widespread adoption of such programs will prompt schools to take part in the water-saving movement. Furthermore, with cooperation from local environment offices, the National Water Resources Corporation, and other related organizations, regional water tours can be developed, and regional celebrities, civic groups, teachers, and students can be invited to join the tour. Meanwhile, social education programs will be further expanded to encourage the participation of about one million citizens in the on-site environmental education program.

At the same time, a public relations campaign will be waged steadily in the media, on billboards and posters, and through public campaign brochures. Special means of publicity, such as K-TV, policy newsletters, national defense newspapers, and specialty papers, will be mobilized to publicize the issue to soldiers and other members of special social groups. A variety of educational and publicity materials will be offered to producers and writers of television and radio programs so that water-saving ideas can be incorporated into popular programs. In 2000, a special report produced in conjunction with KBS titled "Water War 2000" was aired during the nine o'clock news every Wednesday for 50 weeks. Exemplary cases of water conservation will be actively sought after and aired, stimulating the entire society to save water.

Operation of a Water-Saving Campaign Web Site

Joining the era of the internet, the government eschewed conventional ways of simply listing a number of facts and started a sophisticated water conservation website (www.water21.me.go.kr), intensifying the publicity efforts targeted at Korea's many internet users. As of June 30, 2000, approximately 80,000 users have already visited the site and responded very positively.

Evaluation of Water Management and Provision of Incentives by Local Governments

Ever since local government autonomy was expanded, local communities have placed priority on investing usable financial resources in ostentatious projects, such as construction of sports stadiums or community centers. Consequently, a number of local governments did not pay enough attention to critical environment improvement projects such as replacing old water and sewage pipes, or the operation of waste water management systems, which stalled the smooth execution of the central government's plan for better water management and cleaner water supply. There was a gap between policies and actual implementation, increasing people's distrust of water management policy. Therefore, the administration of water management policy by the local government agencies will go through annual evaluation, with the results announced in the media. Organizations with outstanding records will receive incentives and rewards, such as preferential support for water and sewage project costs and so on, ultimately

inducing local governments to efficiently administer the environmental policies of the central government. Evaluations will be conducted on 20 items in four areas of water management, including management of water demand, management of water and sewage operation, water quality improvement, and regulation of businesses that discharge waste water. The evaluation committee is comprised of members from both private and public groups to secure fairness and objectivity. The 1999 evaluation results were announced on June 8, 2000.

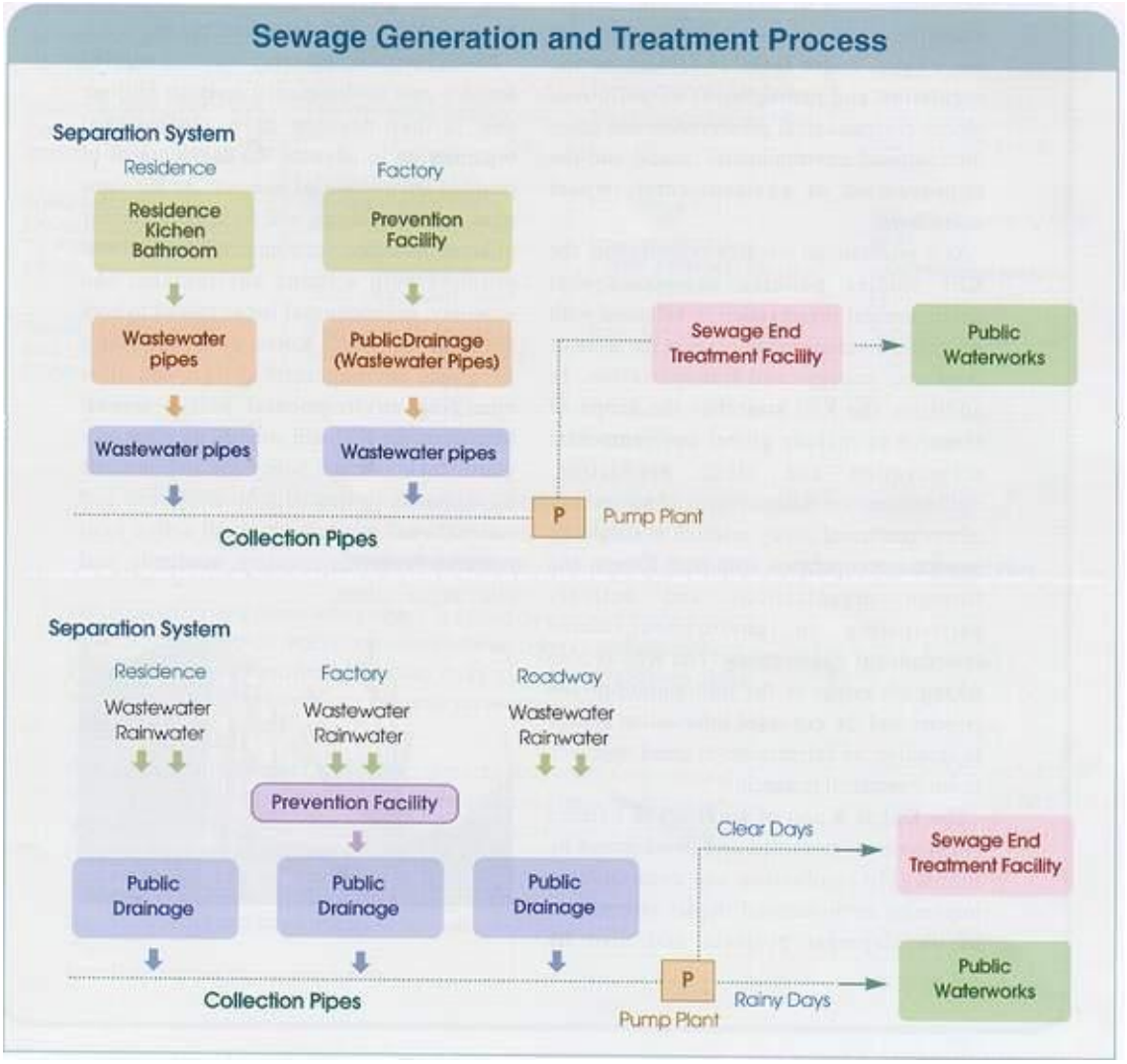
Launching a Nationwide Water Conservation Campaign

Since water conservation is directly linked to the changes in people's behavior, government policy alone is limited in its effect. Private environmental and religious groups, professional organizations, schools, and both central and local governments must get involved in establishing the nationwide water conservation campaign headquarters and educating the public to alter their lifestyles. On February 16, 2000, fifty-two organizations, including private environmental and religious groups, professional organizations, and an association of businesses with high water usage, formed the nationwide water conservation campaign headquarters and started to produce and distribute publication booklets and posters on water conservation. In addition, the headquarters held a contest for "Prince Bang-ul (water drop)" from the Water Country, a children's cartoon with a water conservation theme, and ran conservation campaign ads in newspapers. Other activities include operating of a water conservation web site, forming an inquiry commission for water management policy, holding seminars, and conferring environmental marks to outstanding water-saving devices.
The government will add momentum to the nationwide campaign by actively developing and implementing joint projects that can be driven by both public and private organizations and also by intensifying a water-saving publicity campaign for housewives.

Sewage Management

Generation and Treatment of Sewage

The existing sewage treatment system places emphasis on effectively draining rainwater, preventing floods and improving public sanitation and the ambient environment so as to protect public health. However, sewage end treatment has now become an important policy means to maintain water quality in public waterworks. The sewage generated from the source flows through either separated or integrated drainage pipes and is released into public waterworks after being treated in sewage end treatment facilities. The process is shown in the following diagram.



Current Status of Sewage Facilities

Sewage End Treatment Facilities

As of the end of 1999, there were 150 sewage end treatment facilities in Korea with a capacity of almost 18 million tons, and a sewage service supply rate of approximately 68%. In 2000, an investment of 1.3 trillion won was made to complete 23 sites (16 new and 7 expanded sites), together capable of treating about 1 million cubed meters per day. Moreover, construction and expansion of sewage end treatment facilities are planned with an aim to raise the sewage service supply rate up to 80%.

Sewage End Treatment Facilities Construction Plan				
Category	Total	Up until 1999	2000	2001-2005
Number of Treatment Facilities	350	150	23	177
Facility Capacity (in thousand m^3/day)	30,420	17,712	1,017	11,691

Construction of Sewage End Treatment Facilties						
Category	1976	1986	1996	1997	1998	1999
Number of Cities with Treatment Facilities	1	10	58	65	76	99
Number of Treatment Facilities	1	10	79	93	114	150
Sewage Service Supply rate(%)	4	18	53	61	66	68.4
Capacity (in thousand m^3/day)	150	973	11,452	15,038	16,616	17,712

The sewage treatment plants in operation mostly employ activated sludge methods to purify drainage water, followed by extended aeration and rotating biological context.
Separately from urban areas, sewage treatment projects are being carried out in townships and villages in rural areas, using a special rural tax for a ten year period from 1995 to 2004 in order to improve the ambient environment in rural areas and prevent water source pollution. The Ministry of Agriculture and Forestry is building village drainage systems as part of a cultural village project under the Agricultural and Fishing Village Maintenance Law. The Ministry of Government and Home Affairs is also putting in place village sewage systems as part of an ambient environment improvement project for rural areas. Thirty-eight district-level sewage projects were overseen by the MOE but 17 projects have been changed into general grant-in-aid projects as the special rural tax was slashed

Sewage Project Plans in Agricultural and Fishing Areas				
Category	Sewage Maintenance Project by Township (MOE)	Village Sewage System		Notes
		Ministry of Government and Home Affairs	Ministry of Agriculture and Forestry	
Name of Projects	Sewage Maintenance Project by Township	Residential Environment Improvement Project for Rural Areas	Ministry of Agriculture and Forestry	Township-level project underwent a change in plan due to a reduction in the special rural tax
Budget	Special Rural Tax	Special Rural Tax	Permanant Living Area Development Project in Rural Areas (Cultural Village Project)	
Project Plan	Duration: 1995-2004 Number of Projects: 20 Project Cost: 141 billion won	1995-2004 2,500 projects 500 billion won	1991-2004 772 projects 310 billion won	The number and cost of projects are included in the projects by the Ministry of Government and Home Affairs

Project Status of Township-Level Sewage System

Category		1995	1996	1997	1998	1999
Number of Projects		13	27 (the previous 27 included)	38 (the previous 27 included)	38 (continued)	16 (continued)
Cost of Projects (millions on)	Total	21,429	19,571	17,857	13,857	11,857
	Grants-in-aid	15,000	13,700	12,500	9,700	8,301
	Local Expense	6,429	5,871	5,357	4,157	3,558

Sewage Pipes

Sewage pipes were planned to span over 103,000 kilometers and almost 65,000 kilometers, or 62.7%, have already been laid as of the end of 1999. The status of sewage pipe installation by city shows that Seoul has the highest installation rate of 100% with almost 10,000 kilometers. Daegu has a rate of 95.6%, a relatively high coverage compared to other cities, and Chungnam has the lowest figure with 39.2%.

Status of Sewage Pipes Installation by City and Province
(in kilometers, as of the end of 1999)

City & Province	Plan				Village Sewage System				Coverage Rate(%)
	Total	Combination System	Separation System		Total	Combination System	Separation System		
			Rain Water Pipes	Waste Water Pipes			Rain Water Pipes	Waste Water Pipes	
Total	103,280	39,252	32,279	31,749	64,741	41,437	11,004	12,300	62.7
Seou	9,889	8,609	786	494	9,889	8,609	86	494	100.0
Busan	8,249	0	2,965	5,284	5,259	4,638	265	356	63.8
Daegu	4,084	3,052	319	713	3,904	2,935	287	682	95.6
Incheon	5,361	2,358	1,472	1,531	2,861	2,024	380	457	53.4
Gwangju	4,392	1,443	1,462	1,487	3,196	1,483	824	889	72.8
Daejeon	2,560	1,434	526	600	2,124	1,353	359	412	83.0
Ulsan	3,351	617	1,525	1,389	2,306	466	811	1,029	65.3
Gyeonggi	17,719	6,267	7,024	4,428	10,428	4,903	2,797	2,728	58.9
Gangwon	5,338	1,597	1,877	1,864	2,916	2,263	274	379	54.6
Chungbuk	3,627	2,100	944	583	2,571	1,779	397	395	70.9
Chungnam	5,529	1,387	2,083	2,059	2,170	1,532	349	289	39.2
Jeonbuk	7,026	1,740	2,838	2,448	3,289	2,044	652	593	46.8
Jeonnam	5,826	2,901	1,442	1,483	2,831	1,582	523	726	48.6
Gyeongbuk	7,632	3,344	2,113	2,175	4,169	2,647	707	815	54.6
Gyeongnam	8,831	946	3,804	4,081	4,941	1,734	1,353	1,854	56.0
Jeju	3,686	1,457	1,099	1,130	1,887	1,445	240	202	51.2

Improvement of Administration

The sewage works had been handled by two ministries, the Ministry of Construction and Transportation and the MOE, but have been consolidated under the MOE since May, 1994.
In order to remedy some of the shortcomings shown during the implementation of policies, t three rounds of amendments were made on the Sewage Service Act and ordinances, implementation rules, and standard sewage use regulations.

Sewage Management Measures

Maintenance of Sewage Facility Standards

Most sewage facilities in Korea will be in place when the sewage coverage rate reaches 80% in 2005. The sewage installation projects for the next 10 years will provide permanent facilities for generations, so badly-designed plans and haphazard construction can become big stumbling blocks to national development. Thus, based on the Urban Sewage Pipes Maintenance Techniques Research and Facilities Standard Maintenance executed up until 1997, there was a revision of sewage facility standards, which includes advanced sewage installation techniques as well as automation and information-oriented approaches for operation and management.

Expansion and Maintenance of Sewage Facilities

The government announced the changed sewage facility construction project plan for the period 1996-2005, announced in the Environmental Vision 21 policy guidelines in January, 1996. The project goal is to reach the sewage coverage rate of 80% by 2005, thereby increasing the water quality standard fulfillment rate of 195 rivers up to 95%.
To achieve that goal, Comprehensive Measures for Water Management was instituted in August of 1996, which procured 24 trillion won for the 1996-2005 budget to successfully carry out the Environmental Vision 21? project plan. An annual average of 400 billion won in project cost for the maintenance of sewage pipes will be subsidized by the government, adding new momentum to the sewage pipe maintenance project.
The new sewage treatment plants will include nitrogen and phosphorus treatment capability to prevent eutrophication. The existing end treatment plants will undergo improvements on treatment equipment in parallel with the implementation of sewage improvement projects in upstream areas before being expanded to the entire nation. De-nitrogenation and de-phosphorization processes will be introduced to 180 end treatment plants by 2005.
To secure water for urban rivers and to remedy inefficiencies in the sewage collection process, the sewage treatment system will be located near locations where sewage is generated.

Plans to Strengthen Water Quality Standards of Effluents From Sewage treatment plnts						
Category	Current Standards			Reinforced Standards (2002-2004)*		
	BOD	Nitrogen	Phosphorus	BOD	Nitrogen	Phosphorus
Special Areas	20mg/L	60mg/L	8mg/L	10mg/L	20mg/L	2mg/L
Other Areas				20mg/L	60mg/L	8mg/L

Revised Calculation of Sewage Generation and Reuse of Treated Water

The basis for the calculation of sewage generation, per capita daily water supply, is higher than that of other nations, leading to excessive investment in the construction of sewage treatment plants. Therefore the calculation is now done on the basis of actual usage rather than the amount of supplied water, which will reduce the size of sewage facilities, such as sewage treatment plants and pipes, and increase return on investment.
In addition, the treated water from sewage treatment plants will be reused not only in the plant itself but also in the surrounding residential and industrial areas for everyday use and industrial purposes. By the year 2005, more than 5% of the treated water will be reused.

Development and Distribution of Sewage Technology

The Pilot Project for Advanced Sewage Technology is in progress as a means to quickly diffuse economical and efficient sewage facilities. The Ministry of Environment, Environmental Management Corporation, and local governments have signed a Pilot Project Agreement and selected 13 businesses for the pilot project. These businesses were again divided according to their location and conditions. The project has been in progress since 1996. A variety of pilot projects with different project characteristics will provide real help in optimizing the future facilities. Key features of the pilot projects include highly-advanced treatment processes, automation processes, and resident-friendly facilities. The facilities are again divided by location and condition into those that are resident-friendly, those for technological development, and those for rural areas.

Construction and Management of Sewage Pipes and Strengthened Inspection

Sewage pipe projects have been plagued by problems from unreliable construction, which is extremely difficult to correct, and these problems not only bring budgetary waste but also aggravate traffic congestion. Several preventive measures are sought, like the real-name sewage pipe system and the automated management of underground pipes. The real-name sewage pipe system has everyone connected to the construction of sewer pipes documented in the sewer pipe books and, in case of accidents, the construction staff can be contacted immediately. This system enhances emergency response capability and those responsible for accidents can be called to bear responsibility, thus strengthening the construction management efforts.

Comparison of Water Consumption and National Income

Category	Korea	United Kingdom	Australia	Japan	Germany
Per Capita Daily Water Supply(i)	395	393	479	397	132
Per Capita Income (in US $)	9,500	17,700	20,700	34,700	27,518
Water Consumption Per $1,000 of Per Capita Income	41.6	22.2	23.1	11.4	4.8

Introduction of Drainage Inspection System

Builders report the drainage set up, but the inspection system to determine the appropriateness of drainage systems had been inadequate. By introducing the drainage inspection system with the amendment of the Sewage Service Law in February, 1999, problems such as damage to the public sewer system and leakage of sewage water can now be corrected.

Pilot Projects to Induce Private Capital and Consignment

For those areas that are in dire need of sewage treatment plants but lack local funds, the Ministry of Environment, local government agencies, and the Environment Management Corporation have signed a tripartite agreement to attract private capital to build sewage treatment plants.
The project allows areas with stalled projects due to insufficient budget to continue building sewage treatment plants by attracting private capital. Such pilot projects can complement and develop private capital inducement system for environmental infrastructure and also influence other areas in a positive way. Furthermore the projects will help evaluate and diffuse new technologies by establishing a new technology assessment body.
The pilot projects are being implemented in 15 businesses in 12 cities and counties, including Incheon and Yangju in Gyeonggi Province, and each business is devising basic plans for facility projects.
New sewage treatment plants will be consigned to private companies for management in order to enhance management know-how and apply advanced and appropriate technology from private companies, thereby improving the overall management system of sewage projects. The existing sewage end treatment projects are also encouraged to adopt the same approach. The local government agencies that drive the sewage project with the management know-how of private companies will receive preferential subsidies from the national coffer. The following table shows the figures of sewage treatment plants consigned to private companies.

Status of Pilot Prejects for Private Capital Attraction						
Number of Cities and Counties	Number of Projects	Facility Capacity (tons/day)	Project Cost (hundred million cost)			Amount of Attracted Private Capital
			Total	Central Government	Local Government	
12	15	174,000	3,150	2,206	944	1,630

Status of Private Companay Consignment of Sewage Treatment Plants (1999)		
Category	Number of Treatment Plants	Facility Capacity (thousand tons/day)
Sewage treatment plants under construction in operation	150	17,711
Sewage treatment plants consigned to private companies	31 (21%)	3,039 (17%)

Natrual Environment Survey

Overview

The survey on the natural environment forms the foundation of natural environment preservation policies. Since species preservation and habitat protection are carried out on the basis of this survey, it is one of the most fundamental and vital components of preservation efforts. The current survey can be classified into three types: the nationwide natural environment survey, the field-specific natural environment survey; and the survey of species.
The nationwide natural environment survey, which is the basic survey on the general natural environment, is based on Article 32 of the Natural Environment Conservation Act and is conducted every 10 years. The second nationwide survey (1997 - 2002) is now in progress.
The field-specific survey is a detailed examination of nature by its ecological characteristics and regions, and includes surveys on wetlands and uninhabited islands.
The survey of species entails investigating the current habitat status by species and tracking changes. This survey is yet to be conducted in Korea but is slated to begin in 2001.
The nationwide natural environment survey and the wetland and deserted islands survey are instituted in compliance with related acts, distinguishing them from other occasional surveys such as the survey for the designation of ecology preservation areas, the ecological survey of coastal areas, the forest fire survey, and others.

Nationwide Natural Environment Survey

Identifying the status of the natural environment is crucial for efficient management. The MOE is conducting a nationwide natural environment survey every decade in compliance with the Natural Environment Conservation Act.
The first nationwide natural environment survey was carried out between 1986 and 1990. The second nationwide survey began in 1997 and is scheduled to end in 2002.

In the first nationwide survey, botanical research into flora, current maps of vegetation, and greenery maps for each administrative district were done. Animals were divided into mammals, birds, amphibians, reptiles, and insects, upon which fauna research was conducted on each species by region. For some species, regional distribution status was examined. The physical conditions of 209 lakes and marshes were recorded as well. In the case of major rivers and streams, biological research was carried out on freshwater fish, water insects, benthos, and other water animals. A total of 2 billion won was invested, and over 1,200 people, including academics, specialists, and government employees, were involved in the first nationwide environmental survey.

The survey was significant in that it was the first investigation covering the entire nation but it was also criticized for its insufficiency due to a lack of budget and expert staff. The second nationwide survey began in 1997 and complements the shortcomings of the first survey.
Based on mountain ranges, land was divided into 6 major regions and 206 sub-regions. Coastal areas were classified into 6 major regions and 145 sub-regions. Each sub-region was further categorized into priority survey regions and general survey regions according to the absolute and relative values of the natural environment. Each sub-region has a separate survey plan, implemented on a yearly basis. The survey also actively utilizes local experts in an attempt to more accurately represent regional environmental conditions.
The survey was conducted on 88 out of the 206 land sub-regions from 1997 to 1999. As for the coastal regions, basic surveys on all coastal areas and surveys on 60 sub-regions were completed.

On land, surveys on twenty-four of the priority regions, including seven frontier regions and four general regions, were initiated in 2000. As for the coastal areas, 20 priority regions are being explored, such as Yeonpyeong and Baekryeong Islands and 10 general regions.
The MOE is in the process of building a nationwide natural environment database and making a national ecological map based on the results of the second nationwide environmental survey.

A Comparison of the First and Second Nationwide Natural Environment Surveys		
Category	The First Nationwide Survey	The Second Nationwide Survey
Survey Period	1986-1990 (5years)	1997-2002 (6years)
Survey Budget	2 billion won	14.6 billion won
Survey Method	By administrative district (country)	By topographical and ecological sphere
Survey Staff	240 people/yr (from central gov't)	400 people/yr (from local areas)
Sample	Did not obtain samples	obtained samples
Application of Results	Greenery map preparation	Ecological and natural map preparation Natural environment database setup

Yearly Survey Plan for the Second Nationwide Natural Environment Survey							
	Total	1997	1998	1999	2000	2001	2002
The Number of Surveyed Regions	206 land regions	29	30	29	28	36	54
	145 coastal regions	Basic survey on all coastal area done	30	30	30	29	26
Total	351	29	60	59	58	65	80

Survey Plan for the Second Nationwide Natural Environmental Survey (Year 2000)				
Category	Total (58)	Surveyed Regions		Notes
Land	Priority Survey Regions	Inje, Yanggu 9102)/ Hwacheon (4-1)/ Hwacheon (4-1)/ Hwacheon, Cheonwon (4-3)/ Yeoncheon, Pocheon (4-1)/ Yeoncheon (4-13)		Border Areas
		Gangneung, Jeongseon (1-19) Jeongseon, Yeongwol(1-28) Jecheon, Yecheon (2-07) Seongsan, Gimcheon (2-21) Geochang, Seongju(3-04) Hapcheon, Goryeong(3-5) Seoul, Seongnam (5-08) Cheongyang (6-8)	Boryeong, Buyeo (6-17) Daejeon, Nansan (7-01) Daejeon, Nansan (7-05) Jeongeup (8-02) Gwangju, Hwasun (8-10) Gangjin (8-32) Uiseong, Cheongsang (10-89) Uljin, Samcheok (10-2)	Outside Surveys

	General Survey Region	Mt. Ami (6-10)/ Mt.Seongju (6-16)/ Mt.Chuwol (8-03)/ Mt.Mohu (8-11)	Outside Surveys
Coastal Areas	Priority Survey Regions	Yeonpyung Is/ Boengnyeong Is./ Olyeon Is./ Gyeogryeolbiyeol Is./ Seonyu Is./ Bian Is./ Wi Is./ Mokpo/ Hwawon/ Gwanmae Is./ Wan Is./ Haenam/ Hanjin/ Ando/ Geumo Is./ Jaewon/ Gagyo/ Maryang/ Gaduk Is./ Dadaepo	Outside Surveys
	General Survey Region	Gyodong Is./Daebu Is. (Namri, Holgot)/ Daebu Is. (Malbuheum)/ Anmyeon Is./ Ocheon/ Bigeum Is./ Yeocheon/ Bogil Is./ Daepo/ Cheonjin	Ministry of Env. Ecological Survey Team

National Wetland Survey

The national wetland survey of inland marshes is conducted yearly in compliance with Article 4 of the Wetland Preservation Act, to establish basic plans for wetland preservation on the basis of the survey results.
The inland marshes of Korea are classified into six watersheds. On-site ecosystem and pollution surveys on some 340 marshes will be taken from 2000 to 2004 with a budget of 3.4 billion won.
The MOE plans to raise public awareness on marshes and manage national land more efficiently by proceeding with systematic wetland preservation measures and making maps of inland wetland environments based on the survey. The survey excludes coastal marshes and divides the inland marshes into core, priority, and general wetlands. For core and priority wetlands, detailed surveys in 13 areas will be executed and general wetlands will only be subjected to overviews.
The pilot survey by types of wetland is being done this year. In this pilot survey, one marsh is selected from each watershed and a person is selected to take charge of the on-site regional survey.
Surveys are conducted on geological topography and landscape, regional characteristics, hydraulics and hydrology, large marine plants, vegetation, bottom sediment, mammals, birds, fish, amphibians and reptiles, insects, large invertebrates, animal plankton, plant plankton, water quality, and pollen analysis.

Yearly Wetland Survey Plan		
Year	Regions	Core,Priority,General wetlands
2000(1st year)	Trial wetlands	High moors, river downstream, rivers/strems, back swamps, lagoons, artificial lakeshores (on each)
2001(2nd year)	Nakdong River Area	4 core, 13 priority, 73 general
2001(3rd year)	Han River Area	4 core, 16 priority, 64 general
2003(4th year)	Yeongsan River/ Seomjin River/ Geum River Area	5 core, 16 priority, 35 general
2004(5th year)	East Coast, Jeju Is.	6 core, 18 priority, 80 general

Specific Regions of Wetland Survey (Year 2000)		
Wetland Types	Surveyed Wetland	Areas
Estuary	Geum River estuary.	Geum River Area
River/Stream	Imjin River	Han River Area

Back Marsh	Wondong in the Nakdong River	Nakdong River Area
High Moor	Muljangori in Jeju Island	Jeju Island
Natural Lake/Lagoon	Hwajin Harbor	East Coast
Artificial Lake/Reservoir	Yeongam Lake	Yeongsan River/Seomjin River Area

Natural Environment Survey on Uninhabited Islands

Many of the 2,689 uninhabited islands in Korea serve important ecological functions, often providing treasure troves of wonderful vegetation and habitats for rare animals and plants like migratory birds. Nonetheless these ecosystems are under intense pressure due to indiscriminate hunting of rare animals and plant gathering, damage to vegetation brought on by goat grazing, and water contamination from fishermen and tourists. As a result, the first annual natural environment survey on deserted islands began in 1998 to systematically maintain those deserted islands blessed with beautiful natural landscape and rare flora and fauna by identifying them as especially designated islands.
Surveys involve plant life, animals, sea birds, marine invertebrates, and topological landscape. Islands with a pristine natural environment will be identified as “pecially designated islands” according to the Special Act on the Preservation of Dok-do and Other Island Ecosystems. For a starter, 48 islands including Dok-do were designated as special islands on September 5, 2000.

Yearly Natural Environment Survey Plan for Deserted Islands					
Year	'98	'99	2000	2001	2002
Surveyed Regions	Ganghwa County I Onjin Country Jindo Country I Namhae County I Tongyeong I Goheung County	Wando County I Wando County I Hadong County Haenam County Baryeong County	Taean County Seosan County Sinan County I&II Gunsan County Sacheon City Geoje City	Jeju Island Ganghwa County I Ongjin County I Sinan County III Sinan County IV Namhae County II Tongyeong City II	Busan Met. City Yeocheon City Yeonggwang County Jindo CountyII Masan City Jinhae City Gaseong County
Number of surveyed Islands	69	135	147	145	145

Survey of Ecosystem Damage by the East Coast Forest Fire

The forest fire that ravaged Korea’ east coast in 2000 left extensive economic and ecological scars in the area. Tangible property damage alone amounted to more than 100 billion won but the ecosystem also sustained far longer-lasting intangible losses. The large forest fire swept 23,448 hectares of land near such places as Gangneung, Goseong, Samcheok, Uljin, and Donghae.
The MOE conducted the first inspection on ecosystem damage in April 2000 and initiated a three-month detailed survey in conjunction with the Korea Forest Service and civic groups in June. Based on the findings from the detailed survey, the Ministry will set up and execute a mid- to long-term plan to help the ecosystem of the afflicted area recover quickly and soundly. Moreover, a long-term ecosystem survey was initiated in 2000 to develop plans to address the effects of possible future forest fires.

The Prior Environmental Review System

The Significance and History of the PERS

The Prior Environmental Review System (PERS) aims to balance development and preservation by identifying possible environmental impacts of development plans or projects in the early stages of planning. The system includes considerations of ways to carry out development plans while harmonizing the built and natural environments in an aesthetically pleasing manner.

Along with the Environmental Impact Assessment System, the PERS is one of Korea's most important preventive policies. Unlike the current PERS, the Environmental Impact Assessment System has been rather limited in its ability to promote or enforce environment-friendly development because it mostly deals with large-scale development projects during the execution stage, after plans have been approved and confirmed, and in any case mainly reviews pollution reduction measures. The recent introduction of the PERS should remedy this limitation.

Widespread reckless development brought about a host of problems including inefficient land-use, water pollution, and traffic congestion, which surfaced in the nineties as serious social issues. As a result, the need to evaluate potential environmental effects during the early planning stage of development projects continues to grow.

From early on, development plans with potential environmental impacts were discussed at the ministerial level according to a provision that required prior consultation with the Minister of Environment. Examples of such development plans include new land-use plans introduced under the National Territory Usage Management Act, rural development plans introduced under the Special Act on Rural Development, and plans affecting the use of sea resources introduced under the Act on Prevention of Ocean Pollution. However, economic growth brought a parallel increase in investments in such social infrastructure as roads and seaports, along with a steady rise in demand for leisure facilities like tourist spots and sports centers. In addition, the introduction of greater local autonomy resulted in the emergence of more aggressive regional development plans. Thus more proactive and systematic environmental previews on development plans and projects were being called for by a number of stakeholders.

The result was the January 1993 legislation of the Provision on the Environmental Validity Review of Administrative Plans and Projects, which was based on Article 11 of the Basic Environmental Policy Act. In June 1994, the provision was revised to streamline consultation procedures; since then, environmental previews have been carried out without the previously required legal consultation clause. Previews also began to address medium- and large-scale public development projects in environmentally sensitive areas.

Meanwhile, the PERS had a few remaining problems. Significantly, the system was confined to public projects; private development projects, the key cause of reckless development, were immune from any censure even if the projects were known to be inappropriate. The system was also somewhat limited as a preventive measure since those projects targeted for the Environmental Impact Assessment System were excluded from the PERS. Additionally, as mandated by provisions in other acts, the system also excluded administrative plans and development projects that were already under MOE review. Taken together, these problems created a loophole through which major plans or development projects could avoid the environmental validity review. In other words, although administrative plans such as national territory usage plans or tourism development plans were referred to the MOE for review or comment, there were no detailed provisions for the plans to undergo the PERS. Moreover, a number of administrative plans did not even have basic provisions in place for planning-stage discussions or review, ultimately inhibiting any type of thorough environmental review.

In order to resolve the shortcomings and limitations of the earlier PERS and the Environmental Impact Assessment System, the Basic Act on Environmental Policy was amended, leading to the adoption of the PERS as law. At the same time, the enforcement ordinance was amended to considerably expand the scope of administrative plans and development plans that fall under the system. The strengthened PERS also now specifies the documents required for preview, and sets the timeframe and procedures for reaching agreement, so that the PERS can fully function as a preventive decision-making mechanism.

Key Features of the PERS

Below are the major revisions made to the PERS on August 17, 2000, based on Article 11 of the Basic Act on Environmental Policy.

First, the heads of administrative agencies that establish, permit, or approve administrative plans or development projects are to consult with the Minister of Environment or the head of the local environmental agency on the matter of environmental validity review. The targeted plans and projects are now classified into two types, those that fall under the Basic Act on Environmental Policy and those under other related laws.

Second, forms required for the preview are specified and the submission of documents is now mandatory. The heads of governmental bodies that establish or approve administrative plans or that permit, approve, and authorize development projects must either fill out the forms themselves or receive them from project operators, and then submit the forms to the Minister of Environment or the head of the regional environmental office. Two types of forms are required: basic and individual. Basic forms must be submitted for all administrative plans and development projects due for environmental validity previews and must include items such as project purpose, current land usage, and present distribution of preservation areas. Individual forms cover specific ecological characteristics-the current level and types of pollutants, and environmental impact projection and reduction plans.
Among the administrative plans that must by law be previewed, those that can be defined as one of 29 designated plans requiring environmental sensitivity (i.e., national land-use plans or the development of national industrial complexes) must include the forms for the environmental preview as set forth by the Basic Act on Environmental Policy.

Third, the deliberating organization, specific deliberation period, and post management system are now in place. If the environmental preview applicant (the planner and decision-maker) or the party that permits, approves, or authorizes a project is the head of a central administrative body, the applicant should meet with the Minister of Environment. Otherwise, the deliberation should be held with the head of the regional environmental office. The minister or the regional head receiving the request for the preview must notify the applicant of the outcome of the conference within 30 days, with a single possible extension of 10 days.
When the conference outcome is not released within the deliberation period, the meeting is assumed to have taken place, so as to prevent project implementation delays.

The related administrative bodies that are notified of the meeting outcome should take necessary measures to apply decisions made regarding the administrative or development plans. The administrative bodies should also inform the minister and the regional head of the status of decision implementation. Additionally, the minister or the regional head can conduct on-site inspections to facilitate the implementation of decisions.

Ten Supplement Administrative Plans Subjected to the PERS			
Related Laws	Administrative Plans	Related Laws	Administrative Plans
Acts on Farming and Fishing Villages Special Act on Development of Jeju Island Special Act on Development Support for Areas with Closed Minies Private Investment Act on Social Overhead Capital	Designation of village improvement areas Inter-municipal facilities plan Designation of development zones in areas with closed mines Environmental perservation plan for areas with closed mines Basic plans for private investment facility project	Act related to the Location and Development of Industry Stream Improvement Act Hot Springs Act Law Related to the Construction and Usage of Sports Facilities Basic Act for Juveniles	Designation of agricultural and industrial complexes Comprehensive plan for the improvement of streams Hot springs development plan Sports facilities project plan Training area plan

Types and Sizes of Development Projects Subjected to the PERS	
Preservation Regions	Size Project Plan
Natural environment preservation region, restricted development region, ecological preservation region, natural reservation, animal sancturay, natural protection zone, wetland protection area, municipal water supply area (group residence construction), underground water preservation area	Over 5,000 m^2
Agriculture and forest areas, buffer area, natural environment zone, wetland surroundings maintenance area, wetland improvement area, municipal water supply area (development projects other than group residence construction project), small strea area	Over 7,500 m^2
Semi-agricultural and forest areas, public forests, river area	Over 10,000 m^2
Forest areas other than public forests	Over 50,000 m^2

The Performance of the PERS

Since April 1, 1993, the number of previews conducted as the result of prime ministerial decree has been on the rise, averaging 186 cases per year. It is projected that the figure will continue to increase as private development projects are now included in the environmental preview. As directed by law and regulations covered by individual acts, an additional annual average of 539 cases are being examined by the central government or regional environment offices.

Mumber of Environmental Preview Cases by Consulting Bodies									
Category	Total			Conferences under Individual Acts			Conferences under Prime Ministerial Decree		
	Total	Central Gov't	Local Office	Sub-total	Central Gov't	Local Office	Sub-total	Central Gov't	Local Office
Total	4,766	1,317	3,449	3,515	1,515	2,202	1,251	4	1,247
'94	480	200	280	353	353	154	127	1	126
'95	616	160	456	458	458	301	158	3	155
'96	894	182	712	715	715	533	179	-	179
'97	881	266	615	673	673	407	208	-	208
'98	724	208	516	535	535	327	189	-	189

'99	758	192	566	502	502	310	256	-	256
Sep. '00	413	109	304	279	279	170	134	-	134

Future Course of Operation for the PERS

The PERS will take on a more aggressive approach. The system can cancel or downsize plans when the environmental impact is deemed serious in terms of quality and quantity. It can also force the project operator to present countermeasures to minimize environmental impacts.
When the PERS is correctly implemented, the procedure or components of environmental impact assessment, which occurs when the project plans are approved, could be streamlined or even omitted in some cases, cutting down on time and cost. Moreover, opinions and conditions presented during the environmental preview will be reflected on the environmental impact assessment and their implementation checked, so that the two systems can operate and develop in a complementary way.
In addition, to prevent the PERS from being executed inconsistently due to the subjectivity of those in charge, the Manual for Environmental Preview provides a systematic and detailed list of key review items, review criteria, and methods.
To enhance the objectivity, fairness, and professionalism of the preview, a Special Committee on Environmental Preview and Environmental Impact Assessment was set up at the Ministry of Environment headquarters and regional environmental offices. The committee consists of 30 members, and has been in operation since September, 2000. The members are mostly specialists from academia and research institutes in the fields of environment, urban planning, civil engineering, architecture, and ecology as well as officers from environmental and civic groups.
If the reinforced PERS is implemented as intended, it is expected to contribute immensely toward preventing reckless development and enhancing the quality of life.

Preservation of Tidal Flats

Current Status of Tidal Flats

The Korean peninsula is surrounded on three sides by distinctively beautiful seas. The East Sea is famous for its brilliant deep blue tone. The southern coast presents magnificent scenery with scattered islets and crystal clear water. The Yellow Sea is acclaimed for its vast tidal flats, which are considered internationally important wetlands.
A heavily indented coastal line and semi-closed sea on the western coast generates a maximum tidal range of 9 meters. The low sea level and massive soil inflow from the Yellow River, the Han River, and the Geum River all work to create the world's fifth most important tidal flat. The vast tidal flats in Korea are world-renowned and people are struck by their beauty and richness.
The value of tidal flats go beyond beautiful scenery. They are the treasure troves of marine ecology. Not only are they temporary and permanent homes to many waterbirds but tidal flats are also breeding grounds as well as habitats for 60% of marine animals. The livelihood of many fishermen depends directly and indirectly on the tidal flats. The purification function of the tidal flats plays a major role in maintaining a healthy marine ecosystem. If we destroy the tidal flats it will lead to devastating degradation of the environment. There are many other notable benefits of tidal flats, such as the reduction of flood and typhoon damages, prevention of soil erosion, and the growing recreation and tourist industries.
The wetlands have been often regarded as wasteland with little or no value. Since the 1970s, industrial plants and farming lands were created through enormous reclamation projects.

Around 40% of the total tidal flats were destroyed and lost forever. The cause for reclamation and landfill is in a sense understandable but behind that thinking lies the notion that wetlands are of no use. Tidal flats are indeed a precious part of our land and to ignore that fact would be a serious mistake. Fortunately, public awareness of the importance of tidal flats is gradually growing. Many civic and environmental groups are working to preserve our wetlands. Such activities led to the enactment of the Wetlands Preservation Act in February, 1999. According to this act the Ministry of Marine Affairs and Fisheries (MOMAF) is exerting efforts to systematically preserve and manage tidal flats.

The Wetlands Preservation Act

The Wetlands Preservation Act was legislated to effectively preserve and manage tidal flats and pursue international cooperation in accordance with the Ramsar Convention. The major contents of the Act are listed below (The Act encompasses terrestrial wetlands as well as tidal flats but this report focuses on tidal flats only.).

First, the Minister of Maritime Affairs and Fisheries conducts a monitoring and research program every 5 years to better understand the status of tidal flats. Based on the results the Ministry will establish a basic plan to preserve the tidal flats.
Second, the MOMAF will designate tidal flats that have abundant biodiversity, provide temporary or permanent habitats for endangered wildlife species, or are worth preserving for environmental needs as Wetlands Preservation Areas. The surroundings of these areas will be set aside as Specially Managed Wetlands Surroundings Area. The MOMAF will set up a conservation plan to effectively manage the specific areas.
Third, it is illegal to license landfills, permit digging up construction materials like silt or sand, construct or extend buildings, arbitrarily alter water levels, or hunt and collect animals and plants. However, long-term local residents of tidal flats may continue to cultivate, collect, or catch animals and plants in the region.
Fourth, those who wish to conduct a reclamation project and/or engage in a project that may impair the tidal flat must receive permission from the Minister of Maritime Affairs and Fisheries.
Fifth, The government has the "obligation to save and preserve the tidal flats" by all means. Even in the case where damage is unavoidable, a substantial area of tidal flat must be preserved.

Objectives and Basic Principles of the Tidal Flat Policies

In February 2000, the MOMAF announced specific policy directions and plans to preserve Korea's tidal flats.
The ministry rendered policy objectives that include the management of a tidal flat inventory, preservation or wise use of tidal flats, development of programs to increase income for local residents, and the creation of closer and more reachable tidal flats. To create healthier and richer tidal flats, it is imperative to pursue concrete preservation programs and set up policies for the appropriate utilization of tidal flats. To make tidal flats more accessible to the general public, eco-tourist plans should be designed that do not degenerate the precious ecosystem of tidal flats. To realize the envisioned future concept of tidal flats, the following three principles will be kept in mind.
First, the pristine state of tidal flats must be preserved. If they must be utilized for a certain purpose, it must be done so in a sustainable manner so that tidal flats can be handed down to future generations.

Second, cooperation and participation of local residents is a must in implementing tidal flat policies. The government will listen to the voices of local residents and promote active participation of local communities. Environmental education programs and the development of profitable eco-friendly projects are essential for facilitating a participatory atmosphere.
Third, tidal flats should be managed in a dual system where strict preservation areas and utilization areas are managed in different ways. The tidal flats are highly productive areas where many fishing activities take place so it would not be wise to limit access to all areas. Rather, policies will identify preservation areas that will come under strict supervision and other areas that can be utilized with restrictions.

Key Features of the Wetlands Preservation Plan

According to the Wetlands Preservation Act, the MOMAF will conduct a basic monitoring and research project, establish tidal flat preservation plans, designate and manage wetlands preservation areas, support education programs and cultural events, and develop programs to increase income for tidal flat communities. The 5-year-long basic monitoring and research project will start this year. The project will look into the area size, biotic and physical aspects, biodiversity, pollution level, utilization status, socio-economic status of local communities, and the attributes of tidal flats. With the given information the MOMAF will draw an ecological map of the tidal flats. Then the ministry will assemble a database to create a comprehensive blueprint for effective preservation plans.
Based on the collected information, the MOMAF will establish a basic plan to preserve the tidal flats. The plan will be comprised of policy directions, geographical distribution of wetlands, current biodiversity, coordination with other national projects, and public awareness programs. The MOMAF is currently identifying priority wetland preservation areas in close consultation with local residents.
The Ministry will then establish a detailed preservation plan to set up tidal flat preservation facilities, to develop and support income-increasing projects for local residents, and to specify sustainable use. Some wetlands will be registered on the Ramsar List for more thorough and extensive conservation and management.
The MOMAF will develop environment education programs to facilitate eco-tourism industry in tidal flat regions. In addition, the Ministry will actively support cultural programs that heighten regional pride in wetlands. First of all, educational programs will be designed to target local residents, students, and the general public. In addition, special guides will be trained to teach about the environment to students at eco-camps and eco-schools. The central government will support various cultural events carried out by local governments, including traditional tidal flat fishing events, sports events, food festivals, fitness centers, and mud spas. Meanwhile the local residents must take the initiative to develop and promote local tourism products that give tourists a chance to have hands-on experience of marine environments and the lifestyle of fishing communities. By building pleasant recreation spots and relaxing getaways at these regions, the public awareness of tidal flats will rise, ultimately leading to enhanced quality of life for all.

The Tidal Flats are...

The tidal flats are an invaluable natural resource with various cultural, environmental, and economic values and functions. Nonetheless, for the past few decades, tidal flats have been disappearing from our ecosystem under the pretext of development. Due to excessive reclamation and landfills to create industrial or agricultural land, we failed to fully appreciate the precious value of tidal flats.However, the enactment of the Wetlands Preservation Act was a

turning point, which opened the way for effective preservation and management of tidal flats. The public and private sector must work together to conserve our valuable wetlands. However, efforts on the part of the central government are not enough. Without the support and cooperation of local residents and the general public it would be difficult to achieve the envisioned future for our tidal flats. Voluntary efforts to stop the irreversible damage to our tidal flats are desperately needed to endow the remaining tidal flats to future generations. We must breathe new life into these important areas. Just imagine the peaceful stillness where waterfowls fly high in the sky, crabs and earthworms slowly crawl in the mud and fish swim peacefully in the waters. Tidal flats are full of life, a place where human beings and nature become one.

Air Quality Preservation

Compressed Natural Gas (CNG) Buses

As the number of registered motorized vehicles in Korea reached 12 million, Seoul and other large cities with high concentrations of car ownership became the main culprits of urban air pollution.

In particular, gasoline-powered vehicles which lack advanced emission reduction technology are more responsible for air pollution than other types of vehicles are, accounting for 52% of the total vehicular emission. However, large diesel-powered vehicles like buses and trucks, which only represent 4% of all registered vehicles, generate more than 40% of the total vehicular pollution. This realization called for an immediate response.

The government is therefore facilitating the replacement of diesel intracity bus fleets with compressed natural gas (CNG) buses with the expectation that urban air quality can be improved in the short term, and the 2002 World Cup games can be held in a cleaner ambient environment.

CNG buses do not emit any fumes and produce much less particulate matter and emissions such as nitrogen oxides, which will help reduce ground-level ozone formation. Moreover, the CNG buses are quieter and more comfortable, earning praise as one of the best means to improve urban environments.

The domestic development of CNG buses began in 1991 and ended in 1997 with the joint effort of industry, academia, and research institutes. Four CNG buses have been operating on a trial basis in Incheon and Ansan since July 1998 and have received positive responses from customers.

To promote the replacement of diesel buses with the CNG versions, the government is providing financial support in the forms of bus purchase subsidies (22.5 million won per bus), financing of refueling equipment (700 million won per unit), tax cuts on value-added tax and acquisition tax, and an environment-friendly oil pricing system designed to favor CNG over the conventional alternatives. In addition, city planning codes and other regulations were adjusted to facilitate the building of needed infrastructure such as the CNG refueling stations.

The CNG buses went into full operation this year with 15 buses running in the Seoul metropolitan area since June, 2000, and 11 buses in the Daegu area since December the same year. As of the new year, a total of 58 buses are in operation nationwide (43 buses in Seoul, two in Incheon, two in Kyeonggi province, and 11 in Daegu) and some 5,000 buses are expected to be in service in 2002 when construction of 100 refueling stations is completed.

Reducing Ground-level Ozone in Korea

The ground-level ozone formation rate and the number of ozone warnings issued have steadily climbed in Korea. Twenty-four warnings were issued in 1997 whereas 52 were made in 2000. The number of areas where warnings have been issued has also increased, denoting that ground-level ozone formation is escalating all across the nation.
One of the factors that caused such an increase is the steadily increasing income levels enjoyed since 1990, which resulted in an increased number of cars (3.4 million cars in 1990 to 11.2 million cars in 1999). Another factor is increased emission of such substances as nitrogen oxides and VOC from ever-expanding industrial sites. The topography of many of Korea's large urban areas (basins and hills) exacerbates the problem, by preventing pollutants from dispersing due to low wind speed.
However, factors that cause ozone formation, such as the emission source and amount of pollutants as well as topographical and climatic conditions, differ by city; studies into emission sources and inspection of pollutants are still in their infancy, discouraging a systematic implementation of ozone countermeasures.
Therefore the basic thrust of future policy will be an all-out implementa-tion of viable short-term solutions to reduce ground-level ozone. Special emphasis will be placed on reducing the amount of precursor emissions during the peak summer months when ozone formation is at its worst. Low-pressure gasoline will be sold from May to August, and free emission testing and exhaust control will be strengthened. Furthermore, public awareness campaigns will be launched to encourage people to voluntarily leave their car once every ten days and do their refueling and laundry during at night.

In addition, mid- to long-term measures will be taken to cut ozone pollution at the source. The establishment of a comprehensive information system for air quality management, which will record the emission source of such pollutants as VOC and nitrogen oxides, is scheduled from 2000 to 2005. Moreover, a photochemical assessment monitoring system will be expanded gradually (consisting of 4 networks in the metropolitan area in 2000 and a total of 41 networks by 2005). As mentioned previously, approximately 20,000 diesel-powered intracity buses will be replaced with CNG buses between 2000 (1,100 CNG buses) and 2007. Starting in 2002, automobile emission level and gasoline quality criteria are to be strengthened, and reinforced emission standards will be applied to nitrogen oxides and other pollutants from 2005.

Additionally, major VOC emission facilities will be required to build emission control and prevention systems. Six industries, including paint and car manufacturing, must meet such requirements by 2000, followed by gas stations and shipping facilities by 2004. The air quality regulatory zones (Seoul, Incheon, and Kyeonggi were designated in 1997; Busan, Daegu, and Gwangyang Bay in 1999), which may experience more severe ozone pollution in the future, will be watched more closely. Meanwhile, research and investigation into the ozone generation process in major urban areas will be conducted.

Ozone Warning Incidents						
Category	1995 (Warning System insituted)	1996	1997	1998	1999	2000
Number of Warmings Issued (number of days)	2 (1day)	11 (6 days)	24 (12 days)	38 (14 days)	41 (16 days)	52 (17 days)
Number of Areas Affected	1	2	6	9	10	12
Nationwide Ozone	0.017 ppm	0.018 ppm	0.019 ppm	0.020 ppm	0.021 ppm	0.021 ppm

Rate						
Note: 1st stage ozone warnings are issued when hourly ozone concentration rises above 0.12 ppm. (2nd stage- above 0.3 ppm; 3rd stage- above 0.5ppm)						

Extended Producer Responsibility System (EPRS)

Under the Producer Deposit System of 1992, producers of home appliances, tires, lubricants, batteries, paper goods, and metal cans paid a certain deposit to the government, and received refunds proportional to the deposit when they recycled their products and product waste. This system, however, was limited in promoting recycling because it did not place enough recycling responsibility directly on the producers.

To further encourage recycling, the government will implement the Extended Producer Responsibility System (EPRS) starting January 1, 2003, which will impose waste recycling obligations on producers or importers of high waste-generating products and packaging materials.

The government sets the amount of waste that must be recycled by each producer of goods and packaging materials, taking into account the collection of recyclable resources and other recycling conditions, and the producers must reach their recycling target.

According to the system, producers must recycle home appliances like televisions, refrigerators, and washing machines, tires, lubricants, fluorescent lights, and packaging materials such as cans, glass bottles, and plastic bottles. The list of recyclable materials will be further expanded.

The volume-based waste system is in place in Korea and most residents separate recyclable goods from garbage. Local governments also encourage separation of recyclable waste and are encouraged to set up waste storage containers and facilities.

If Korean producers could make the design and packaging of goods a bit more environment-friendly throughout the product lifecycle, recycling can take stronger root in Korean society as a whole, making the EPRS that much more meaningful.

Quality Certification for Recycled Goods (The GR Mark System)

This system involves government certification of high-quality recycled goods produced by private companies. With the Good Recycled Mark System, private businesses can enhance the quality of recycled products, thereby minimizing consumer distrust and increasing the demand for recycled goods.

In May 1997, the Ministry of Commerce, Industry and Energy implemented the Quality Certification System for High-Quality Recycled Goods. As of April 2000, 166 items in 16 categories, including paper and plastic, were selected as targets for certification.The certification mark represents the repetition and cycle of GR with the balanced beauty of harmony and continuity. The circular shape that links the beginning and the end expresses the human hand and a leafy tree. The green color symbolizes nature and blue is the color of earth, which means that the responsibility for leaving a living and breathing world to our children lies in our hands. In addition, resource recycling can be viewed as a yardstick for measuring the value of human integrity and community life as well as the key to improving quality of life.

There are many reasons for certifying outstanding recycled products. It eases consumer mistrust these goods and prompts them to favor recycled items. The certification also establishes quality requirements and standards, which serve as the basis for quality standardization and government procurement. Furthermore, the certification system reinforces the industrial base for small recycling companies and reduces oil imports.

Number of GR Marks Given by Year			
Year	Certification Evaluation		
	Certified	Unsatisfactory (Incl. returned goods)	Total
1997	7	11	18
1998	28	25	53
1999	48	48	96
2000	32	21	53
Total	115	105	220

Number of GR Marks by Category		
Category	Number of items	Number of products certified
Paper	10	28
Plastic	11	34
Rubber	7	17
Ceramics	7	17
Glass	1	1
Lumber	3	8
Acide and Alkaline	1	1
Pertroleum Containers	1	1
Oil	2	4
Metal	4	4
Total	47	115

Soil Preservation

Loss of Soil in Slope Areas

The area of Korea is 10 million hectares, 12% of which are rice paddies, 7.5% upland fields, 64% forests, and 16% used for other purposes. The total area of farmland amounts to almost 2 million hectares, just under 20% of the nation's total land area.
More than half of the farmland consists of rice fields, serving many intangible value-added functions: prevention of soil erosion and landslides, flood control, conservation of water resources, reduction of greenhouse gases and air pollution, and aesthetic value. The vast majority of upland fields (693,000 out of 746,000 hectares) are distributed in slope areas with more than 2% incline. Moreover, two-thirds of the yearly precipitation of 1,200 mm is concentrated during the summer season, worsening the loss of soil and nutrients. The yearly average amount of soil loss in slope areas is 30 tons/ha and the amount of nutrient loss amounts to 84 kg/ha (N.P.K.), resulting in the loss of topsoil, drops in productivity, the burying of reservoirs, and insufficient flood control.

Current Activities

In 1961, the Agriculture Agency, the predecessor to the Agricultural Promotion Agency, published Soil Preservation and began to propagate the importance of soil preservation and disseminate preservation techniques to farmers. Since 1970, the Agricultural Promotion Agency

has conducted soil loss tests on upland fields by precipitation, soil type, incline, crop type, and soil management methods, working out measures to prevent soil loss in these sensitive areas.
Korea is currently in the process of developing OECD agriculture-environment indices, and soil preservation indices in particular, jointly with Japan. Through such activities, the multiple functions of rice paddies can be identified, such as prevention of soil erosion and conservation of water resources. In addition, there are two soil loss prevention methods, the agricultural method and the agri-engineering method.
In areas with gentle slope (less than 15% incline), such agricultural means as contour farming, straw mulching, subsoiling, and organic experiments can be used to preserve soil. However, in areas with steeper slopes of 15-20% incline, more aggressive methods are called for. Vegetation belts should be formed following the contour line and deep furrows should be dug along the contour line to allow for contour height as well as the hothouse cultivation of mulching material. Engineering methods are required in very steep areas with 20-30% incline. For instance, when irrigation channels are placed 20-25 meters apart, they work to prevent runoff from flowing down and supply water to the either side of the terrace channels. Then there are stone ridges, which supply water to the plot and allow soil to settle on top of the ridges, ultimately forming terraced fields. There are also terraced upland fields to ease the slope and inversely inclined tiered paddies. During the summer months, planting crops that can densely cover the surface soil would also prevent soil loss.
Between 1994 and 2004, the Ministry of Agriculture and Forestry is conducting an upland soil project using various methods on 110,000 hectares of land. Furthermore, the project recommends the conversion of highly-graded upland fields of greater than 30% slope to grazing land, pledging stable productivity without damage from soil loss.

Environmental Technology Policy

Development of Environmental Technology

The 21st century will bring many changes in environmental technology. Environmentally friendly technology that improves quality of life while keeping human values intact will continue to be developed so that humans and the natural environment can both thrive. In general, technology will be transformed from an emphasis on post-treatment processes to a greater emphasis on proactive processes that focus on prevention and elimination of pollution sources. Environmental technology is a general term for a range of techniques and products - some new, some long - established. It can encompass anything from a simple change in production processes to the development of sophisticated equipment.
In Korea, the importance of environmental technology is starting to receive greater emphasis, and is expected to move beyond post-treatment of air, water, and waste to pollution prevention. In the science and technology projection for 2000-2025 made by the Korea Institute of Science and Technology Evaluation and Planning between May 1998 and November 1999, environmental technology emerged as one of six major areas that will receive focused attention.
Korean environmental technology lags behind that of advanced nations by roughly 4-5 years due to its short history and lack of fundamental experience and access to basic technologies. However, some traditional post treatment technologies stand out. The first generation post treatment technologies such as dust collection, advanced waste water treatment, and small-scale incineration, are in the demonstration stage, and are evaluated to be up to 60-80% of the level of the advanced nations. Nonetheless, the level of overall environmental technology remains at 30-60% of that of developed countries. In any case, cutting-edge technologies of the future, such as second-generation clean production technology, bioengineering and aerospace technologies, are still in their infancy and dependent on imported technology. Core post

treatment and pollution prevention technologies are especially under-developed. Even private companies resort to application or simple adoption of imported technology and become expert only in its operation rather than developing source and factor technologies independently. The direction of environmental technology development in Korea has been focused on the development of basic environmental facilities like wastewater treatment, in contrast to advanced nations which strategically develop next-generation cutting-edge technologies that address such areas as cleaner production, renewable energy, and environmental restoration.
Such vanguard technologies are projected to lead the industry in coming years for their high added value, vast marketability, and efficiency. However, clean technologies and other forefront environmental technologies are in their nascency in Korea. Therefore, unless Korea makes a serious effort to develop its technology, subordination to advanced technology will only speed up. The technological delay in environmental technology is 1 to 2 years shorter than that of other fields, which are generally 5 to 6 years. Environmental technology possesses immense potential for growth, which justifies strategic investment from the state.

Environmental Technology Research and Development Project (G7 Project)

The MOE has undertaken a three-stage public-private technology development partnership project from 1992 to 2001 for the development of environmental engineering technologies in air, water quality, waste, clean production, and environmental health in general. The Ministry injected a sum of 363 billion won into this project to help raise the level of Korea's environmental technology up to that of G-7 nations. In the first stage, the fundamental expertise needed for eventual commercialization was secured, and in the second stage, the core technologies needed for commercialization were developed. The basic objective for the third stage is actual commercialization.
Specific figures for the period between 1992 and 2000 show that 325 billion won was invested on 306 research and development tasks (163 billion won from the government and 162 billion won from businesses), out of which 199 tasks were completed.
From 1998, based on the accomplishments of the first and second stages, the project has been focusing on commercialization and practical usage. The number of applications and registrations of industrial ownership jumped to 810 instances and commercialization soared to 131 instances as of December 2000, in contrast to 348 cases of industrial ownership application and registration and 36 cases of commercialization up to 1997. If Korea is able to develop and utilize these technologies without any assistance from other nations, the results of commercialization and practical usage will become ever more tangible, significantly uplifting the global competitiveness of Korea's environmental technology industry.

Next Generation Core Environmental Technology Development Project (Eco-technopia 21 Project)

It is true that the 1992 G-7 Project raised the level of under-developed environmental technology by some degree. However, according to an evaluation of the G-7 Project, there were not enough large-scale tasks to fulfill the objective of turning environmental technology into an export industry. Furthermore, the project should incorporate areas of national importance such as pollution prevention, ecosystem restoration, and global environmental preservation. It was also pointed out that more efforts should be put on commercializing the technologies already developed. Such evaluations formed the basis of the Next Generation Environmental Technology Development Project, also known as the Eco-technopia 21 Project.
Built upon the experience and research capacity of the G-7 Project, the Eco-technopia 21 Project was initiated to meet the demands for new environmental technologies. In contrast to

conventional environmental technology development that was oriented toward the treatment of pollution, the ?ew technology concentrates on the impact of pollution on receptors such as human beings and the ecosystem, and aims to prevent negative effects.
The basic thrust of the Eco-technopia 21 is, first, to organize a consortium of industry, academia, and research institutes to develop package technology. Second is to follow the principle of selection and concentration. The support method will be changed from the current form of giving widespread small-scale assistance to one of providing large-scale aid to a small number of promising enterprises. The third direction is to develop technology for pollution prevention and ecosystem restoration, which is unique to the Ministry of Environment. Fourth, technology R&D, commercialization, and international cooperation should all be integrated so that a comprehensive technology development method can be adopted by the consortium of industries, academia, and other organizations.
Major targets of the project will be some 22 core technologies in four unit projects, including pollution prevention technology, and ecosystem preservation and restoration. For 10 years, from 2001 to 2010, roughly 100 billion won in annual subsidies will be offered by the government, amounting to 1 trillion won in total support. In 2001, the project's inaugural year, a sum of 50 billion won will be injected into the project. If the project proceeds without a hitch, the level of environmental technology in Korea will approach that of advanced countries in a relatively short time frame. It will not only greatly improve the quality of Korea's environment and enhance human health, but will also strengthen Korea's national competitiveness.

Establishment of the Environmental Technology Development Master Plan

There is a concern for redundancy in environment-related technological development because the MOE, the Ministry of Commerce, Industry, and Energy, and the Ministry of Science and Technology are all pushing their own development projects.
To address this problem and enhance project efficiency as well as national industrial competitiveness, all environmental technology research and development projects will be overseen by one ministry. Every five years, the MOE will compile and coordinate the environmental technology development master plan, which is currently being devised separately by the various ministries. Other ministries will proceed with their own development projects within the scope of the master plan. This new measure is reflected in the Act Related to the Development and Support of Environmental Technology, revised on February 3, 2000. The Master Plan will be finalized in consultation with other related ministries before the end of 2001.

Environmental Technology Financing for Private Development Projects

Aside from the environmental technology project partially overseen by the government, the MOE provides long-term low-interest financing to struggling small and medium enterprises with outstanding environmental technologies and commercialization potential, especially focusing on those companies that wish to commercialize patented environmental technologies. The fund is consigned to the Environment Management Corporation and almost 39 billion won has been provided to 110 companies as of 2000.

Commercialization and Distribution of Environmental Technology

Although a huge portion of the national budget has been injected into various technology development projects, no tangible results were obtained, largely because of a lack of commercialization. The MOE therefore presented a report entitled System Improvement

Measures for Environmental Technology Development at the Science and Technology Committee, which is chaired by the President, on July 12, 1999, and selected 10 major tasks for the development of environmental technology, and coordinated policies to promote the commercialization and dissemination of new technologies.

Improvement in the Design and Operation of Bidding System of the Environmental Facility Corporation

The bidding system for environmental facilities was inadequate regarding technology application since the system assessed the bidding price rather than the quality of the technology itself. Therefore businesses with new technology should be given an edge by converting the design of the tender system into a package bidding and open contest system. In addition, new regulations were enacted on September 26, 2000, so that private contractors can receive recognition for their work.

Incentive System for Using New Technology

There are many instances where numerous new technologies are developed within environmental technology research and development projects but become obsolete for shortcomings in the legal and institutional systems. Those facilities that apply new technology to obtain lower facility and operating costs will be given incentives in the form of differentiated budget subsidies, in accordance with the related provisions. Furthermore, if they were able to cut a larger percentage of facility and operating costs than that represented by existing environmental facilities, a portion of the saved budget may even be given as a grant. This system is based on the Act on Technology Transfer Promotion and the Law on Environmental Technology Development and Support, newly enacted on January 28, 2000. In addition, based on the results of Policy Research into Encouraging New Environmental Technology Use, a task of the MOE in 1999, the grant guidelines will be implemented in 2001 after consultations with related ministries.

Incentive System for New Technologies without Commercialization Records

Environmental technologies without commercialization track records are not likely to be adopted by the users for lack of confidence. Government workers and users may be held responsible in cases where a new technology fails to work, which is a major impediment in accepting new technologies in general. Moreover, technology developers and providers evade making their technological know-how public, and designers that do not own in-house technology shy away from using new proprietary technologies for fear of high royalty fees.

From now on, there is a way for new technologies lacking track records to be adopted by users. When the government agency plans to construct environmental facilities, the agency selects the most suitable business through an open tender. The selected business will build the environmental facility at its own expense and have the facility evaluated through pilot tests. If the facility is deemed a success, all or a part of the construction fee will be reimbursed. The details concerning the evaluation standards for the success of new technology and the subsidy recipient will be decided in 2001.

Strengthening Environmental Technology Assessment

Even when superior environmental technology is developed, it is not quickly applied or used in real facilities because of lack of assessment. Local governments, the main users of new environmental technologies, do not have the capacity to conduct thorough assessments, which

leads them to avoid accepting new technologies. Although Korea does have a technology certification system, it is based on forms submitted by developers and has been rather theory-oriented, leaving doubts as to the applicability of the technology. The need for professional technology assessment remains.

A technology evaluation system is planned to be implemented at the government level and will assess the applicability of new technologies to the real world. The system will foster a rapid diffusion of new techniques, know-how, and state-of-the-art equipment in Korea and help propel technology development, as well as resolve issues surrounding environmental market stimulation and pending environmental problems.

The basic thrust of technology assessment will be oriented toward applicability and practicality. In addition, an Environmental Technology Evaluation Council, comprised of specialists from related fields, will add credibility to the evaluations of a given technology? quality, effectiveness, and impacts. The legal basis for the evaluation system is provided in the Act Related to Environmental Technology Development and Support, amended on February 3, 2000. The system is also divided into two parts, the designation of new environmental technology and the environmental technology verification system. Technologies designated as new or which have performed well in tests will receive additional points for tenders; this will facilitate market entry for the new technology. Moreover, the Environmental Management Corporation is partially subsidizing the assessment cost for small and medium enterprises.

Projects for Optimum System Design Management (Value Engineering)

The purposes of conventional optimum system design management are to enhance the profitability and efficiency of building and managing environmental facilities and to increase demand for new environmental technology. These purposes were achieved by analyzing the investment efficiency, for example energy efficiency and equipment capacity, followed by reviews and coordination of various alternatives. The basis for the optimum system design management projects was provided in an enforcement ordinance of the Construction Technology Management Act, revised on March 28, 2000.In 2001, when the efficiency of pilot projects is deemed satisfactory, environmental facilities using other construction methods will be persuaded to employ the VE method in the planning and construction phases, thus obtaining optimal design.

Enhancement of Environmental Facility Efficiency

Diagnoses will be carried out on old environmental facilities to improve the processes and increase the efficiency and profitability of operations. The facilities can then be renovated or improved to cut operation costs and to raise efficiency, ultimately contributing to environmental protection efforts.

This project is hosted by the Environmental Management Corporation (EMC) and targets 14 facilities run by the EMC and the Environmental Facilities Management Corporation. Those facilities will undergo pilot tests to raise profitability and efficiency by improving treatment processes and other areas. The results of the pilot test will be evaluated and applied in the future to other environmental facilities operated by local governments. In particular, contractors for landfill gas facilities were selected in December 2000, and the list of target facilities will be expanded in 2001.

Establishment of a Technology Information Network

The environmental technology research and development project and private developers have come up with a number of new technologies, but some technologies failed to consider environmental policies or market trends from lack of environmental technology information, which leads to slow sales even after the technology has been commercialized. This is causing such problems as a waste of R&D costs and a slackened drive for development.
In order to find solutions to these problems, the MOE established the Korea National Environmental Technology Information Center (KONETIC) in June, 1999. A database including roughly 260,000 items related to environmental technology and industry was constructed in 1999 and 2000, enabling search services on the web.(www.konetic.or.kr)
In addition, the internet now provides an important venue for employment of environmental technology manpower; about 1,000 workers found new jobs through this channel. The publication of environmental technology magazines and the construction of free websites for small and medium enterprises are expected to boost Korean environmental technology development and the environmental market. In the future, information on Korean environmental industry and technology will be translated into English, thereby providing services to foreign nations and assisting the Korean environmental companies in exporting abroad.

Strengthening Environmental Technology R&D Projects

The government is pressing for cutting-edge environmental technology development through various R&D projects in order to secure global competitiveness in the 21st century, raise the quality of life through environmental protection, and turn the environmental industry into a strategic export industry through commercialization and practical usage.
However, the diffusion of new environmental technology faces some inherent difficulties. One problem is that it combines technologies from several fields. In addition, customers of new technology tend to be public institutions, which can create problems in commercialization of patented technology. Furthermore, the absence of a single organization in charge of environmental technology development management makes the systematic supervision, identification of new demands, and support for commercialization that much more difficult. Therefore, commercialization has become the priority criteria in the selection of tasks and support measures when planning or evaluating technology development. In addition, an increase in the environmental R&D budget and project scale necessitated greater coordination and organization; this, however, is extremely problematic since it would run counter to public restructuring efforts and the idea of small government. Therefore, the temporary Korea Institute of Environmental Science and Technology, of the National Institute of Environmental Research will exclusively oversee environmental technology development projects and build a professional and efficient management system via outsourcing.

Technology Exhibits and Publicity Projects

Biannual environmental industry exhibits are organized to introduce new technologies and to link developers with consumers, with the ultimate aim to accelerate the distribution of new environmental technology developed in Korea. The Hanam International Environmental Fair, held in 1999 from September 21 to October 20, served as an excellent opportunity to publicize environmental technologies, industry, and companies.
Other publicity efforts are already on-line, including the requirement that any designation, certification, or application of a new environmental technology be reported in a newsletter. Also, the KONETIC is running ads on the internet for new environmental technology companies and introducing their technology and products to the public through the Cyber Environmental Exhibit. Lastly, at the permanent environmental exhibit scheduled to open in

Beijing, Korean environmental facilities and technologies will be displayed, assisting entry into international markets.

Foundation for Commercialization and Distribution of Environmental Technology

Implementation of the Eco-dream Project (EDP)

A range of assistance will be provided to small and medium enterprises that have joined the environmental industry armed with promising technologies so that they can grow to become world-leading environmental companies. Their success can help scale the environmental industry as well as enhance environmental protection and economic development. In July 2000, the MOE selected a research institute to make plans for promising environmental ventures, and is currently devising follow-up measures. The key features under consideration include forming an investment fund for technology development, forging technological alliances with renowned overseas companies, attracting capital and subsidies, discovering STAR environmental venture firms, and setting up incubator centers for start-ups. Furthermore, the Korea Environmental Venture Association (KEVA), founded in May 2000, opened a website (www.keva.or.kr), to resolve common difficulties faced by venture firms, exchange information and knowledge on management, and strengthen global competitiveness through technological innovation. The KEVA homepage not only provides all sorts of information but also makes it easy for the members to participate in international environmental industry exhibits.

Expansion and Improvement of Regional Environmental Technology Development Centers

Research will be concentrated in areas plagued by environmental problems so that environmental challenges unique to a particular area can be examined and identified, and the technology needed in addressing the challenges can be developed. The areas with most urgent environmental needs were selected to host the centers, with one center per metropolis or province, to strengthen the regional capability to solve local environmental problems, foster regional environmental industry, and disseminate new environmental technology. In 2000, the 10 regional Environmental Technology Development Centers received 1.5 billion won in total subsidies. The number of regions receiving subsidies will be increased year by year to help resolve pending regional issues.

Establishment and Operation of the Office of Environmental Support for Businesses

Despite more stringent environmental management by companies, the percentage of businesses violating emissions regulations reaches 6 to 7% each year, which implies that the current reactive system of inspecting pollutants, emissions, and discharge cannot eradicate this problem. Thus the current command-and-control method of compliance will be transformed into a new method based on technology and financial support, thereby strengthening the company competitiveness and introducing efficiencies into the pollution prevention system. The Office of Environmental Support for Businesses will be established in each region's environmental technology development center and will form pools of ?nvironmental home doctors to make diagnoses and advise on technology to companies. The home doctor pool is made up of that region's professors, environmental managers, process specialists from companies, and former government employees. Teams are formed according to the types of problems needing technological assistance. In addition, an exclusive phone line with one nationwide number will be installed in the Office; a variety of services will be provided, such as environment-related

authorization and permits as well as financing systems, to assist businesses in their environmental management efforts.

Environmental Information Systems

The MOE Website (www.me.go.kr)

The 21st century is the age of information. The information and communications revolution brought on by the internet is altering the paradigms of national governance and corporate management. Moreover, cyberspace is rapidly expanding, and an increasing number of people now have easy access to fast, reliable environmental, political, economic, and social information. In step with these developments, the MOE has established the Cyber Network for Environmental Information as a venue for the government and the people to engage in true two-way communication.
To introduce environmental policies to the people in a transparent and open way, the MOE established the Korea National Environmental Technology Information Center on its website, providing environmental technology and industrial information services. In addition, the Cyber Environmental Education Institute was opened to provide environmental education appropriate for the 21st century.
Furthermore, remote automatic measurement and monitoring systems, which can post the real-time pollution levels such as ozone on electronic billboards and the internet, will be implemented to expand the people-oriented environmental information network.

The MOE Website (www.me.go.kr)

The MOE website provides a range of environmental information, fulfilling the people's right to have access to useful, reliable information. It also serves as a channel to exchange information and opinions with the Korean people through such sites as the cyber opinion page on environmental policies and the cyber family of environment. The main features of the homepage are listed below.
? In the status page of major works in water, waste, air, and other fields, environmental news, press releases, and notices as well as organization, budget, statutes, announcements, and other information stimulate peoples awareness of environmental issues.
? Several channels of dialogue are set up, such as Talk with the Minister, Cyber Forum on Environment, and bulletin board, to engage in two-way communication with the people.
? Complaints and grievances are handled through several venues, including Cyber Complaints, Public Address of Grievances, Information Disclosure, Center for Reporting Environmental Irregularities, and the Center for Reporting Poaching and Illegal Trafficking.
? A variety of environmental information is available such as remote sensing, toxicity, flora and fauna, and national parks. Comprehensive records on the natural environment are being developed.
? Other features include regional environmental pollution status and a FAQ on cyber complaints.

Korea National Environmental Technology Information Center (www.konetic.or.kr)

As a provider of the information infrastructure for the development and marketing of environmental industry and technology, this web site is an excellent venue for exchanging technological information among environmental companies, governments, and end users. In conjunction with overseas information networks, the site supports technology development and market entry of environmental companies.

? A variety of consumer-oriented information is offered through the internet. For instance, information on available environmental facilities and human resources in environment technology, and assistance in building websites for small and medium environmental enterprises are parts of the Web Hosting Project. A systematic information system on domestic and international environmental industry and technology firmly supports the advancement and commercialization of environmental technology.
? Additional services to the environment industry include on-line consultations with environmental technology experts, environmental technology swap meets, a job bank, and an equipment marketplace-giving consumers tailor-made technology and up-to-date business information.

Cyber Environmental Education Institute (www.emei.ac.kr**)**

Environmental education in cyberspace helps nurture environmental instructors and augment the expertise of government employees working in the field of environment. Internet-assisted education also enhances environmental learning by providing virtual experience in cyberspace.
 The site offers a training program for environmental instructors and classes for government employees.
 An electronic library systematically manages and distributes environmental education information and materials from Korea and abroad. The site also has an animation that enables you to see and hear everyday environmental problems and their solutions.

Telemetry Monitoring System (TMS)

The Telemetry Monitoring System (TMS) proactively deals with environmental accidents by constantly measuring and monitoring pollution levels and inserting more scientific rigor into environmental policymaking. The results of remote monitoring are posted on electronic billboards so everyone can join in the fight against pollution.
The early warning system for water pollution regularly measures and monitors the water quality of the four major rivers. An automatic measurement system for air quality monitors the air pollution levels of the entire country and posts the results on electronic billboards.
The TMS for smokestacks constantly measures and monitors pollutants emitted by factories. The system facilitates the scientific inspection of polluters and provides a solid basis for the formation of air policy.

Local Agenda 21

Major Successes of Local Agenda 21

In June 1992, Agenda 21 was adopted at the Rio Conference as an environmental preservation action plan for the 21st century designed to promote sustainable development. It is a collection of guidelines for devising policy directions, objectives, and measures along with the forging of mutually cooperative relations among nations and organizations. In short, Local Agenda 21 is an action plan for local governments to execute Agenda 21.
Chapter 28 of Agenda 21, in which the role of local governments for the support of Agenda 21 is defined, states that the involvement and cooperation of local governments are vital factors in achieving the objectives of Agenda 21. It also recommends that local governments adopt and

execute Local Agenda 21 with full consultation with local residents, civic groups, and businesses.
Local Agenda 21 went into full gear when the central government distributed an outline for Local Agenda 21 to local governments in April 1997, and kicked off the Local Agenda 21 road show.
As of the end of January 2001, 144 out of 248 autonomous local governments nationwide, including 16 large autonomous local governments, drew up their plans for Local Agenda 21. They are expanding the organization of the operating agency and the scope of activities. Currently, 49 autonomous bodies are in the process of implementing Local Agenda 21 plans.
For a smoother implementation of Local Agenda 21, the central government will develop evaluation-oriented guidelines based on a careful analysis of the status and problems of the project and distribute them to local governments. At the same time, the implementation of Local Agenda 21 will be a factor in environmental budget support and comprehensive evaluation of local governments so as to give incentives to local bodies.
Moreover, organic cooperation among members of the Sustainable Development Committee (founded on September 20, 2000) is to be solidified in order to encourage early activation and development of Local Agenda 21. Members include local governments, the National Local Agenda 21 Council, and other organizations.

Seoul Agenda 21: Green Seoul for the 21st Century

The City of Seoul formed the Seoul Local Agenda 21 Council, comprised of citizens, businesses, and the city government, to outline its vision of "Green Seoul for the 21st Century". After holding some 100 rounds of meetings, the draft of Seoul Agenda 21 was drawn up and, after public input was gained through workshops, public hearings, and other means, Seoul Agenda 21 was finalized and announced in June, 1997.
The municipal government of Seoul and the Seoul Agenda 21 Action Council carried out a variety of action plans for Seoul Agenda 21. However, some of the features of the plan required revisions due to a change in circumstances, which led to the formation of the Seoul Agenda 21 Revision Committee in eight areas, including air, ecosystems, and city planning, and to rewrite unclear objectives and indices. In March 2000, the revision of Seoul Agenda 21 was announced.
The Green Seoul Citizen's Committee constantly reviews the implementation of legal and other plans and keeps track of accomplishments by action target, project organization, and action plan. The Green Seoul Citizen's Committee is also in charge of the formation and operation of the Citizen's Action Group and Business Action Group, the implementation and review of action targets, the open bidding for environmental preservation, and the Seoul Agenda 21 song contest.

Citizen's Action Group
The Citizen's Action Group was inaugurated on July 5, 2000, to elevate the Seoul Agenda 21 to a civic movement. The Seoul Agenda 21 Action Council provides action programs, while the municipal government of Seoul gives financial support, and autonomous local districts drive education and regional environmental improvement projects.
The Citizen's Action Group is not only involved in the monitoring of pollution, such as on-site river purification activities and tracking of illegal waste dumping, but also leads field trips to food waste treatment plants and sewage treatment plants to help enhance public environmental awareness.

Business Action Group

The Business Action Group was set up to encourage participation from businesses during the implementation stage of Seoul Agenda 21. The Group was inaugurated on September 6, 2000, with the members of the Seoul Chamber of Commerce as core participants. It is responsible for the development of green technology and management techniques, the publicity of corporate environment information, and the spread of environmentally friendly products and services.
An autonomous environmental management system is in place, in which the companies from the Business Action Group can voluntarily submit environment improvement plans to the Seoul Chamber of Commerce, enforce it themselves, and make self-evaluation of environmental improvement and performance. Currently seven companies, including Doosan Park Pak, Asiana Airlines, and LG Construction, are taking part in the autonomous environmental management Program.

Implementation and Follow-Up of Action Objectives for Seoul Agenda 21

A number of activities and publicity efforts have been carried out after Seoul Agenda 21 was announced. However, it was pointed out that it was difficult to evaluate the degree of accomplishments due to an absence of means to measure the results. Hence, between September 1999 and February 2000, the Seoul Agenda 21 Revision Committee devised measurement indices for 27 quantifiable action objectives out of 30 objectives in eight areas. Currently, citizens, businesses, specialists, government employees and other members from various social classes are looking into the implementation and inspection of Seoul Agenda 21. An evaluation forum is planned for May 2001, in which the achievement level of action objectives, improvement targets, and action plans are to be revised and complemented, and the evaluation results will be posted on the internet.
The evaluation of Seoul Agenda 21 will be conducted once every year under the supervision of the Seoul Agenda 21 Action Council under the Green Seoul Citizens Committee.

Projects Open to the Public

The municipal government of Seoul and the Green Seoul Citizens Committee are working to improve Seoul's environment by inducing residents to participate in environmental protection activities. The city government and the Committee hold open tenders and select operators for environmental preservation programs led by civic groups and also subsidize project costs. These activities are carried out so that Seoul can pursue environmentally sustainable development and create a green city through Seoul Agenda 21.
Projects that are eligible for subsidies include air and water quality projects, waste treatment, ecosystem preservation, as well as Seoul Agenda 21 projects such as citizen action projects, business action projects, public relations and education activities, pollution monitoring, resources recycling, and ecosystem preservation.
The subsidy program began in 1996 and up until 2000, provided a total of 2.4 billion won to 170 projects among 175 organizations.

Open Contest for the Seoul Agenda 21 Song

There was an open contest for the lyrics that provided visions of an environmentally friendly Seoul. It was open to all residents of Seoul, to help Seoul Agenda 21 be elevated to a successful civic movement. Eight songs were selected out of 61 submissions, and the chosen songs will be distributed to government agencies and schools.

Indices by Action Ojective for Seoul Agenda 21			
Category	Indices (Unit)	Category	Indices (Unit)

Seoul, with fresh air	Per capita annual usage (liter) The number of ozone warming issued Amount of automobile air pollutant emissions (ten thousand tons) Level of noise roadside residential areas(dB)	Seoul, with convenient mass transportaition and more pedestrians	Citizen satisfaction level with pedestrian environment (%) Percentage of cars observing stop lines (%) Satisfaction level with mass transportation (%) Number of pedestrian deaths from car accidents Number of bicycles per household
Seoul, with clean water	Water pollution in the Han River Per capita water consumption (liter) Number of river segments where natural river restoration projects are implemented	Pleasant and friendly Seoul	Per capita parkland in residential areas (m2) Number of support projects for neighborhood landscaping
Seoul, with less waste and more recycling	Per capita waste generation (kg) Recycling rate (%) Per capital generation of food waste (kg)	Seoul, alive with history, nature, and culture	Number of culture venues Number of culture projessional trained per district Number of cultural programs per district
Seoul, with flora and fauna	Percentage of urban green areas9%) Number of marshes Specials of fish living in the Han River	Seoul, without walls of prejudice	Percentage of facilities for the disabled (%) Number of youth centers Employment rate for the elderly (%) Economic participation rate of wamen(%)

Successes of Local Agenda 21 in Gyeonggi Province

In order to drive Green Gyeonggi 21, Gyeonggi Province's Local Agenda 21 effort, action projects by NGOs and schools, as well as pilot projects by local governments, are being carried out. The following are some major projects in progress.

The environmental exploration activities of Green Gyeonggi 21 allow teenagers to examine areas in the province with environmental problems, recognize the importance of the environment and heighten the sense of community.

Gyeonggi Province encourages the participation of NGOs in water quality inspection, air pollution monitoring, inspection of and sampling from environmentally hazardous facilities, through which credibility and objectivity of administrative process are secured.

Green Gyeonggi 21 plans to host an International Seminar on Local Agenda 21 in August 2001, inviting members of local governments and organizations from abroad with successful Local Agenda 21 programs. Through the seminar, Green Gyeonggi 21 expects to benchmark successful cases and strengthen relationships with other civic groups.

Members from civic and religious groups, private businesses, and administrative agencies, are involved in the Green Gyeonggi 21 project.

Green Family Movement in the Anyang Region

The Anyang Civic College is spearheading the Green Family Movement, which strives to change our lifestyle through family-oriented environment-friendly activities and exchanges with other families. This movement was initiated to encourage environmentally friendly ways of life, through such activities as energy and water conservation. The households in the Anyang region are enlisted for the Green Family Movement and through surveys, ten action items are

identified in regards to energy, water, and waste. Every week, families of the Green Family Movement check the items on the inspection sheet. The "eco-check sheets" are then collected to select exemplary Green Families and publicize model cases.

Love of Water Campaign

As a part of the Love Water, Love Life Family Campaign, the environmental center of the Suwon Catholic Diocese selected 19 pilot areas within Gyeonggi Province and set up containers to collect used oil, increase public participation and establish a systematic collection system for used oil. In addition, the center regularly holds environmental photo exhibitions and manufactures high-quality recycled soap using refined oil, to enhance the environmental consciousness of residents. As a result, participation in the environmental movement has considerably increased among residents of pilot areas, adding momentum to the family-driven environmental movement.

Practice of Local Agenda 21 by Partnership

The Council for 21st Century Suwon is mediating a stronger link between Suwon Agenda 21 and government, business, and civic groups so that the features of the Suwon Agenda 21 can be accurately identified and efficiently practiced.

Briefings on Suwon Agenda 21 activities are held to evaluate and analyze the projects so that the results can be reflected in project plans for the following year and the Local Agenda 21 projects can be continuously implemented.

In addition, the city of Suwon examines how much of the administrative process is linked to the Suwon Agenda 21. The municipal government is building cooperative relations with civic groups and also devising ways to encourage public participation and strengthen the partnership among many regional groups.

Creating a Demonstration Pond

As a part of a demonstration pond project, an employees association of the Samsung Electronic plant in Giheung held a contest for local residents and students in order to submit ideas to create a "natural pond" and the selected ideas were included in the planning. The employees association also ran an ecological exploration program. A botanical purification tank was installed to clean the secondary-treated water released from the wastewater treatment system, and the purified water was used to create a natural-style river. With the creation of the demonstration pond, the water quality of Osan Stream improved, providing residents and schools with a place to study ecosystems.

A Pleasant and Vibrant Incheon

Incheon Agenda 21 is a movement that promotes genuine development of Incheon with all of its residents, businesses, and government agencies doing their part. The Incheon Agenda 21 Action Council of 2001 will proceed with the following projects in five divisions.

In the public information and education division, there will be programs to train environmental resource activists. Workshops and publication of a newsletter are planned so that residents, companies, and government offices have a venue to discuss issues. In addition, a task force for a green World Cup will be formed to encourage participation from citizens, businesses, and government agencies.

The water, ecosystem, and urban planning division will spearhead the Civic Green Area Experience and the Forest Restoration Movement to restore green areas. The Seunggi Stream Restoration Association, comprised of citizens, businesses, government agencies, and experts,

allocates roles in restoration and sets the project direction. Other projects include mud flat preservation, opening of coastal areas, and a marine environment appreciation program.
In the air and transportation division, areas with serious pollution will be addressed and subject to direct monitoring by residents. Detailed research and improvement plans are being carried out to improve the environment for pedestrians.
In the energy and waste division, education programs will be continuously offered to children so that they can realize the importance of renewable energy sources. An education program on resources recycling will also be made available for residents.
The culture and welfare division will host a regular forum as part of a regional cultural promotion campaign. The House of Culture project will be advanced and the Teen Agenda 21 will be implemented to help youth to forge their own culture and find their place in the society. Also, Women's Agenda 21 will be developed to promote gender equality and highlight the many contributions women make to Korean society.
When the spirit of Agenda 21 spreads to the entire city, it will form the cornerstone of a society where everyone gets along with each other and each member has a role to play. These efforts will help make Incheon a clean and pleasant city to live in.

The Sudokwon Landfill Site Management Corporation (SLC)

'Turning Waste into Resources'

The Sudokwon Landfill site Management Corporation launched in July, 2000 in order to treat waste generated by 22million people living in Seoul, Incheon, and Gyeonggi province.
Mr. Lee Jeong-Joo, President, said, "The Sudokwon Landfill is the largest single landfill in the world and will be divided into four sub-sites which will be filled in stages. It will be in use for about 30 years from 1992 to 2022. The motto of the corporation is 'Turning waste into resources."
One of the most urgent environmental issues facing Korea is the safe and sanitary treatment of metropolitan waste. The Nanjido landfill, after years of service, closed down in 1993, while the new Sudokwon landfill, which was sited in 1987 on almost 21 square kilometers of reclaimed land in Incheon, went into operation in February, 1992.
The landfill has been managed by these three administrative regions but in January 2000, it was announced that responsibility would be switched to a national corporation, leading to the inauguration of the Sudokwon Landfill Site Management Corporation in July the same year.

Operating Fund

The Sudokwon Landfill site operates with a fund consisting of waste treatment charges and allocated funds from three cities and Gyeonggi province. The treatment charge totals about 100 billion won per year and the allocated funds are used to construct the landfill infrastructure. The 2001 operating budget amounts to 226 billion won, which will be used to finance waste burial (85 billion won), resident support projects (21 billion won), leachate treatment (14 billion won), R&D (12 billion won), and administration.

Waste Burial and Soil Covering

Roughly 66 million cubed meters of waste have been buried over the past nine years, more than half of which was general waste. Approximately 20,000 tons of waste are received by the landfill and pass through weighing and an illegal toxic waste screening process before the final burial. There are eight pre-burial stages spanning about 40 meters.

The leachate released after the waste has been buried is safely treated. The incoming water, with a BOD of 1,500 to 2,000 mg/l, is also treated, posting a BOD of only 10 to 15 mg/l after treatment (compared to a standard of 70 mg/l).

Resident Support Projects

Since 1992, 161 billion won has been provided to finance several projects to support local residents affected by the landfill. The projects mostly funded improvements in the living environment, including such activities as installation of tap water systems, road construction, urban infrastructure, construction of new public buildings, and educational improvements.

Status of Landfill (unit: ten thousand pyong)						
Total	Site1	Site2	Site3	Site4	others	
					Facility Complex	Gyeongin Canal
628	124	112	100	118	100	74

Cyclical Waste Management System

The most serious problem stemming from the landfill is environmental impact from odor, leachate, dust particulates, and vermin. However, there are limits to fundamentally dealing with such problems as long as the current burial-oriented method is maintained. Moreover, it will likely be impossible to secure alternative landfills after 2022. Therefore, there is an urgent call for a fundamental shift in waste treatment methods toward the prevention and pre-evaluation of waste.

As such, the corporation plans to proceed with a cyclical waste management system, to deal with odor and other environmental problems at the source, extend landfill capacity, raise operational efficiency, create added value, and promote the welfare of local residents.

Through this method, waste that can be burned is incinerated after the waste is dried and sorted. The heat generated from incineration and the gas recovered from the landfill are used to generate electricity.

This is an up-to-date operation method that can simultaneously address the above-mentioned problems and create immense added value.

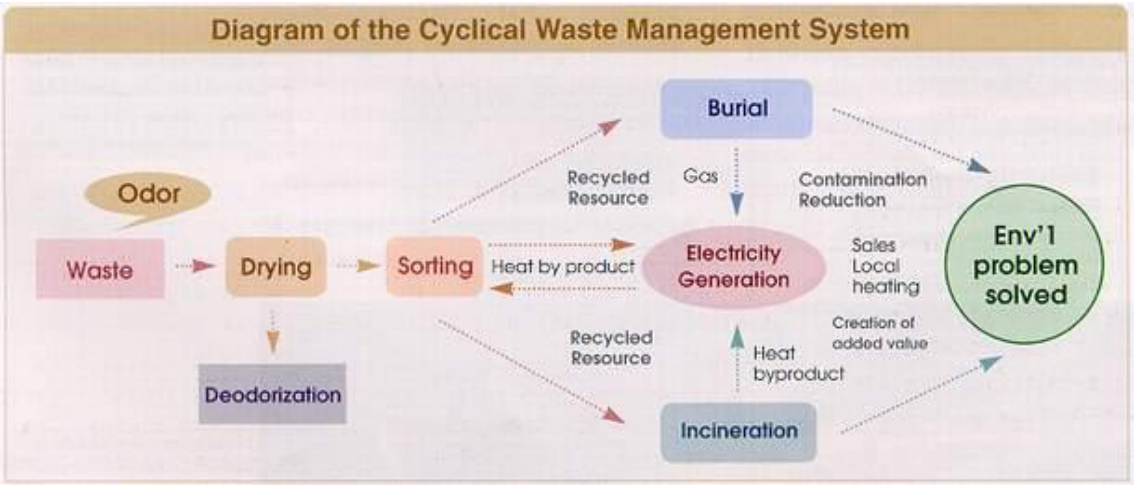
The cyclical waste management system will be subjected to a validity test in the first half of 2001, and a pilot project will be executed in the latter half, which will be put in place in 2002.

Outline of the Cyclical Waste Management System Timetable			
2000	2001	2003	2007
Burial-oriented Operations	Electricity generation from gas Stabilization of landfill site 1 Establishment of a	Electricity generation from gas Turning waste into resources (400 tons/ production of construction	Commercializing electricity (176 MW) Turning waste into

	comprehensive computer network (information database)	materials) Utilizing available land (rest areas, public parks, etc.)	resources (10,900 tons/day) Utilizing available land (leisure complex)

Turning Landfills into Parks

In parallel with the project of turning waste into resources, trees suitable for landfills will be planted as part of a comprehensive landscaping plan to turn landfills into parkland. Trees will be supplied on a yearly basis. A public golf course and other sports facilities, as well as flower gardens, camp sites, hiking and bicycle paths will be situated on the landfills.
If the cyclical waste management system progresses as planned, the Sudokwon Landfill Site will be transformed into a massive resource complex that treats waste via drying, sorting, incineration, and finally, generates electricity and provides recreational opportunities to the public. Furthermore, major problems such as odor, leachate, dust particulates, and vermin will be significantly lessened. In addition, new jobs will be created for local residents and energy imports can be reduced.



Appendices

Major Functions of the MOE

Organizations	Major Functions

Planning and Management Office	. Budget planning; managing the organization and the personnel . Examining and assessing major tasks . Establishing information networks for legal and the environmental affairs and imrproving the data processing system
Environmental Policy Bureau	. Establishing mid and long-term Plans for environmental conservation . Supporting environmental education and environmental groups . Developing environmental technology including pollution preservation technology . Conducting environmental impact assessments
Nature Conservation Bureau	. Ecosystem conservation . Managing national parks . Preventing land degradation
Air Quality/ Management Bureau	. Establishing air quality improvement plans . Reducing and preventing vehicular pollution . Ecouraging the use of low-pollution fuel . Reducing noise pollution, vibration and dust
Water Quality/ Management Bureau	. Establishing basic water preservation plans . Managing wastewater . Planning and managing environmental facilities
Water Supply and Sewage Treatment Bureau	. Developing basic policy on water supply and sewage . Establishing basic water conservation plans . Maintaining and managing water supply and sewage treatment facilities . Managing drinking water
Waste Management and Recycling Bureau	. Establishing basic and comprehensive plans for waste treatment . Supporting waste reduction and the recycling industry . Managing dangerous chemical substances
Public Informationa Office	. Conducting public campaigns
Inspector General	. Auditing environmental activities
International Cooperation Officer	. International environmental cooperation . Global environmental conservation

Subsidiary Organizations of the MOE

Organization	Major Fuctions
Central Environmental Disputes Coordination Commission	. Resolving environmental disputes . Investing/valuing environmental damage and indentifying casual relationships
National Institutek of Environmental Research	. Establishing environmental research plans and collectiong and managing inforamtion . Studying environmental impacts and ecosystem conservation . Developing and studying technologies for preventing air pollution, noise and vibratio . Developing and studying water pollution prevention technology . Developing and studying waste management officials engineers and managers working in the private sector
Han River Watershed Environmental Office	. Establishing, implementing and managing major water policies for Han River Wastershed . Collecting water-use charges and conducting projects to support residents . Monotoring activities that pollute Han River Watershed
Regional Environmental	. Establishing and implementing measures for enviornmental conservation by impact area

Management Offices (3units) Subregional Environmental and Management Offices (4units)	. Guiding and supervising pollution emitting industries . Consulting on environmental impact assessments and end-of-pipe management . Managing and recycling specified waste . Measuring examining and analysing on pollutants
Korea Resources Recovery and Reutilization Corporation	. Collecting and purchasing recyclables . Establsihing and operating waste recycling facilities . Securing technologies to reduce waste generation and expand recycling
Environmental Management Corporation (EMC)	. Implementing diverse projects for preventing pollution . Supporting and examining environmental facilities with technology . Commissioning or operating national and municipal enviornmental facilities
National Parks Authority	. Protecting natural resources in national parks . Maintaining and managing facilities in natioanl parks . Implementing projects regarding national parks
Korea Environment Institute (KEI)	. Studying enviornmental policy technology and environmental impact assessments . Studying policies for global enviornmental challenges
Sudokwon Landfill Management Corporation	. Managing waste from Seoul metropolitan area . Waste recycling . Promoting the reuse of lanfills

Environmental Activities of other Central Governmental Bodies

Government body	Environmental Activities
Ministry of Science & Technology	. Coordination of nuclear safety controls . Establishment and implementation of preventive measures for Radioactivity
Ministry of Agriculture & Forestry	. Measures to reduce agricultural and forestry pollution . Planning and technical guidance on the development of agricultural water
Ministry of Commerce, Industry & Energy	. Import/export of toxic substances and implementing import restrictions on industrial waste . Allocation and management of industrial sites . Supply of low sulfur oil . Research & Development of new and alternative energy sources . Managment of nuclear power generators and disposal /treatment hof nuclear waste
Ministry of Construction & Transportaion	. Formulation and coordination of comprehensive plans for national land use . Designation of areas subject to the National Land Use and Management Act . Establishment and coordination of a comprehensive plan for water resource development . Management of rivers, reclamations and use of rivers and lakes . Type approval and performance tests of motor vehicles
Ministry of Labor	. Countermeasures on occupational diseases and improvement of working conditions
Ministry of Culture and Tourism	. Designation, protection and management of natioanl monuments, which include rare plants and animals
Ministry of Maritime Affairs and Fisheries	. Protection of marine resoureces . Reclamation and ocean management, developing countermeasures on coastal water pollution 7 . Supervision and prevention of marine pollution

The Office of Forestry	. Formulation of basic forestry plan . Protection and oversight of forests
Agriculture Promotion Administration	. Improvement of agricultural land and guidance on soil improvement

Environmental Laws			
1960 (5laws)	**1970~1980 (9laws)**	**2001 (30 laws)**	
Social Pollution Prevention Act ('63.11.5	Environment Preservation Act ('77.12.31)	Basic Environmental Policy Act Air Quality Preservation Act Water Quality Perservation Act	(1999.12.31) (1999.4.15) (2000.1.21) (2001.1.16) (1996.12.30)
		Act Relating to Water Resources in Han River and Community Support	(1999.2.8)
		Act Relating Air Qualities in Underground Space	(1997.8.28)
		Noise and Vibration Contraol Act	(1997.12.31)
		Acts Relating to Punishment for Enviornmental Crime	
		Natural Environment Preservation Act	(1999.2.8)
	Natural Park Act ('80.1.4)	Natural Park Act Special Act on the Ecosystem Preservation of Islands such as Tokdo Island	(1999.2.8)
		Wetland Preservaton Act	(1997.12.13)
	Act Relating to Protection of Birds and Hunting ('83.12.30)	Act Relating to Pretection of Birds and Hunting Act Relating to Environmental Improvement Charges	(1999.3.31)
		Enviornmental Impact Assessment Act on Environment, Transportation and Natural Disaster	(1999.2.8)
		Soil Environment Preservation Act	(1999.12.31)
	Environmental Pollution Preservation Corporation Act ('83.5.21)	Environmental Management Corporation Act Act Relating to the Special Accounting for Environmental Improvement	(1999.2.8)
		Act Relating to Environmental Technology Support and Development	(1993.12.27) (1996.12.30) (2000.2.3)

Act Relating to Toxic and Hazardous Substance ('63.12.13)----- Waste Clean Act----------Waste Management Act---------- ('61.12.30) (,96.12.31)	Toxic Chemicals Control Act Waste Management Act Act Relating to the Treatment of Sewage, Night soil, and Livestock Wastewater Act Relating to Promotion of Resoureces Saving and Reutilization Act Relating to Transboundary Movement of Waste and Their Disposal Act for Promotion of Waste Treatment Facilities and Local Community Act Relating to the Establishment and Operation of Sudokwon Landfill Management and Corporation	(1999.2.8) (1999.12.31) (1999.2.8) .(1999.2.8) (2001.1.16) (1999.2.8) (2000.1.21)
Compound Waste Treatment Corporation Act ('79.12.28)-------- Sewer System Act ('66.8.3)---------- Waster Supply Act ('61.12.31)----------	Korea Resource Recovery and Utilization Corporation Act, Sewer System Act Water Supply Act Drinking Water Manangement Act	(1993.12.27) (1999.2.8) (1999.2.8) (2000.1.7)

Environment-related Laws under the Authority of other Ministries	
Field	**Laws**
Air	Road Traffic Act, Atomic Energy Act, Nuclear Damage Compensation Act, Energy Use Rationalization Act, Integrated Energy Supply Act, Act on the Promotion of the Development and Use of Alternative Energy, Petroleum Business Act, Act on the Control, etc. of Manufacture of Specific Substances for the Protection of the Ozone Layer
Water	Prevention of Marine Pollution Act, Goundwater Act, River Act, Public Waters Reclamation Act, Aggregate Picking Act, Public Waters Management Act, Specific Muti-Purpose Dams Act, Small River Maintenance Act, Local Grant Act
Noise	Road Traffic Act, School Health Act
General Laws	Act on Comprehensive Plans for Construction in the National Territory, Act on the Utilization and Management of the National Territory, Urban Planning Act, Building Act, Urban Park Act, Industrial Placement and Factory Construction Act, Land Expropriation Act, Urban Redevelopment Act, Industrial Sites and Development Act, Land Compartmenttalization and Rearrangement Projects Act, Housing Site Development Promotion Act, High-Speed Railroad Construction Promotion Act, Act on the Promotion of a New Airport Construction in Seoul Metropolitan Area, New Harbor Construction Promotion Act, Special Act on Jeju-Do Development, International Conference Industry Promotion Act, Seoul Metropolitan Area Readjustment Planning Act
Agriculture	Agrochemicals Control Act, Act on the Special Measures for Development of Agricultural and Fishing Villages, Rearrangement of Agricultural and Fishing Villages Act, Farmland Act, Plant Protection Act, Act on the Prevention of and Countermeasures against Agricultural and Fishery Disasters
Livestock	Livestock Industry Act, Dairy Promotion Act, Grassland Act
Fisheries. Harbors	Fisheries Act, Fishery Harbors Act, Harbor Act
Forestries	Forestry Act, Work against Land Erosion or Collapse Act
Others	Act on Special Measures for the Deregulation of Corporate Activities, Protection of Cultural Properties Act, Foreign Trade Act, Act on the Promotion of the Conversion into Environment-Friendly Management, Mining Safety Act, Tourism

	Promotion Act, Science and Technology Promotion Act, Mining Industry Act, Inland-Water Fisheries Development Promotion Act, Punishment of Minor Offenses Act

Major Environmental Related Companies (1999)

Type of companies	Number	Type of companies	Number
Environmental pollution prevention equipment	899	Night collection and transportation*	554
Pollution measurement	135	Nightsoil sanitation and cleaning*	740
Wastewater treatment	51	Nightsoil treatment facility construction and sewage/livestock treatment facility construction*	1,448
Waste treatment (collection, transportation)	1,849	Purifier manufacturing*	68
Waste Treatment (primary, secondary)	297	Waste disposal at sea	17
Waste recycling/treatment (licensing, reporting)	1,568	Vehicle Inspection	779
Environmental impact assessment	126	Inspection of measurement equipment	4
Environmental inspection	14		

Designation of Natural Parks (Oct.2000)

Order of Designation	Name	Province	Area(km^2)	Date of Designation	Remarks
Total		20 Locations	6,473		Land 3,824km^2, Sea 2,649km^2 (6.5% of Totaol National Territory)
1	Mt. Jiri	Jeollanam·Jeollabuk, Gyeongsangnam	440	'67.12.29	
2	Gyeongju	Gyeongsangbuk	138	'68.12.31	Entrusted to Gyeongsangbuk Province
3	Mt. Gyeryong	Chungcheongnam	61	'68.12.31	
4	Hanryehaesang	Jeollanam, Gyeongsangnam	510	'68312.31	244km^2 (Entrusted to Odong Island and Jeollanam Province)
5	Mt.Seorak	Gangwon	373	'70.3.24	
6	Mt.Songni	Chungcheongbuk, Gyeongsangbuk	283	'70.3.24	
7	Mt. Halla	Jeju Island	149	'70.3.24	Entrusted to Jeju Island
8	Mt.Naejang	Jeollanam·Jeollabuk	76	'71.11.17	

9	Mt. Gaya	Gyeongsangnam·Gyeongsangbuk	80	'72.10.13	
10	Mt.Deogyu	Jeollabuk, Gyeongsangnam	219	'75.2.1	
11	Mt.Odae	Gangwon	299	'75.2.1	
12	Mt.Juwang	Gyeongsangbuk	106	'76.3.30	
13	Taeanhaean	Chungcheongbuk	329	'78.10.20	290 Km^2 is sea
14	Dadohae Haesang	Jeollanam	2,345	'81.12.23	2,004 Km^2 is sea
15	Mt.Bukhan	Seoul, Gyeonggi	78	'83.4.2	
16	Mt.Chiak	Gangwon	182	'84.12.31	
17	Mt.Worak	Chungcheongbuk, Gyeongsangbuk	285	'84.12.31	
18	Mt. Sobaek	Chungcheongbuk, Gyeongsangbuk	321	'87.12.14	
19	Byeonsan Peninsula	Jeollabuk	157	'88.6.11	9km^2 is sea
20	Mt.Wolchul	Jeollanam	41	'88.6.11	

Environmental Standards

General Area	Specific Area	Relevant Legislation
Water Quality	Water quality standard (river, lake, udergroundwater, marine water), drinking water standard, treated water standard, discharged wastewater standard	Basic Environmental Policy Act, Water Quality Preservation Act, Act Relating to the Treatment of Sewage, Nightsoil, and Livestock Wastewater
Air Quality	Air quality standard, allowed emission standard, emission standards for newly manufactureed automobiles and for those in operation	Air Quality Preservation Act
Noise & Vibration	Allowed noise & vibration standard from factories, noise standard for automobiles (new and used automobilies), domestic noise & vibration regulation standard, noise & vibration limit on transportation (roads and railways)	Noise & Vibration Control Act
Soil and Toxic Chemicals	Warming standard and countermeasures standard on soil pollution, pollution standard on limiting harvest of agriculture and forestry products, standards on toxic chemicals	Soil Environment Preservation Act, Toxic Chemical Contraol Act

Protection of National Ecosystems

Location	Reason for Designation	Location	Area(km^2)	Date for Designation
Nakdong estuary	Habitats for migratory birds	Busan-si, Saha-gu, Janrim, Dadaedong	34.2	'89.3.10
Mt.Jiri	Virgin forest	Jeollanam-do Gurye-gun Sandong-myeon, Toji-myeon	20.2	'89.12.29

		(Simwom and Pia valley)		
Mt.Daeam	High wetland	Gangwon-do, Inje-gun, Seohwa-myun (Yong Swamp)	1.1	'89.12.29
Changnyeong Woopo swamp	Largest natural wetland	Gyeongsangnam-do, Changnyeong-gun, Daehapmyeon, Ibang-myeon, Yooeo-myeon, Daeji-myeon	8.5	'97.7.26
Ulsan Moojechi swamp	High wetland	Ulsan-si, Ulju-gun, Samdong-myeon	0.2	'98.12.31

Soil Pollution Levels (unit: mg/kg)

	pH	Cd	Cu	As	Hg	Pb	Cr^{+6}	PCB	CN	Organic Phosphorous	Phenol	Oil
'99 Average	6.2	0.173	4.600	0.396	0.045	6.672	0.035	N.D	0.031	N.D	0.000	0.319
National Network	6.0	0.203	5.101	0.421	0.076	7.376	0.038	N.D	0.019	N.D	0.000	0.074
Local Network	6.3	0.158	4.356	0.384	0.030	6.322	0.034	Not identified	0.037	N.D	0.000	0.380
'98 Average	6.2	0.126	4.602	0.319	0.043	5.818	0.027	N.D	0.022	N.D	0.000	0.279
Natural Composition	5.7	0.135	3.995	0.560	0.085	5.375						
Warming Level (agricultural areas)	-	1.5	50	6	4	100	4	-	2	10	4	-

Number of Air Pollution Point-sources (1999)

	Total	Class1	Class2	Class3	Class4	Class5
National	32,437	681	1,201	1,235	5,036	24,284

Annual Air Emissions Qualities **(unit:tons/year)**

Pollutant/Year	Total	(SO_2)	(NO_x)	(TSP)	(CO)	(HC)
'90	5,169,119	1,610,960	926,065	420,318	1,991,065	220,711
'91	4,489,959	1,597,780	878,389	431,375	1,759,505	199,910
'92	4,867,637	1,613,549	1,067,001	392,243	1,630,378	164,466
'93	4,583,839	1,571,700	1,186,697	389,750	1,290,527	145,165
'94	4,526,250	1,602,764	1,191,533	429,398	1,156,464	146,091
'95	4,349,606	1,532,320	1,152,765	405,526	1,109,097	149,898
'96	4,424,546	1,500,260	1,257,993	423,694	1,088,788	153,811
'97	4,364,723	1,356,395	1,278,348	438,531	1,129,092	162,357
'98	3,768,473	1,146,005	1,083,774	420,034	977,263	141,397
'99	3,709,190	951,183	1,135,503	430,815	1,036,045	146,644

Air Quality Standard (revised Jan. 1, 2001)

Category	Standard	Measurement Method
SO2	. yearly avg <0.02ppm . 24-hour avg < 0.05ppm . 1-hour avg < 0.15ppm	Pulse U.V.flourescence -
CO (revised 1995.1.1)	. 8-hour avg < 9ppm . 1-hour avg < 25ppm	Non-dispersive infared
Nitrogen dioxide(NO2)	.yearly avg < 0.05ppm . 24-hour avg < 0.08ppm . 1-hour avg < 0.15 ppm	Chemiluminescent
PM-10 (revised 1995.1.1)	. yearly avg < 70μg/m^2 . 24-hour avg < 150μg/m^2	ß-Ray absorption
O3	. 8-hour avg < 0.06ppm . 1-hour avg < 0.1ppm	U.V.photometric
Pb	. yearly avg < 0.5μg/m^2	Atomic absorption spectrophotometry

Air Quality Standards for Underground Spaces	
Category	**Standard**
SO2	1-hour avg < 0.25ppm
CO	1-hour avg < 25ppm
NO2	1-hour avg < 0.15ppm
PM-10	1-hour avg < 150μg/m^2
CO2	1-hour avg < 1000ppm
HCHO	1-hour avg < 0.1ppm
Pb	1-hour avg < 3μg/m^2

Water Quality Standards

***Health-related Standards (applied to rivers and lakes)** **(unit: mg/L)**

Cd	As	CN	Hg	Organic Phosphorus	Pb	Cr+6	PCB	ABS
< 0.01	<0.05	Not Detected	Not Detected	Not Detected	< 0.1	<0.05	Not Detected	< 0.5

*** Environmental standards by Usage (rivers)**

Grade	Designation and suitable usage	Standards				
		pH	BOD(mg/L)	SS(mg/L)	DO(mg/L)	(MPN/100ml)
I	Level Idrinking water, nature protection	6.5 ~8.5	< 1	< 25	> 7.5	< 50
II	Lvel II drinking; Level I aquaculture, swimming	6.5 ~8.5	< 3	< 25	> 5	< 1,000
III	Level III drinking water;Level II aquaculture; Level I industrial	6.5 ~8.5	< 6	< 25	> 5	< 5,000

IV	Level II industrial, agricultural	6.0 ~8.5	< 8	< 100	> 2	-
V	Level II industrial, general environment	6.0 ~8.5	< 10	No floating waste	> 2	-

Environmental Standards by Usage (lakes)								
Overall	Designation and suitable uae	Standards						
		pH	COD (mg/L)	SS(mg/L)	DO (mg/L)	(MPN/ 100ml)	T-P (mg/L)	T-p (mg/L)
I	Level Ⅰ drinking water nature protection	6.5~8.5	<1	<25	>7.5	<50	<0.010	<0.200
Ⅱ	Level Ⅱ drinking; Level Ⅰ aquaculture, swimming	6.5~8.5	<3	<25	>5	<1,000	<0.030	<0.400
Ⅲ	Level Ⅲ drink water; Level Ⅱ aquaculture; Level Ⅰ industrial	6.5~8.5	<6	<25	>5	<5,000	<0.050	<0.600
Ⅳ	Level Ⅱ industrial, agricultural	6.0~8.5	<8	<100	>2	-	<0.100	<1.0
V	Level Ⅲ industrial, general environment	6.0~8.5	<10	Not Detected	>2	-	<0.150	<1.5

Yearly Change in Coastal Area Pollutio Level (COD) (unit: mg/L)										
Year/Coastal Area	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yellow Sea	2.0	1.7	1.6	1.7	1.8	1.5	1.5	1.4	1.2	1.5
South Sea	2.0	1.8	1.5	1.7	1.9	1.7	1.7	1.4	1.8	1.6
East Sea	4.6	2.4	2	2.1	2.0	2.1	1.8	1.1	1.0	1.2
Jeju	1.5	1.1	1.1	1.2	1.3	1.3	1.3	0.6	1.1	0.9
Annual average	2.4	1.8	1.7	1.8	1.8	1.7	1.6	1.3	1.3	1.2
* data: Ministry of Maritime Affairs & Fisheries (2000)										

Supply of Drinking Water									
Year	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total population (in 10,000 persons)	4,327	4,457	4,508	4,551	4,597	4,643	4,688	4,717	4,754
Population supplied (in 10,000 persons)	3,467	3,564	3,657	3,735	3,811	3,882	3,961	4,019	4,095
Supply rate (%)	80.1	80.0	81.1	82.1	82.9	83.6	84.5	85.2	86.1
Facility capacity (10,000 tons/day)	1,687	1,879	2,010	2,097	2,184	2,291	2,396	2,570	2,659
Supply per capita (litres)	376	385	394	408	398	409	409	395	388

Supply of Sewage Pipe								
Year	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total population (in 10,000 persons)	44,569	45,077	45,512	45,974	46,426	46,878	47,174	47,543
Population supplied (in 10,000 persons)	17,279	18,620	19,081	20,908	24,420	28,559	31,099	32,538
Supply rate (%)	26	43	57	71	79	93	114	150
Facility capacity (10,000 tons/day)	38.7	41.3	41.9	45.4	52.6	60.9	65.9	68.4
Supply per capita (litres)	5,815	6,370	9,391	9,653	11,452	15,038	16,616	17,712