

# ECOREA

Environmental Review 2008, Korea



MINISTRY OF ENVIRONMENT  
REPUBLIC OF KOREA



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Environmental Review 2008, Korea

>>> ECOREA is  
a compound of the prefix “ECO”,  
which suggests an ecologically sound  
and comfortable environment,  
and the name of the nation, “Korea”



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## The Minister's Message

During nearly 14 months since its inauguration, the new government of Korea has implemented a number of policy initiatives. In my view, the most remarkable one among them is the new national vision for “Low Carbon, Green Growth” designed to guide the country for the next 60 years.

In the midst of the current global financial and environmental crisis, I strongly believe that the vision of “Low Carbon Green Growth” shall serve as a guiding principle to change the challenges of today into opportunities so that our country can make headway towards sustainable development.

Under the new national vision of “Low Carbon Green Growth” the Korean Ministry of Environment has prepared the environmental action plan which includes projects for promotion of environmental technologies and industries and programs for the creation of green jobs with a goal of generating some 220,000 green jobs by 2012.

This year is the first year of the action plan. A number of measures for GHG emission mitigation and climate change adaptation will be implemented, which involve biomass-to-energy and waste-to-energy projects, the construction of a climate change monitoring system, the development of a climate change vulnerability map, the introduction of a climate change impact assessment system and so on.

The ministry will strengthen its efforts to foster 10 key green industries and technology sectors, which include promotion of the environmental plant industry, creation of the carbon market, and the promotion of resource recycling, development of low emission vehicles and so on. The ministry will also establish Blue-Green (water & protected area) Networks in the country by restoring the ecological health of the rivers, particularly for four major ones in Korea, and promoting eco-tourism.



Every effort will be made so that the action plan could lay a strong foundation for the development of low-carbon society.

Furthermore, as part of our efforts to boost the national economy, the government will execute a significant portion of the environmental budget allocated for major projects in the first half of this year. The ministry will increase its support for small- and medium-sized environmental businesses to enable them to develop their own technologies, and will further expand its environmental services for those who are vulnerable to environmental pollution, particularly for citizens in rural regions.

I am very excited when I hear the news that many other countries are taking steps for green growth. I am confident that if nations of the world work together with the goal of protecting the Earth that we all share, peace and prosperity that we have been longing for could be attained sooner.

The Ministry of Environment has published the book “ECOREA - Environmental Review 2008, Korea” in order to share our green growth initiative with other countries. It includes our vision, our policy actions, and expected outcomes of our efforts. I hope this book will serve as a means to strengthen international environmental cooperation, and will result in better environmental policy worldwide through the exchange of ideas and experiences.



MAA-NEE LEE  
Minister of Environment  
April 2009





## The 10th Meeting of the Conference of the Contracting Parties to the Ramsar Convention

Under the theme of ‘Healthy Wetlands, Healthy People,’ the 10th Meeting of the Conference of the Contracting Parties to the Ramsar Convention (COP10) was held in Changwon, Gyeongsangnam-do, for eight days from Oct. 28 to Nov. 4, during which about 2,300 representatives of governments and NGOs from 140 countries participated in the general meeting and various conference events.

On Oct. 28, President Lee Myung-bak, Minister of Environment Lee Maa-nee, Minister of Land, Transport and Maritime Affairs Chung Jong-hwan, Chairwoman of the National Assembly Environment and Labor Committee Choo Mi-ae, Provincial Governor of Gyeongsangnam-do Kim Tae-ho, Secretary General of the Ramsar Convention Anada Tiega, Executive Director of UNEP Achim Steiner, Director General of IUCN Julia Marton-Lefevre, and Environment Manager of the Convention on Biological Diversity David Coates attended the opening ceremony and presented welcoming or congratulatory addresses. Various events were also held, including the Ramsar Prize award ceremony and the presentation of messages for conserving wetlands written by children of countries that hosted Ramsar COPs.

From Oct. 29 to Nov. 1 and from Nov. 3 to 4, the general, regional and steering committee meetings were held to discuss the proposed matters, while various incidental festivals and cultural events took place. On Nov. 2,



the participants looked around the major wetlands of Korea, such as the Upo Wetlands, Suncheon Bay and Jeonnam Wetlands, and had an opportunity to experience local culture.

To hold an eco-friendly carbon neutral festival, the general meeting sought active participation from attendees in minimizing the use of paper documents and disposable items, increased awareness of the preservation of the environment and raised approximately 17 million won through the Carbon Offset Fund, in which 2,500 domestic and foreign participants joined. The Carbon Offset Fund will be delivered to the secretariat of the convention so that it can be used to support wetland conservation and greenhouse gas reduction efforts.

With Lee Maanee, Minister of Environment, elected as the Chairperson and Kim Chan-woo, Director General of International Cooperation in Ministry of Environment, as the alternative Chairperson, the general meeting proceeded, during which 32 resolutions were adopted, including resolutions related to the Changwon Declaration, the legal status of the convention, budget, and the promotion of biodiversity in rice fields as wetland systems.

The resolutions on the Changwon Declaration and the promotion of biodiversity in rice fields as wetland systems, which were written under Korea's





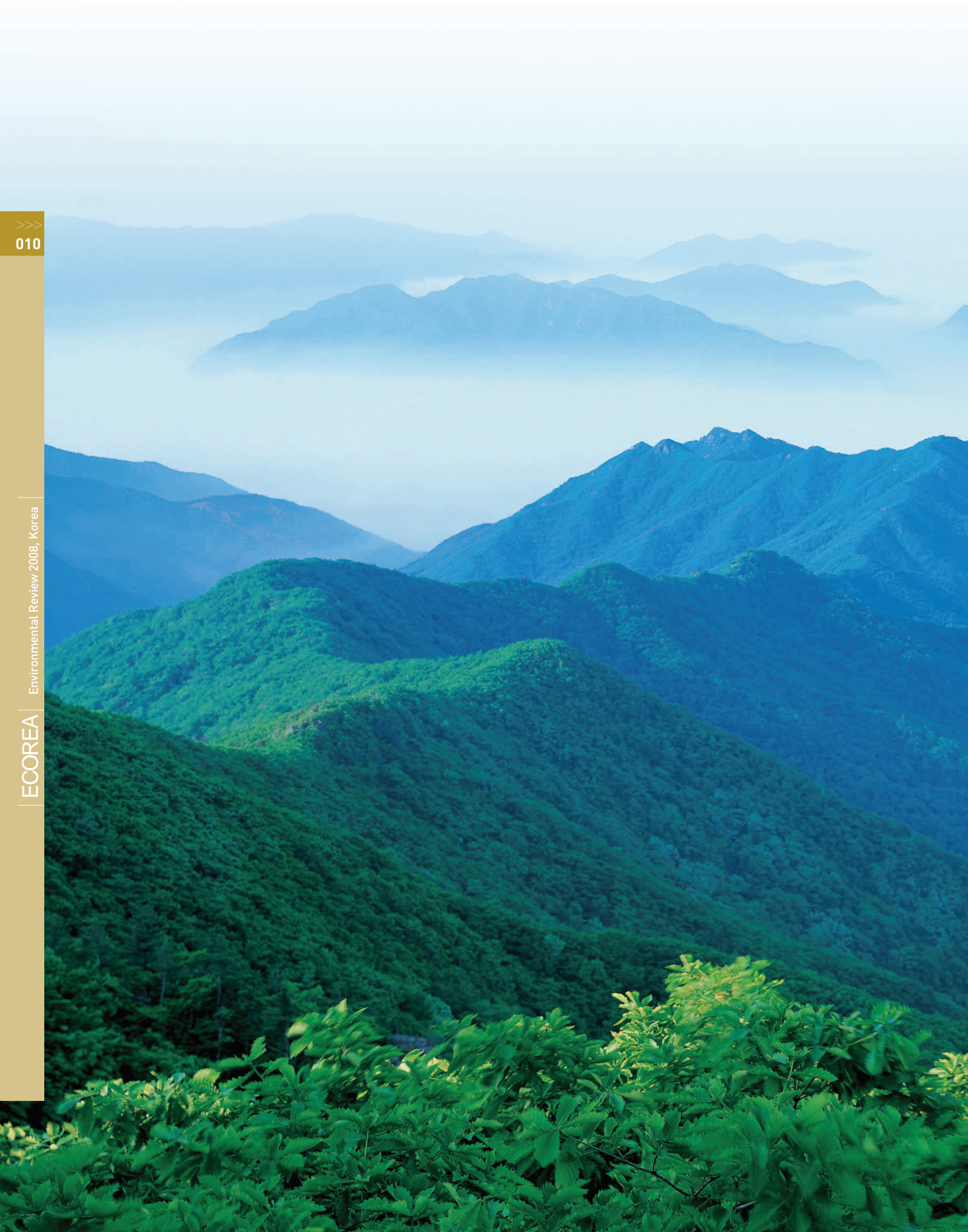
leadership, were adopted along with other resolutions on matters such as climate change & wetlands, and wetlands & bio-fuel.

At the 39th standing committee meeting that was held immediately after the general assembly, Director General Kim Chan-woo of Ministry of Environment was elected the new chairman of the standing committee and will continue to serve until the next general meeting.

The Secretariat of the Ramsar Convention and a number of Contracting Parties assessed the Ramsar COP10 as the most successful in terms of content, organization and facilities compared to COPs in the past, and this will make a positive contribution toward bringing other international environmental meetings to Korea such as the IUCN World Conservation Congress (2012).

The Ramsar COP10 was an opportunity for Korea to enhance its status in the international community through its environmental diplomacy such as the adoption of the Changwon Declaration, the resolution on rice paddies, on which Korea led the discussion, and the election of a Korean as chairman of the standing committee. If the decision to attract the Ramsar Regional Center for East Asia is made, the center will function as the hub of wetlands conservation in the East Asian region.







〈Source: National Geographic Information Institute〉

### General

**Country Name** Republic of Korea

**Capital City** Seoul (10.1 million)

**National Flag** Taegeukgi

**National Flower** Mugunghwa (Rose of Sharon)

**Currency** won

**Language** Korean (alphabet: Hangeul)

### Geography

**Location** Strategically located at the crossroads of Northeast Asia. Korea lies between Japan, the Russian Far East and China.

**Territory** 223,098km<sup>2</sup> (South Korea: 99,678km<sup>2</sup>)

**Major Cities** Seoul (10.1 million), Busan (3.5 million), Incheon (2.6 million), Daegu (2.5 million), Daejeon (1.5 million), Gwangju (1.4 million), Ulsan (1.1 million)

**Climate** Temperate with four distinct seasons

### People

**Population** 48.46 million (2007)

**Foreign Residents** 1.1 million

**Population Increase Rate** 0.33% (2007)

**Life Expectancy** Males 75.7 years, females 82.4 years (2006)

**Religion** A 2005 census showed half of the population actively practices religion. Among this group, Buddhism (43.0%), Protestantism (34.5%) and Catholicism (20.6%) comprise the three dominant religions.

### Economy

**Gross Domestic Product** \$969.9 billion (2007)

**Per Capita GNI** \$20,045 (2007)

**GDP Growth Rate** 5.0 % (2007)

**Exports** \$371.5 billion (2007)

**Imports** \$356.8 billion (2007)

**Major Industrial Products** Semiconductors, Automobiles, Ships, Consumer Electronics, Mobile Telecommunication Equipment, Steel and Chemicals

〈Source: <http://www.korea.net/>, The official website of the Republic of Korea〉





# >>> 03

## Institutional Mechanisms

### 3-1. Administrative Organizations

#### Environmental Administrative Structure

The president makes the final decision on environmental policy based on environment-related laws that have been formulated by the National Assembly. The policies are then executed through relevant administrative departments. Also, the Presidential Commission on Sustainable Development which involves both public and private sectors, operates to propose eco-friendly and sustainable policies and to coordinate the major policies of each ministry regarding economic development and environmental conservation.

Environmental policy is implemented and diversified among ministries/offices/agencies of the central government and local governments, and thus, the decision-making process and the executing system are complicated. That is, environmental policy is implemented by nine central ministries/offices/agencies, including the Ministry of Environment, (local) river basin environmental offices, a branch office, province/city/county/districts, and their subsidiary organizations and institutions that finance environmental policies.

#### The Ministry of Environment

The Ministry of Environment takes responsibility for environmental conservation and has 12 subsidiary organizations including the National Environmental Dispute Resolution Commission, the National Institute of Environmental Research (NIER), the National Institute of Biological Resources, the National Institute of Environmental Human Resources Development and eight local environmental offices. The five public organizations under the Ministry are the Environmental Management Corporation (EMC), Korean Environment & Resources Corporation (ENVICO), Korea National Park Service, Sudokwon Landfill Site Management Corporation (SLC), and the Korea Environmental Industry and Technology Institute. For in-depth research on environmental policy, policy development and the review of environmental impact assessment reports, the Korean Environment Institute was established under the Prime Minister's Office.



### **The Main Office**

The Ministry of Environment, which is in charge of developing comprehensive environmental policies, consists of two departments, three bureaus, seven offices, 32 divisions, four teams, and one T/F team. The major responsibilities of the Ministry include: the establishment of a framework for environmental administration through the enactment and amendment of environmental acts and the introduction of environmental institutions; the development and implementation of mid-to long-term comprehensive measures for environmental conservation; setting regulatory standards; administrative and financial support for local environmental offices and municipalities to promote environmental management; environmental cooperation between North and South Korea; and international cooperation in environmental conservation.

### **The National Environmental Dispute Resolution Commission (NEDRC)**

Under Article 4 of the Environmental Dispute Adjustment Act, the National Environmental Dispute Resolution Commission was established to settle disputes over damage caused by environmental pollution. This Commission is under the Ministry of Environment, and the regional Environmental Dispute Resolution Commissions were established in the capital city of Seoul, metropolitan cities and provinces. The NEDRC consists of the chairperson (first rank, standing), eight non-standing members, and the secretariat which provides administrative support for activities regarding dispute resolution.

### **The National Institute of Environmental Research (NIER)**

The National Institute of Environmental Research conducts research, examinations and assessments that are needed to support the establishment of policy by the Ministry of Environment. The NIER is composed of one office, four departments, 18 divisions, and three research centers.

### **National Institute of Biological Resources(NIBR)**

This Institute was launched in February 2007 as a specialized research institute to conserve biological resources, conduct research, study effective conservation and use of national biological resources and promote/exhibit biological resources. It is composed of two departments and eight divisions.





## **The National Institute of Environmental Human Resources Development (EHRD)**

This Institute was launched as a specialized institute for environmental education, separated from NIER in December 2006, in order to educate and train public officials and citizens involved in the environment sector. It is composed of two divisions.

### **Local Environmental Offices**

As specialized local administrative agencies to manage areas like the four major river basins, there are four River Basin Environmental Offices (Han, Nakdong, Geum, and Yeongsan), three Regional Environmental Offices (Wonju, Daegu and Jeonju), and one local branch office (Wangpicheon). In addition, the Metropolitan Air Quality Management Office is responsible for improving the air quality of metropolitan areas.

Local environmental offices are responsible for the development and implementation of regional environmental management plans; consultations on the Prior Environmental Review System (PERS) and Environmental Impact Assessments (EIA); conservation of the natural environment and ecosystems; inspection of pollution sources and the measurement and analysis of environmental pollution; fostering and support for environment-related industries; control over businesses which emit designated waste as well as waste treatment companies; and guidance and supervision on the operation of environmental infrastructure.

In addition to the aforementioned tasks, the four River Basin Environmental Offices are in charge of operating the Watershed Management Committee; using/allocating Watershed Management Funds; review and approval of water quality improvement projects by region; approval and assessment of the Total Maximum Daily Load Management System (TMDL); and imposing water use charges on businesses according to a special law on watersheds. The Metropolitan Air Quality Management Office is responsible for preventive air quality management of metropolitan areas under the Special Act on Metropolitan Air Quality Improvement.

### **Relevant Central Administrative Organizations**

As environmental affairs are so diverse, complex and wide-ranging, the Ministry of Environment has cooperated with other governmental bodies

including eight ministries. They include the Korea Forest Service in charge of forests, which account for a large share of the territory and are home to a diversity of plants, animals, and microorganisms; the Ministry of Land, Transport and Maritime Affairs, which is responsible for marine environment management and transportation policies, which are closely related to water flow management, river/stream management and air quality, as well as land use plans, which are directly linked with the environment; and the Ministry of Knowledge Economy, which is in charge of energy supply/demand policy, which is relevant to air pollution, and policies for control over businesses which emit pollutants.

### Municipalities

The work on environmental affairs is divided between central and local governments. In other words, the Ministry of Environment develops a framework for environmental policies including the enactment of environmental laws and the setting of regulatory standards. The responsibilities for implementation are shared by local environmental offices and municipalities.

The major tasks of municipalities are divided into two categories. One category consists of their own environmental affairs — the development and implementation of regional environmental conservation policies within their administrative jurisdiction; the collection and treatment of municipal waste; the treatment of sewage and livestock waste; the regulation of noise, vibration and gas emissions of vehicles. The other consists of matters authorized by the Minister of Environment, such as the control and the management of pollutant-emitting companies in and around industrial complexes and the imposition of environmental improvement charges.

Departments involved in environmental administration within local governments are different in terms of their types and roles. Each of sixteen metropolitan cities has set up an environmental green area bureau, an environmental affairs bureau or a department that incorporates the environment, culture, tourism and marine affairs. Municipalities have set up an environmental protection division, an environmental management division or a department that incorporates maritime and urban functions to take charge of environmental affairs.

## 3-2. Environmental Acts

Under the provision of Article 35 of the Constitution, “All citizens shall have the right to a healthy and agreeable environment. The State and all citizens shall endeavor to protect the environment.” The Environmental Acts solidify environmental rights, guaranteed by Article 35 of the Constitution. The concept of Environmental Acts can be interpreted in both a broad and a narrow sense according to its scope. The Environmental Acts in a broad sense include all laws that stipulate the ‘environment,’ ‘natural environment,’ or ‘living environment,’ as regulated in Article 3.1 of the Framework Act on Environmental Policy. In a narrow sense, the Environmental Law signifies laws that the Ministry of Environment directs according to Article 40 of the Government Organization Act or laws related to the preservation of the natural environment and living environment and the prevention of environmental pollution.

However, environmental problems cannot be solved solely by the laws that are directed by the Ministry of Environment, but are rather closely related with land policies, energy policies and industrial policies. Thus, when discussing the problem of preserving and improving the environment in general, understanding Environmental Acts in a broad sense is necessary.



Table 1. History & Current Status of Environmental Acts

| 1960s<br>(6 Acts)  | 1970s-1980s<br>(9 Acts)                                 | 1990-2008 (46 Acts)   |  |                                    |               |
|--|---|---|--|------------------------------------|---------------|
|  |   | Current Status  | Enacted Date   | Revised Date                       |               |
| Environmental<br>Pollution<br>Prevention Act<br>(Nov. 5, 1963)                           | Environmental<br>Conservation<br>Act<br>(Dec. 31, 1977) | Framework Act on Environmental Policy   | Aug. 1, 1990   | Mar. 28, 2008                      |               |
|  |   | Clean Air Conservation Act  | Aug. 1, 1990   | Mar. 21, 2008                      |               |
|  |   | Framework Act on Sustainable Development  | Aug. 3, 2007   | Aug. 3, 2007                       |               |
|  |   | Environmental Education Promotion Act   | Mar. 21, 2008  | Sept. 22, 2008<br>(Effective Date) |               |
|  |   | Environmental Health Act  | Mar. 21, 2008  | Mar. 22, 2009<br>(Effective Date)  |               |
|  |   | Indoor Air Quality Control in<br>Public Use Facilities, etc. Act                          | Dec. 30, 1996  | Oct. 17, 2007                      |               |
|  |   | Noise and Vibration Control Act   | Aug. 1, 1990   | Mar. 21, 2008                      |               |
|  |   | Foul Odor Prevention Act  | Feb. 9, 2004   | Mar. 21, 2008                      |               |
|  |   | Special Act on Metropolitan Air Quality Improvement                                       | Dec. 31, 2003  | Mar. 28, 2008                      |               |
|  |   | Water Quality and Ecosystem Conservation Act  | Aug. 1, 1990   | Mar. 21, 2008                      |               |
|  |   | Act Relating to the Han River Water Quality<br>Improvement and Community Support          | Feb. 8, 1999   | Aug. 3, 2008                       |               |
|  |   | Act on the Nakdong River Watershed<br>Management and Community Support                    | Jan. 14, 2002  | Dec. 27, 2008                      |               |
|  |   | Act on the Guem River Watershed<br>Management and Community Support                       | Jan. 14, 2002  | Dec. 27, 2008                      |               |
|  |   | Act on the Yeongsan & Sumjin River<br>Watershed Management and Community Support          | Jan. 14, 2002  | Dec. 27, 2008                      |               |
|  |   | Natural Environment Conservation Act  | Dec. 31, 1991  | Mar. 28, 2008                      |               |
|  |   | Act on Special Measures for the Control of<br>Environmental Offenses                      | May 31, 1991   | May 17, 2007                       |               |
|  |   | Environmental Dispute Adjustment Act  | Aug. 1, 1990   | Mar. 21, 2008                      |               |
|  |   | Act on Antarctic Activities and Environmental<br>Protection (jointly enacted)             | Mar. 22, 2004  | Feb. 29, 2008                      |               |
|  |   | Act on Promotion of the Purchase of<br>Environment-Friendly Products                      | Dec. 31, 2004  | Mar. 21, 2008                      |               |
|  |   | Act on Environmental Test and Examination   | Oct. 4, 2006   | Mar. 21, 2008                      |               |
|  |   | Environment Improvement Expenses Liability Act  | Dec. 31, 1991  | May 17, 2007                       |               |
|  |   | Natural Park Act<br>(Jan. 4, 1980)  | Natural Park Act   | Jan. 4, 1980                       | Mar. 21, 2008 |
|  |   |   | Special Act on the Ecosystem Conservation<br>of Islands such as Dokdo Island | Dec. 31, 1997                      | May 17, 2007  |
|  |   |   | Wetland Conservation Act (jointly enacted)                                   | Feb. 8, 1999                       | Mar. 21, 2008 |
|  |   |   | Environmental Impact Assessment Act  | Dec. 31, 1999                      | Mar. 28, 2008 |
|  |   |   | Soil Environment Conservation Act  | Jan. 5, 1995                       | May 17, 2007  |
| Act on the Protection of the Baekdudaegan<br>Mountain System (jointly enacted)           | Dec. 31, 2003   |   | Feb. 29, 2008  |                                    |               |
| Act Relating to the<br>Protection of<br>Birds, Mammals<br>and Hunting<br>(Mar. 30, 1967) | Wildlife Protection Act                                 | National Trust Act on Cultural Heritage &<br>Natural Environment Assets (jointly enacted) | Mar. 24, 2006  | Mar. 28, 2008                      |               |
|  |   | Wildlife Protection Act   | Feb. 9, 2004   | Feb. 29, 2008                      |               |

| 1960s<br>(6 Acts)  | 1970s-1980s<br>(9 Acts)  | 1990-2008 (47 Acts)   |   |                                |
|--|--|---|---|--------------------------------|
|  |  | Current Status  | Enacted Date                                  | Revised Date                   |
|  | Environmental Pollution Prevention Corporation Act (May 1, 1983) | Environmental Management Corporation Act  | May. 21, 1983                                 | Mar. 21, 2008                  |
|  |  | Act Relating to Special Accounting for Environmental Improvement                                  | Jan. 5, 1994                                  | Feb. 29, 2008                  |
|  |  | Development of and Support for Environmental Technology Act                                       | Dec. 22, 1994                                 | Mar. 21, 2008                  |
| Act Relating to Toxic & Hazardous Substances (Dec. 13, 1963) |  | Toxic Chemicals Control Act   | Aug. 1, 1990                                  | Mar. 21, 2008                  |
|  |  | Persistent Organic Pollutants (POPs) Control Act  | Jan. 26, 2007                                 | Apr. 27, 2007                  |
| Waste Cleaning Act (Dec. 30, 1961)                           | Waste Control Act (Dec. 31, 1986)                                | Waste Control Act   | Dec. 31, 1986                                 | Dec. 21, 2007                  |
|  |  | Act on the Disposal of Sewage, Excreta & Livestock Wastewater (annulled)                          | Mar. 8, 1991                                  | Sept. 28, 2007 (Annulled Date) |
|  |  | Act on the Management and Use of Livestock Manure (jointly enacted)                               | Sept. 27, 2006                                | Mar. 21, 2008                  |
|  |  | Act on the Promotion of Saving and Recycling of Resources   | Dec. 8, 1992                                  | Mar. 21, 2008                  |
|  |  | Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles (jointly enacted)   | Apr. 27, 2007                                 | Feb. 29, 2008                  |
|  |  | Act on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal               | Dec. 8, 1992                                  | Feb. 29, 2008                  |
|  |  | Act on the Promotion of Construction Waste Recycling  | Dec. 31, 2003                                 | Feb. 29, 2008                  |
|  |  | Promotion of Installation of Waste Disposal Facilities and Assistance, etc. to Adjacent Areas Act | Jan. 5, 1995                                  | Feb. 29, 2008                  |
|  |  | Sudokwon Landfill Site Management Corporation Act   | Jan. 21, 2000                                 | Apr. 11, 2007                  |
|  |  | Compound Waste Treatment Corporation Act (Dec. 28, 1979)  | Korea Environment & Resources Corporation Act | Dec. 27, 1993                  |
| Sewerage Act (Aug. 3, 1966)                                  |  | Sewerage Act  | Aug. 3, 1966                                  | Mar. 21, 2008                  |
| Water Supply and Waterworks Installation Act (Dec. 31, 1961) |  | Water Supply and Waterworks Installation Act  | Dec. 31, 1961                                 | Mar. 21, 2008                  |
|  |  | Management of Drinking Water Act  | Jan. 5, 1995                                  | Mar. 21, 2008                  |

### The Enactment and Amendment of Environmental Acts in 2008

In 2008, 15 Acts were enacted and/or revised including the Environmental Health Act and the Environmental Education Promotion Act, which were newly enacted, and the Act on Assessment of Impacts of Works on Environment, Traffic, Disasters, etc., which was completely revised during the 17th National Assembly (2004 ~ May 2008).



### **Environmental Health Act (enacted)**

In order to promote the Environmental Health Act systematically, a comprehensive plan for environmental health will be developed and implemented every 10 years, and the foundation for establishing a committee for environmental health, which will decide on important matters of environmental health policy, has been laid. The subjects that were designated by the president during the administrative planning and development phases of the project, which are environmental assessments and the health effects on people from environmentally harmful factors, will be revised and assessed. In the case of concerns for damage to human health due to environmentally harmful factors, research will be conducted to find the cause and the necessary management will be put in place according to the results. Children's goods that contain environmentally harmful ingredients that threaten the health of children will be recalled or vendors will be advised to stop selling such goods.

### **Environmental Education Promotion Act (enacted)**

By developing and propagating environmental education and conducting researches on it, this Act will provide the foundation for supporting social and academic environmental education. In order to promote the plan systematically, the Minister of Environment has ordered the development of a comprehensive plan for environmental education every five years. Also, an environmental education promotion and support committee will be established under the Minister of Environment; people with professional knowledge in environmental education will be certified as social environmental educators; and centers for environmental education will be established to promote environmental education by training professional human resources.

### **Act on the Assessment of Impacts of Works on Environment, Traffic, Disasters, etc.**

The name of the Act will be changed to the Environmental Impact Assessment Act, and regulations on the assessment of the impacts of traffic, population and disasters have been deleted to reduce the problem of overlap between other assessment policies that showed up in the process of applying a comprehensive act on the assessment of such impacts. The participation of the public will be extended by revealing evaluations and reflecting people's opinions. To improve the process of writing out and consulting evaluations on the assessment of



impacts, the process of ‘scoping,’ in which the category and range of the assessment are decided upon prior to writing out the evaluation, has been made obligatory and some loopholes have been removed by introducing a simple process of evaluation for businesses that have low environmental impacts.

### **Act on Promotion of the Purchase of Environment-Friendly Products**

The legal foundation has recently been established to allow public institutions to submit actual purchases of environment-friendly products through a computerized system in order to compute the total figure. Detailed reports of the location where environment-friendly products are sold or other data can be requested. The act has been improved to supervise and inspect places where the system is not installed.

### **Toxic Chemicals Control Act**

In order to secure the effectiveness of the Act and to make discretionary work transparent, the act clearly states about the registration of businesses dealing with toxic chemicals and the reasons for taking administrative measures such as the cancellation of business licenses.

### **Wetland Conservation Act**

The penalty for disturbing, avoiding and rejecting investigation on wetlands has changed from the imposition of a penalty (less than a year of imprisonment or a fine of less than 5 million won) to a negligence fine.

### **Natural Park Act**

When a non-park management agency runs the park’s business, a “replotting method” can be applied such as establishing and operating an association according to the 「Urban Development Act」. The system for reporting the expenses of restoring provincial and county parks will be decided by the local governments, and the conditions for prohibiting the entrance into natural parks have been clarified.

### **Clean Air Conservation Act**

If the owner of a vehicle that has not received a thorough examination refuses the order to undergo the examination, the governor of the city or province can confiscate the registered number plate of the vehicle. If a vehicle



is attached with exhaust-reduction equipment, or if its engine has been remodeled into a low-pollution engine with financial support from local governments except for the Seoul metropolitan area, the period of obligatory operation of the vehicle will be fixed and the attached equipment shall be removed when the vehicle is scrapped or exported.

### **Special Act on Metropolitan Air Quality Improvement**

A vehicle that satisfies the performance qualification after it has been attached with gas-reducing equipment is exempt from thorough examination and if the period of obligatory operation of the vehicle with attached equipment is not completed, the vehicle owner should return the financial assistance that he or she received from the government.

Also, the legal foundation for companies to formally object to an emission cap they have been allocated and the calculated total emission will be arranged, and the calculated total emissions can be computerized. Owners of diesel vehicles that have been attached with equipment that reduces emissions or that have been remodeled will be imposed with the responsibility to maintain the performance of the equipment. For the manufacturers, suppliers and sellers, the responsibility to maintain the function of the equipment to reduce gas emissions has been strengthened.

### **Management of Drinking Water Act**

A penalty has been recently designed to allow the cancellation of certificates or accusation of laboratories (or persons) that produce a false record for water examination. In the past, the water improvement charge on the manufacturers of drinking water was imposed based on the selling price of drinking water or the amount of water used in the product. It will now be imposed on the basis of water intake. The rate of the charge that was different among drinking water, beverages and alcoholic beverages will be applied equally to ensure fairness.

### **Act on the Promotion of Saving and Recycling of Resources**

In order to change the direction of policy for waste management from the current safety and recycling-centered management to control on the generation of waste and its conversion into resources, the concept and principle of resource circulation have been introduced. Degradable resin products have





been exempted from being classified into disposable products (vinyl and shopping bags) that are subject to the prohibition of free distribution.

### **Korea Environment & Resources Corporation Act**

As part of adjusting the functions of affiliated organizations of the Ministry of Environment, a legal foundation for fostering and developing the Korea Environment & Resources Corporation into an organization that is fully responsible for the business of resource circulation has been arranged.

### **Environmental Dispute Adjustment Act**

The effect of settlement has been granted on the protocol of adjustment or the document of arbitration, which previously approved only the effect of mutual agreement between concerned parties. The number of regular members of the Environmental Dispute Resolution Commission has been extended from the current nine to no more than 15, and the range of compulsory arbitration has been widened.

### **Other environment-related Acts of governmental bodies**

There are more than 70 environment-related Acts of other governmental bodies as can be seen on the table below, and there are over 15 relevant bodies. Among these, the Special Act on the Development of the East, West and South Sea Areas has been enacted to support the development of national parks that have beautiful natural environments and scenery, and was announced on Dec. 27, 2007, after going through a confrontation between supporters of development and supporters of conservation in the process of passing the National Assembly.

Since a number of environment-related regulations are scattered in several Acts of different governmental bodies, legal loopholes may appear in the authoritative boundary of each body. Also, as the policy directions of governmental bodies are different from one another, contradictions or clashes may arise, and thus, close cooperation is needed between different bodies.

Table 2. Environment-Related Acts of Governmental Bodies

| Category            | Acts  |
|---------------------|---|
| Air Pollution       | Road Traffic Act, Automobile Management Act, Atomic Energy Act, Nuclear Liability Act, Petroleum Business Act,<br>Energy Use Rationalization Act, Construction Machinery Management Act,<br>Integrated Energy Supply Act, Alternative Energy Development Promotion Act, Act on the Control, etc. of the Manufacture of Specific Substances for the Protection of the Ozone Layer  |
| Water Pollution     | River Act, Public Waters Reclamation Act, Public Waters Management Act, Aggregate Picking Act, Small River Maintenance Act, Inland Water Fisheries Act, Act on the Construction of Dams and Assistance, etc. to their Environment, Groundwater Act, Hot Springs Act   |
| Noise               | Road Traffic Act, School Health Act, Assembly and Demonstration Act   |
| General             | Framework Act on National Territory, Act on Planning and Use of National Territory, Building Act, Urban Park Act, Act on Cluster Facilitation and Plant Establishment,<br>Act on Land Purchase and Compensation for Public Projects,<br>Urban Development Act, Industrial Sites and Development Act, Housing Site Development Promotion Act, High Speed Rail Construction Promotion Act, Act on the Promotion of a New Airport for Seoul Metropolitan Area Construction,<br>New Harbor Construction Promotion Act, Special Act on Jeju Free International City, Seoul Metropolitan Area Readjustment Planning Act, Act on the Conservation and Management of Marine Life, Act on the Development and Management of Marine Deep Water, Act on Conservation and Management of Uninhabited Islands,<br>Installation and utilization of Sports Facilities Act,<br>Special Act on Support for Areas Granted to the U.S. Forces (Article 28),<br>Mine Pollution Prevention and Reclamation Act,<br>Special Act on the Development of the East, West and South Sea Areas, Special Act on Investment Promotion for Fostering Newly Developing Regions |
| Agriculture         | Agrochemicals Control Act, Special Act on Rural Development, Act on Maintenance and Improvement of Rural and Fishery Areas, Farmland Act, Plant Protection Act, Act on Measures for Disaster Prevention in Rural and Fishery Areas  |
| Livestock           | Livestock Industry Act, Dairy Promotion Act, Meadow Land Act  |
| Fisheries & Harbors | Fisheries Act, Fishery Harbor Act, Harbor Act   |
| Forestry            | Forestry Act, Erosion Control Act, Forest Management Act  |
| Others              | Act on Special Measures for the Deregulation of Corporate Activities, Protection of Cultural Properties Act, Act on the Promotion of the Conversion to an Environmentally-Friendly Industrial Structure, Mining Safety Act, Tourism Promotion Act, Scientific Technology Promotion Act, Mining Industry Act, Inland-Water Fisheries Act, Countermeasures against Natural Disasters Act, Punishment of Minor Offenses Act, Foreign Trade Act,<br>Transboundary Movement of Genetically Modified Organisms Act, Framework Act on the Construction Industry  |



### 3-3. Budget & Finance

#### 2008 Budget Framework

Considering the priority of policies and investment plans for major businesses presented in the ‘Comprehensive National Environmental Plan From 2006 to 2015,’ financial resources have been effectively distributed. The 2008 budget plan puts less focus on water supply, drainage and wastewater as the infrastructure in these areas has been expanded with huge investment, and investment in nature, air, and the environment has been increased. Investment was expanded in order to foster strategic industries and create green jobs.\*

\* 2007: Natural Environment Guides (325), guards on Korea’s five major rivers (167), ecosystem protection area watchmen (203)

Also, strong measures have been taken for asbestos management, soil pollution investigation, etc.; and the Ministry saved financial resources by suspending or reducing some existing projects of poor performance or improving the efficiency in carrying out existing projects. With this saved financial resources, the Ministry has increased its spending on projects of higher priorities or started to implement new projects.

Table 3. Current Status of Expenditure by Sector

(Unit: 100 million KRW, %)

| Classification                                   | 2004        | 2005         | 2006         | 2007         | 2008         |
|--|-------------|--------------|--------------|--------------|--------------|
| <b>Total</b>                                     | 14,519(100) | 28,557(100)  | 29,992(100)  | 32,232(100)  | 35,914(100)  |
| Water Supply Services                            | 1,958(13.5) | 2,034(7.1)   | 2,255(7.5)   | 2,295(7.1)   | 3,490(9.7)   |
| Water Quality Improvement                        | 3,773(26.0) | 16,311(57.1) | 15,675(52.3) | 17,372(53.9) | 17,784(49.5) |
| Waste Management                                 | 2,867(19.7) | 2,787(9.8)   | 2,773(9.2)   | 2,771(8.6)   | 2,872(8.0)   |
| Air Quality Improvement                          | 1,042(7.2)  | 1,933(6.8)   | 3,249(10.8)  | 3,486(10.8)  | 3,599(10.0)  |
| Nature Conservation                              | 1,102(7.6)  | 1,262(4.4)   | 1,576(5.3)   | 1,992(6.2)   | 2,778(7.7)   |
| Environmental Protection in General <sup>1</sup> | 2,068(14.2) | 2,243(7.9)   | 2,167(7.2)   | 3,131(9.7)   | 3,757(10.5)  |
| Other  | 1,709(11.8) | 1,987(6.9)   | 2,297(7.7)   | 1,185(3.7)   | 1,634(4.5)   |

Footnote 1 Environmental Protection in General was managed separately from Environmental Technology Research until 2005

\* Environmental Technology Research: The development of core next-generation environmental technology, funding for environmental improvement, research projects for environmental investigation and the strengthening of international cooperation

## Major Investment Plan for 2008

### 1) Strengthen investment in environmental health and improve the living environment in vulnerable areas

The risk to public health is increasing as exposure to environmental pollution and chemical substances increase, and as environment-related diseases increase, especially asthma and atopy in children, environmental health policy is being promoted, and continuous efforts are being made for the improvement of the living environment of environmentally vulnerable areas such as farming and fishing villages, islands, areas near industrial complexes and abandoned mine sites.

Table 4. Budget for Environmental Health and Improvement of the Living Environment in Vulnerable Areas  
(Unit: 100 million KRW)

| Classification   | 2007(B) | 2008(B) | Increase /Decrease (B-A) | Rate of increase /decrease (%) |
|--|---------|---------|--------------------------|--------------------------------|
| Establishment of a system for the prevention and control of environment-related diseases | 62      | 63      | 1                        | 1.6                            |
| Comprehensive control of risk to public health   | 46      | 31      | △15                      | △32.6                          |
| Developing safe water sources for rural residents  | 1,380   | 2,038   | 685                      | 47.7                           |
| Field survey on soil pollution around abandoned mines                                    | 23      | 26      | 3                        | 13.0                           |
| Soil inspection in industrial complexes  | 20      | 24      | 4                        | 20.0                           |
| Improving waterworks in rural communities  | 526     | 608     | 82                       | 15.6                           |
| Control of chemical substances   | 73      | 95      | 22                       | 30.1                           |

### 2) Increase investment in businesses that improve the living environment including water and air quality

A lot of effort is put into improving the quality of the environment by promoting investigative projects on the ecology of areas around industrial complexes and the health of public waters, projects on cleaning up rivers and projects on improving the air quality of metropolitan areas where air pollution is very serious.



Table 5. Current Status of Major Budget Items

(Unit: 100 million KRW)

| Classification   | 2007(B) | 2008(B) | Increase /Decrease (B-A) | Rate of increase /decrease (%) |
|--|---------|---------|--------------------------|--------------------------------|
| Measures for the improvement of metropolitan air quality       | 2,597   | 2,380   | △217                     | △8.4                           |
| Management of areas vulnerable to odor and relevant facilities | 23      | 17      | △6                       | △26.1                          |
| Survey of environmental capacity of rivers and streams         | 10      | 11      | 1                        | 10.0                           |
| Project for purifying rivers to their natural state            | 712     | 811     | 99                       | 13.9                           |
| Propagation of natural gas vehicles                            | 395     | 549     | 154                      | 39.0                           |
| Development of industrial wastewater management                | 3       | 40      | 37                       | 1,233.3                        |

### 3) Conservation and management of biological resources and building of a resource circulation system

To conserve biological resources and ecosystem protection areas, investment in nature will be expanded, while the building of a resource circulation system, such as the construction of mechanical biological treatment plants, is strengthened.



Table6. Current Status of Budget for Biological Resources and the Resource Circulation System  
(Unit: 100 million KRW)

| Classification   | 2007(A) | 2008(B) | Increase /Decrease (B-A) | Rate of increase /decrease |
|--|---------|---------|--------------------------|----------------------------|
|  |         |         |                          | (%)                        |
| Comprehensive measures for the conservation of national biological resources | 71      | 88      | 17                       | 23.9                       |
| Wetland conservation and management  | 83      | 98      | 15                       | 18.1                       |
| Management of ecology and landscape preservation areas                       | 118     | 123     | 5                        | 4.2                        |
| Development of biological resources and classification studies, etc.         | 37      | 55      | 18                       | 48.6                       |
| Facility for Mechanical Biological Treatment                                 | 27      | 82      | 55                       | 203.7                      |

#### 4) Active reflection on the new budget for new environmental demands

In order to deal with emerging environmental issues, 24 projects (e.g. the establishment of the National Institute of Ecological Research and Conservation (NIERC) and a comprehensive plan for asbestos management) are implemented with a budget of 111.9 billion KRW.

Table7. Status of Newly Allocated Budget per Year  
(Unit: 100 million KRW)

| Classification        | 2004  | 2005   | 2006   | 2007  | 2008                                       |
|-----------------------|---|--|--|---|--|
| Total Budget          | 14,519  | 28,557   | 29,992   | 32,232  | 35,914                                     |
| Scale of New Projects | 411   | 224  | 718  | 103   | 1,119                                      |
| No. of Projects       | 24  | 25   | 38   | 15  | 24   |
| Projects              | 24 projects such as metropolitan area air quality improvement | 25 projects such as indoor air quality improvement | 38 projects such as building foundations for environmental health research | 15 projects such as the establishment of an RFID-based infectious waste management system | 24 projects such as establishment of NIERC |

Table 8. New Major Projects in 2008

(Unit: 100 million KRW)

| Classification   | 2008 Budget | Contents  |
|--|-------------|---|
| Lay water pipes for households that receive basic livelihood payments      | 11          | support laying water pipes for low-income households that receive basic livelihood payments |
| Improve small scale water facilities                                       | 400         | improve water pipes that don't meet current standard or that are older than 25 years        |
| Establish a national ecological park                                       | 520         | cost for land purchase for the park, etc.   |
| National park guards   | 34          | a project to create jobs (576)  |
| Build inventory for biological resources of Korea                          | 4           | secure specimens of biological species  |
| Comprehensive plan for asbestos management                                 | 29          | management of substances that contain asbestos in general buildings                         |
| Purify regions with polluted groundwater                                   | 5           | investigate soil and groundwater of areas around industrial complexes                       |
| Research on environmental impact of groundwater                            | 10          | close investigation on natural radioactive substances such as uranium, radon, etc.          |
| Manage policy for environmental measurement and analysis specialist system | 22          | foster environmental measurement and analysis specialists                                   |







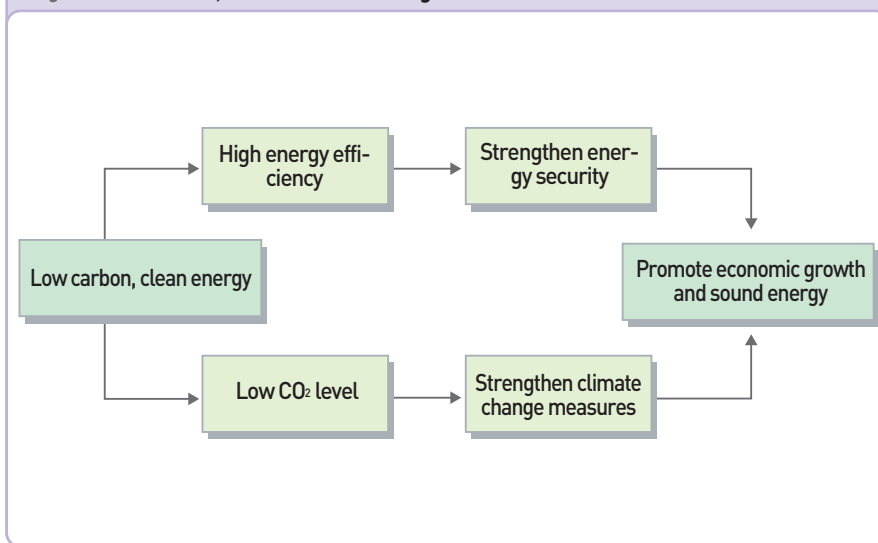
## Comprehensive Plan for Combating Climate Change

A Climate Change Committee met under the superintendence of Prime Minister Han Seung-soo on Sept. 19, 2008, and deliberated and concluded the Comprehensive Plan.

The Comprehensive Plan represents a follow-up measure to carry out the Low Carbon, Green Growth\* paradigm in the country, which was presented in the celebratory remarks of the president on Aug. 15, Korea's National Liberation Day.

\* Low Carbon, Green Growth : a new development strategy to convert from the current "vicious cycle" between waste of energy, lower economic efficiency, global warming and ecosystem degradation into a "virtuous cycle."

Figure1. Low Carbon, Green Growth Paradigm



● **Vision**

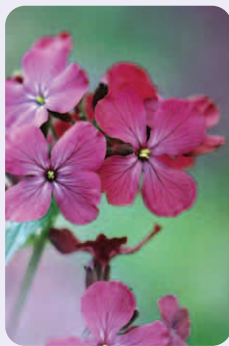
“Join the pan-terrestrial efforts in facing climate change and realize a low-carbon society through green growth”

● **Goals**

“First, foster a weather-friendly industry with new growth power.  
Second, improve the quality of life and the environment.  
Third, lead international efforts to deal with climate change in order to realize the states of a ‘Mature World State.’”

● **Promotion Strategy**

In order to realize a “low carbon society,” the carbon intensity(CI)\* of each sector of the economy will be improved. For “green growth,” eco-efficiency(EE)\*\* will be promoted.



\* As a standard for a ‘low carbon society,’ carbon intensity (CI) represents purity (= greenhouse gas emission/energy consumed) and efficiency (= greenhouse gas emission/GDP)

\*\* As a standard for ‘green growth,’ eco-efficiency represents the promotion of economic growth by developing new technologies and expanding investment through the promotion of efficiency and zero-pollution when using every ecological resource including energy, water, air and land (= Environmental cost/economic output) (Source: ESCAP)

Also, action plans will be promoted as long-term and short-term tasks for each goal and the vision of “low carbon, green growth” will be reflected as the basis of Official Development Assistance (ODA) to promote Korea’s leading role in working with developing countries and to promote the understanding and participation of the Korean people through communication.

### ● Political Measure

The government has presented various policy measures to achieve “low carbon, green growth.”

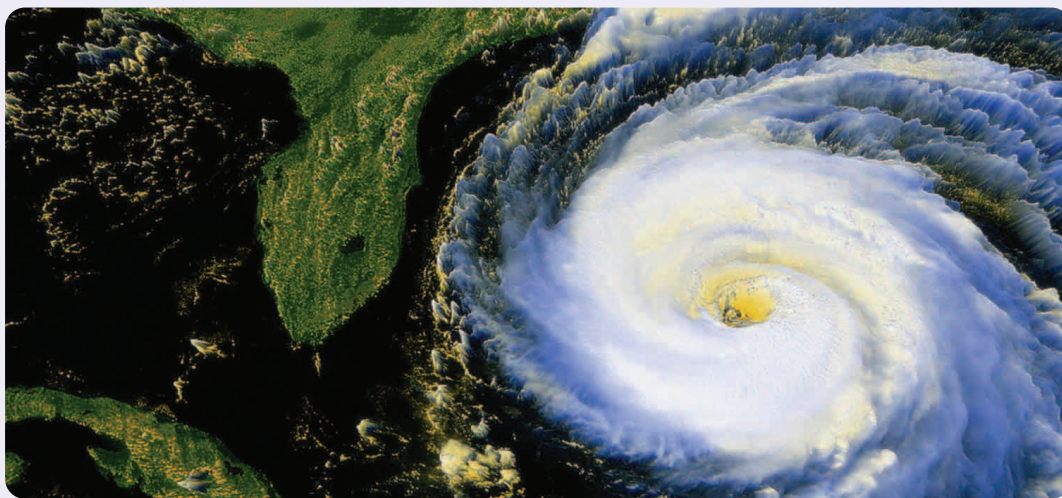
With the prospect that financial resources of over 31 trillion KRW will be needed within five years, support for finance and financial resource distribution policies will be strengthened and R&D investment in major technologies such as thin-film solar batteries and large wind power plants will more than double to 5 trillion KRW by 2012.

Also, in order to strengthen the legal and political basis, the arrangement of a legal foundation for low carbon, green growth, the establishment of a national emission statistics system, the mitigation of regulations on the location of renewable energy providers, and the introduction of carbon credits in the mid-to long-term will be examined.

In order to reduce the social and economic expenses caused by traffic congestion which accounts for nearly 3% of GDP, eco-friendly transportation including railways and subways will be extended, people’s access to public facilities including airports and public parks through public transport will be enhanced, and the regulation of CO<sub>2</sub> emissions from vehicles will be strengthened according to the Polluter Pays Principle.

Taxation reforms could be made in a more weather-friendly direction, or the tentatively named ‘carbon tax’ will be introduced in the mid-to long-term, but it will be tax neutral and will not augment the tax burden on the people.

Also, people’s participation in the new paradigm and their sense of responsibility to the environment will be enhanced by strengthening the promotion of the new vision to the people, and the curriculum of elementary and middle schools will reflect the paradigm so that the understanding and practice of low-carbon, green growth can begin from a young age.



### ● Promotion Tasks Per Goal

**First, to use the climate change crisis as an opportunity for national development, weather-friendly industries will be developed and fostered as the new growth engine and stepping-stone to becoming an economically developed country.**



The current technological level of 60 % of the technology for climate change of developed countries will be enhanced to 80 % by 2012, and the common use of major technologies such as thin-film solar batteries and large wind power plants will be promoted.

Green growth will be fostered as a new growth strategy to increase the export of solar and wind power generation to 10 trillion KRW per year by 2012.

Also, the ratio of renewable energy will greatly increase (2.24 % in 2006 → 11 % in 2030) through creation of renewable energy complexes, establishment of tidal power plants and supply of green homes (one million houses).

The current level of 60 % of investment in businesses that increase energy efficiency such as energy storage, LED and electric power IT in developed countries will be sharply expanded to enter the world's four major countries that produce green cars. This will create 100,000 jobs by 2012 and 200,000 more by 2030.

Competitive corporations specializing in global water management will be fostered for penetration into foreign markets for reusing treated sewage and sea water desalination.

**Second, the reduction of greenhouse gas emissions and the adaptation to global warming will be promoted in every area of society from the design of land and towns to the construction and transportation policies to enhance the quality of life of the people.**

Comprehensive public transportation (railways, subways, etc.) networks between cities will be greatly expanded to reduce greenhouse gas emissions and enhance the quality of life.

A green living environment will be created by expanding the supply of small cars, and environmentally-friendly and highly efficient green cars, and increasing green homes and green buildings for reducing the consumption of energy and the emission of CO<sub>2</sub>.

Also, in order to protect the people from disasters such as heat waves and floods, the system for predicting climate change and managing disasters will be strengthened and precautionary measures against diseases caused by climate change such as malaria will be thoroughly prepared.

A much more nature-friendly society will be realized by reducing greenhouse gas emissions through the expansion of an environmentally-friendly agricultural industry, the restriction of the generation of domestic waste and an increase in the sources of carbon sinks such as forests.

**Last but not least, Korea's passive attitude in the past in solving the global problem of climate change will be discarded so that it could play a significant role in accordance with its national strength.**

In 2009, Korea will join the global effort by presenting and putting into practice the national goal for greenhouse gas reduction by social agreement, and:

A creative system for climate negotiations based on the market will be promoted so that developed and developing nations can participate; and support for measures to limit climate change in developing countries, such as the East Asian Climate Change Partnership, will be strengthened for a contribution that corresponds with Korea's national strength.

### ● Expectations

If the plan for fighting climate change is successfully adopted, Korea will receive the triple effect of economic growth, an enhancement in the quality of life and a contribution to international efforts against climate change by realizing a "low-carbon, green growth" society.

The government announced the current year as the first year for moving toward a low-carbon society, and anticipates that this year it can build a foundation for taking another leap toward becoming a leading developed country through green growth.

By solidifying the green-growth paradigm, the current industrial structure of consuming large amounts of energy will gradually change to a low-carbon economic structure of developed countries, and the economic crisis, along with climate change, will be overcome.



# >>> 05

## Action Plans for 2009

### Current Status of Environmental Policy in 2009 and the Action Plans

#### Overcome Economic Crisis through Green New Deal

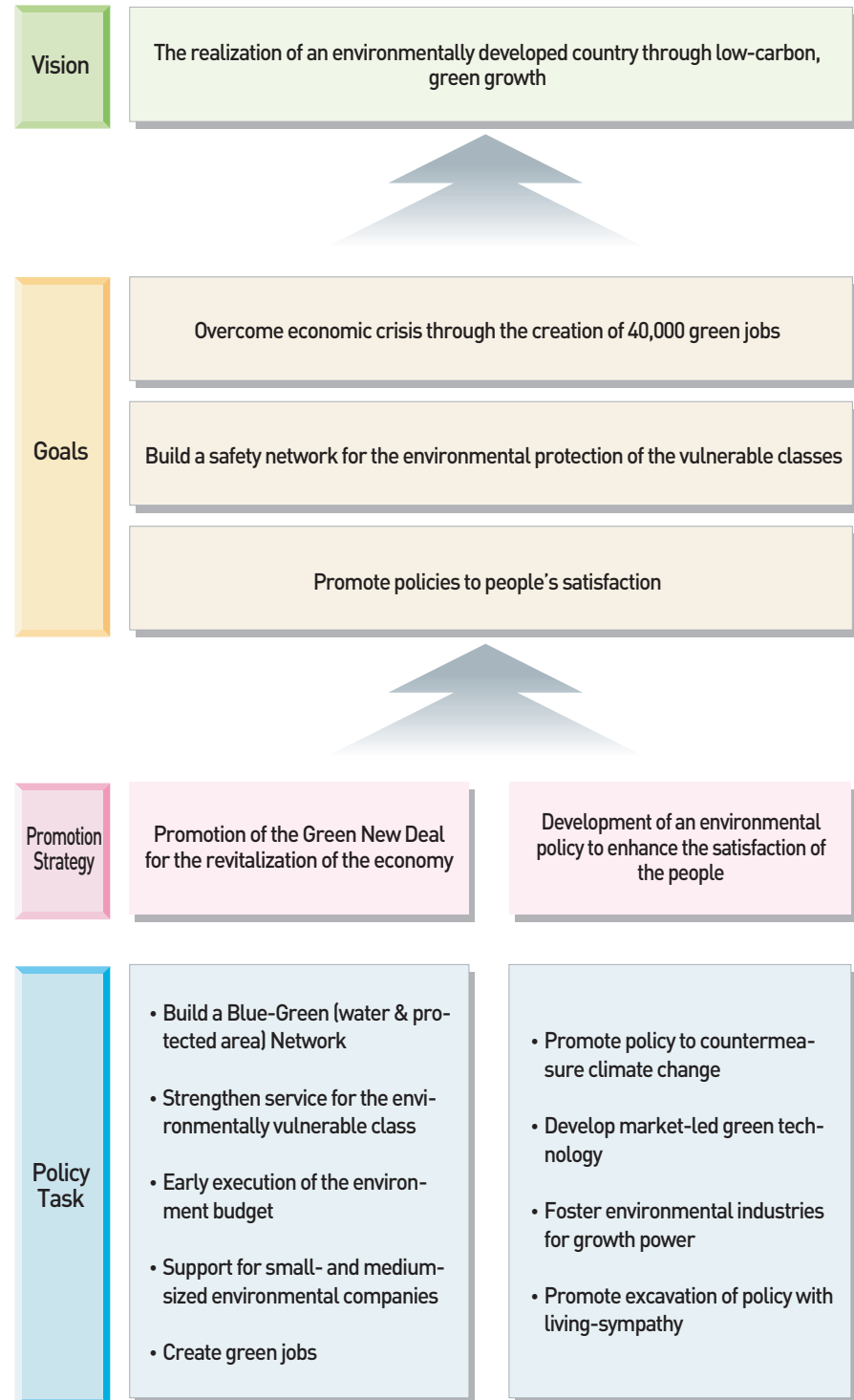
In the aftermath of the world financial crisis, economic contraction and deteriorating employment cause concerns about the reduction of R&D and investment in the environmental sector. However, in order to deal with climate change effectively and to realize green growth, new growth engine industries should be actively promoted so that Korea can survive the current economic crisis.

#### Promote Environmental Policy that makes improvements in people's daily lives

Considering economic difficulties, a policy for environmental justice and an environmental safety network should be actively developed and implemented for the protection of the environmentally vulnerable class and low-income groups. And policies should be persistently developed and improved in order to solve complaints regarding people's lives and improve regulations to solve the difficulties enterprises are suffering from.



## Goals for Environment Policy Promotion for 2009







## Environmental Action Plan for Overcoming Economic Crisis

### Build a Blue-Green (Water & Protected Area) Network

To remove the pollutants that flow into rivers and restore rivers to their pristine state, a project to restore the health of rivers in the country, including the four major rivers, will be implemented and the budget and fund that amounts to KRW 3.3 trillion will be invested in the project. And an 「environmental evaluation team for revitalization of four major rivers」 will be formed and operated.

Also, the Ramsar COP10 in Changwon in 2008 raised public awareness on wetland conservation, which will serve as a turning point for promoting ecological tourism. 10 major models for Korea's homegrown ecological tourism will be developed by 2012, and the infrastructure for ecological tourism will be expanded, such as creating a 1,000 kilometer-long pathway for looking into the nation's ecological culture and designating more wetland conservation areas.

Moreover, old waste in and along rivers, estuaries, mountains, coasts and seashores will be collected and disposed of, and the impaired land will be restored ecologically as part of an extensive Clean Korea project.

### Expand Environmental Service for Environmentally Vulnerable Areas and Farming & Fishing Areas

Meanwhile, as part of the policy to relieve the difficulties of the common people, the reduction rate of environmental improvement charge on trucks smaller than 3,000cc will be raised from 25 % to 50 %; volume-based waste bags will be provided without charge to low-income residents; and other various measures will be provided including reducing water rates, laying water pipes and improving indoor water pipes for free, providing bottled tap water without charge and establishing water fountains with a directly-connected water supply.

### Early Execution of Environmental Budget

63.9 % of the 2.8 trillion KRW total major project expenses, or 1.8 trillion KRW, for the environment sector in the current year will be executed early in the first half of this year.

Table 9. Details of early execution of major projects during 1Q '09: 63.9% of total annual budget  
(Unit: 100 million KRW)

| Category                     |  | Budget Amount | Execution in the First Half | %    |
|------------------------------|--|---------------|-----------------------------|------|
| Total                        |  | 28,417        | 18,154                      | 63.9 |
| Environment SOC              | Subtotal   | 24,646        | 15,263                      | 61.9 |
|                              | Water supply facilities                                      | 3,376         | 2,072                       | 61.4 |
|                              | Sewerage facilities  | 16,655        | 10,241                      | 61.5 |
|                              | Wastewater management facilities                             | 2,809         | 1,799                       | 64.0 |
|                              | Waste management facilities                                  | 1,806         | 1,151                       | 63.7 |
| R&D                          | Development of next generation environmental technology      | 1,974         | 1,664                       | 84.3 |
| Loans for the Private Sector | Subtotal   | 1,500         | 1,000                       | 66.7 |
|                              | Fostering recycling industry                                 | 650           | 500                         | 66.7 |
|                              | Fostering environment industry                               | 100           | 67                          | 67.0 |
|                              | Natural gas provision facilities                             | 150           | 100                         | 66.7 |
|                              | Environment improvement fund                                 | 600           | 400                         | 66.7 |
| Environment Information      | Building of national environmental information network, etc. | 297           | 227                         | 76.4 |

### Development of Small and Medium Environmental Businesses and the Expansion of Support for their Operation

Funding for solving the difficulties of small- and medium-sized environmental businesses will be expanded, such as the support for the establishment and overseas expansion of promising environmental industries (KRW 10 bln), support for investment in recycling facilities and funds for the management of recycling enterprises (KRW 65 bln).

Also, a separate ordering and common contract work system will be introduced to enable small and medium environmental businesses with excellent environmental technologies to participate equally with large corporations in the construction of environmental facilities.

In addition, an examination on the production process of small- and medium-sized companies and technology examination/consultation on the improvement/establishment of facilities for emissions prevention will be implemented through 18 regional environmental technology development centers.

## Green Job Creation

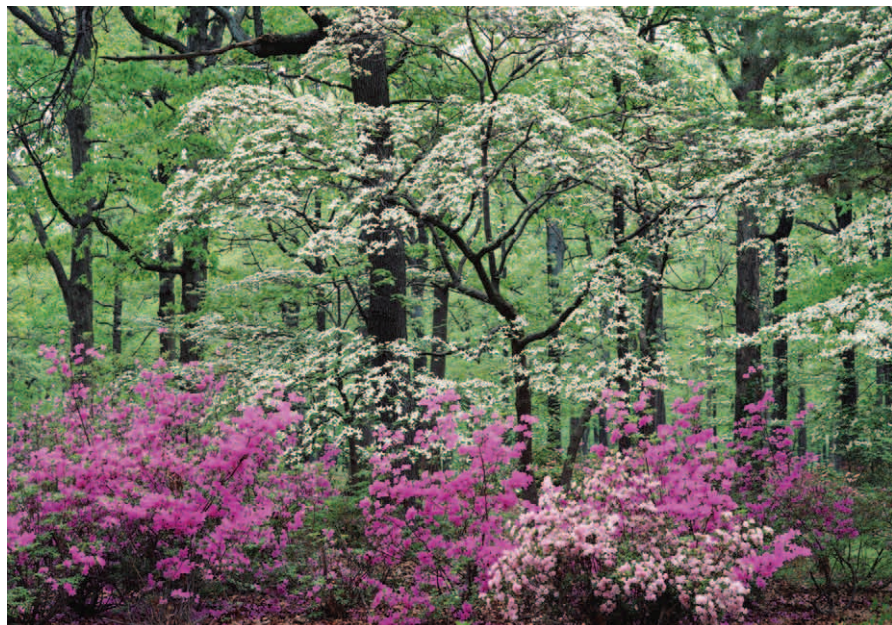
### Create 43,000 green jobs in four major sectors

Through early budget execution and support for the private sector, 5,800 short-term jobs will be created in the environmental service sector, including natural park guards; 3,400 internship or part-time jobs for university students; 20,000 specialized jobs will be created by expanding environmental infrastructure projects, such as sewage treatment plants and large water pipes; 1,400 professional workers in promising environmental industries in the fields of climate change response, eco-design, restoration of soil and groundwater and waste-to-energy; and 12,000 jobs in environmental industry plants, environmental consulting and promising environmental technology development.

## Action Plan for Developing Environmental Policy

### Promotion of Green Growth

Countermeasures against climate change, such as promoting a carbon labeling system (expansion of categories of products subject to the system: 10 in 2008 → 50 in 2009), arranging a guideline for the assessment of the environmental impact of greenhouse gases and establishing a greenhouse



gas emission DB per local government will be promoted; and 「eco-energy towns」 in landfill sites in metropolitan areas will be created, along with projects for recovering energy from waste resources and biomass, such as creating 600 low-carbon, green-growth villages.

Also, 10 major green technologies and industries will be selected and intensively developed/fostered, including the environmental plant industry, carbon market and the soil purifying industry, so that Korea could be among top 5 environmentally-friendly countries by 2020.

Figure2. Goals

| Category   | Goals for 2012   |
|--|--|
| Environmental Plant Business                         | <ul style="list-style-type: none"> <li>• Develop sewage and wastewater treatment technology with zero pollution burden</li> <li>• Amount of export : 1.3 trillion KRW('06) → 8 trillion KRW('12)</li> </ul>                    |
| Green Car  | <ul style="list-style-type: none"> <li>• Change every intra-city bus to CNG</li> <li>• Replenish 100 thousand hybrid vehicles</li> </ul>   |
| Carbon Market as a Countermeasure for climate change | <ul style="list-style-type: none"> <li>• Promote common use of non-CO<sub>2</sub> greenhouse gas reduction technology</li> <li>• Foster 1 trillion KRW of carbon market</li> </ul>   |
| Weather Service Industry                             | <ul style="list-style-type: none"> <li>• Develop weather information application technology and weather control technology</li> <li>• Create selling market of 100 billion KRW</li> </ul>                                      |
| Resource Recovery Industry                           | <ul style="list-style-type: none"> <li>• Develop technology based on recycling</li> <li>• Achieve 16.9% of resource circulation of abandoned electric appliances</li> </ul>  |
| Soil Purification Industry                           | <ul style="list-style-type: none"> <li>• Foster soil purification market of 5trillion KRW-worth scale('15)</li> <li>• Construct 5 regional soil bank complexes('20)</li> </ul>   |
| Biological Resource Industry                         | <ul style="list-style-type: none"> <li>• Utilize biological resources and develop restoration technology</li> <li>• Create biological resources cluster</li> </ul>   |
| Ecological Tourism Industry                          | <ul style="list-style-type: none"> <li>• Form regions of excellent natural environment into tourist attractions</li> <li>• Occupy 5% of domestic tourism market</li> </ul>   |
| Environmentally-Friendly Product Industry            | <ul style="list-style-type: none"> <li>• Develop technology for environmentally-friendly products</li> <li>• Foster 20 billion KRW-worth of environmentally-friendly product market</li> </ul>                                 |
| Environmental Consulting Industry                    | <ul style="list-style-type: none"> <li>• Introduce policy for public notice of environmental information of corporations</li> <li>• Form domestic environmental consulting industry of 1.5 trillion KRW-worth scale</li> </ul> |



### **Promote Green Living Policy that Satisfies the People**

Many other projects will be established with regard to the improvement of the damaged environments of the environmentally vulnerable classes, such as performing diagnoses on the environmental safety of playgrounds, the diagnosis and improvement of indoor air quality in facilities for children and environment-friendly health aides' visiting low-income families and families in vulnerable areas.

Additionally, for the scientific and systematic management of asbestos, which is the first-grade carcinogenic substance, the standard for asbestos control in sites for redevelopment/reconstruction will be developed and/or promoted, and a 「Center for Reporting Damage from Asbestos」 will be established to receive reports of damage and to provide service for the investigation and analysis of cases of damage.

Meanwhile, in order to enhance the precision of weather forecasts, new projects, such as the launching of independently-developed communications, ocean and meteorological satellites (COMS), allowing weather forecasts for private business, and real-name forecasting will be promoted; and a special weather report system for heat wave, fog and other conditions will be expanded.

Also, in order to expand the national movement for saving resources and making prudent purchases, flea markets (more than one in each city/county/district) will be held regularly, and an online market for recycled products will be opened.

### Improve Environmental Regulations

In order to reduce the factors that cause public inconvenience and the obstruction of entrepreneurial activities such as uniform regulations, improvements on science-based environmental regulations will be continuously promoted.

A remote measuring system will be introduced, so that vehicles that emit a small amount of pollutants will be exempt from inspections for gas emissions, and regulations that restrain the development and use of technology irrelevantly to environmental performance will be improved.

Also, uniform regulations on nature conservation areas in metropolitan areas will be changed to an emission cap system and an emission reduction system to solve public grievances of relevant regions; an environmental assessment system that will shorten the time needed for impact assessment (15 months → 10 months) and an environmental impact assessor system will be introduced to enhance the reliability of assessment; and an 「Impact Assessment Information System」 will be established.



## Major Legislative Plan for 2009

| Enacted/revised Acts  | Direction of Improvement  | Schedule   |
|---|---|--|
| Framework Act on Environmental Policy<br>Act Relating to Special Accounting for Environmental Improvement   | · Absorb and integrate into 「Framework Act on Environmental Policy」   | * Submit to Ministry of Government Legislation (Jan. '09)<br>* Submit to National Assembly (Mar. '09)  |
| Development of & Support for Environmental Technology Act<br>Act on Promotion of the Purchase of Environment-Friendly Products  | · Rename and integrate into 「Environmental Industry Development Act」  | * Submit to Ministry of Government Legislation (Aug. '09)<br>* Submit to National Assembly (Oct. '09)  |
| Environment Improvement Expenses Liability Act, partly revised  | · A new provision on the succession of obligation for payment, etc.   | * Submit to Ministry of Government Legislation (June '09)<br>* Submit to National Assembly (Sept. '09) |
| Persistent Organic Pollutants (POPs) Control Act, integrated into other acts and then annulled  | · Integrate into the Acts on management of different materials, such as the Act on Waste Management               | * Submit to Ministry of Government Legislation (July '09)<br>* Submit to National Assembly (Sept. '09) |
| Indoor Air Quality Control in Public Use Facilities, etc. Act, partly revised   | · Foundation for establishing automatic measurement network and utilization of collected information              | * Submit to Ministry of Government Legislation (Aug. '09)<br>* Submit to National Assembly (Oct. '09)  |
| Act Relating to the Han River Water Quality Improvement & Community Support   | · Introduce Total Maximum Daily Load System   | * Submit to Ministry of Government Legislation (Mar. '09)<br>* Submit to National Assembly (May '09)   |
| Act Relating to the Han River Water Quality Improvement & Community Support<br>Act on the Nakdong River Watershed Management & Community Support<br>Act on the Geum River Watershed Management & Community Support<br>Act on the Yeongsan & Sumjin River Watershed Management & Community Support | · Rename and integrate into 「Act on the Five Major River Water Systems Management and Community Support」          | * Submit to Ministry of Government Legislation (Oct. '09)<br>* Submit to National Assembly (Dec. '09)  |
| Act on the Promotion and Support for the Reuse of Water, enacted  | · Promote the reuse of treated sewage water and rainwater, etc.   | * Submit to Ministry of Government Legislation (June '09)<br>* Submit to National Assembly (Sept. '09) |
| Management of Drinking Water Act, partly revised  | · Introduce quality certification policy, etc.  | * Submit to Ministry of Government Legislation (July '09)<br>* Submit to National Assembly (Oct. '09)  |
| Soil Environment Conservation Act, partly revised   | · Prepare method for fostering soil industry, etc.  | * Submit to Ministry of Government Legislation (July '09)<br>* Submit to National Assembly (Oct. '09)  |
| Prior Environmental Review System(PERS) sector of Framework Act on Environmental Policy<br>Environmental Impact Assessment Act  | · Rename and integrate into 「Environmental Impact Assessment Act」   | * Submit to Ministry of Government Legislation (Jan. '09)<br>* Submit to National Assembly (Mar. '09)  |
| Waste Control Act, partly revised   | · Introduce the concept of low carbon, green growth, etc.   | * Submit to Ministry of Government Legislation (Oct. '09)<br>* Submit to National Assembly (Dec. '09)  |
| Weather Industry Promotion Act, enacted   | · Operate the registration system of weather forecasting business, evaluating business, consulting business, etc. | * Submit to National Assembly (Sept. '08)  |





## 6-1. Achievements in 2007

The year 2007 was a year of the promotion of environmental conservation policies for the improvement of the living environment such as the residential environment in cities and protection of the public health. In order to achieve the vision of 'Beautiful Environment, Healthy Future,' the Ministry of Environment promoted environmental measures such as forming an ecologically healthy and pleasant urban environment, strengthening environmental conservation policies to protect the public health, preventive management of land environment, securing a system for forming an ecologically healthy and sustainable water environment, saving resources and enhancing resource circulation, promoting the environmental friendliness of the government, local governments and corporations and strengthening international cooperation.

### 1. Ecologically Sound and Healthy Urban Environment

In order to establish a management system for a sustainable urban environment, a diagnosis of and goals for environmental ecology of cities have been presented and the assessment index for the urban environment has been developed (Oct. 2007) to consider the environment first in land use plans. Also, when calculating environmental capacity for establishing a city plan, a calculation method for environmental capacity centered on available green land in cities has been developed (Dec. 2007), and a forum on an urban environment policy has been formed to set up a mid- and long-term direction of urban environmental policy (Apr. 2007).

Meanwhile, the policy for enhancing an ecologically-friendly urban environment has been strengthened. A guide on how to write out a biotope map (map of the current status of city ecology), which ranks the ecological type and conservation value of each region for establishing an ecology network, has been arranged (Mar. 2007) to be used in the environmental examination when establishing a city plan and pursuing restoration and development projects. Also, a framework for establishing a broad ecological axis of the five major regions - the Han River and metropolitan areas, Chungcheong region,



Yeongsan River and Honam region, Nakdong River and Yeongnam region and Taebaek Gangwon region - has been established (Dec. 2007). In addition, an emission cap on air pollution was introduced for large businesses (Type 1) within the Seoul metropolitan area to reduce the emissions of major pollutants such as dust, sulfur and nitrogen oxides, while the system for emission trading was introduced (Jul. 2007~) to drive voluntary efforts to reduce the emissions from corporations. Moreover, in order to drive the early common use of low pollution vehicles, the supply of low pollution vehicles (1,289 vehicles in 2007) such as hybrid cars and natural gas intra-city buses (3,109 buses in 2007) has been continuously promoted (ratio of natural gas buses to total intra-city buses: 20 % in 2004 → 50 % in 2007).

There have been efforts to develop a model for regional development that can coexist with environmental conservation. A guideline that can be used by local governments in creating an eco-city that promotes regional development within the frame of environmental conservation policy has been arranged (Apr. 2007); and the establishment of a framework for creating eco-cities according to different city types such as areas of environmental damage, underdeveloped areas and areas under high pressure for development has been started (Sept. 2007).

## 2. A Strong Environmental Health Policy for the Protection of the Public Health

There have been efforts to expand infrastructure for environmental conser-



vation policies and to establish an investigation and supervision system for environmental diseases. Firstly, to protect the public health from environmental pollution and harmful substances, the 'Environmental Health Act' has been submitted to the National Assembly (Oct. 2007); and for scientific and systematic research on environmental diseases, three hospitals - Samsung Medical Center (atopy), Korea University Anam Hospital (asthma) and Dankook University Hospital (developmental disorders of young children) - have been designated as research centers for environmental diseases (Jun. 2007). Also, the establishment of a system to investigate health effects during an entire lifecycle of people has been promoted by investigating environmental diseases on 870 families of mothers and infants, 2,800 children and 150 elderly people.

Policies have been promoted to improve the living environment to protect the public health from harmful substances. A plan for the assessment and management of risks in places for children such as playgrounds has been established (Mar. 2007); a program for managing risk factors in children's products has been developed, the 「Persistent Organic Pollutants (POPs) Control Act」 has been enacted (Jan. 2007) for the safe management of persistent organic pollutants (POPs); and a plan for investment and management of endocrine disruptors has been established (Mar. 2007). Also, four substances including formaldehyde have been designated as restricted or prohibited substances (Mar. 2007) and a comprehensive plan for asbestos management has been established (Jul. 2007) as a foundation for safe management of specific harmful substances.

A system for chemical substance management has been developed and a national system for dealing with chemical accidents has been strengthened. In order to overcome new trade barriers that are based on the superior environmental technology of developed countries, such as EU's REACH that was enforced from June 2007, a 「Plan for Response to EU REACH」 has been arranged (Apr. 2007) in partnership with relevant ministries. Also, countermeasures against chemical accidents and terror attacks have been greatly strengthened with the development of a guideline on impact assessment, restoration and post-management of chemical accidents (May 2007), and a manual for crisis management in case of a chemical terror attack (Nov. 2007) as the use of chemicals has increased recently.

### 3. Conservation of Natural Resources and Preventive Management of the National Environment

By conserving natural resources and restoring the damaged ecosystem, the ecological foundation of the land has been secured. Five islands including Jam Island of Wando County, the Jeonnam Province, were designated as special islands (Nov. 2007) to prevent damage to the ecosystem. With the abolition of entrance fees for national parks, the rest-year system for nature has been expanded (Jan. 2007), the reservation system for the use of park facilities has been introduced (Jul. 2007) and restoration projects have been promoted in 18 national parks to restore the damaged ecosystem (19km, 7,677 million KRW), which are all examples of the strengthening of the ecosystem conservation measures. The outsourcing system on natural environment conservation projects has been recently developed to secure professional technology for restoring the ecosystem and the condition for promoting a large restoration business has been formed (May 2007, revision of the Natural Environment Conservation Act).

The foundation for a biological resources management system similar to those of developed countries has been laid, such as the opening of the National Institute of Biological Resources. An ecological nature map that shows the distribution of plants and endangered species, natural scenery and wintering places of migratory birds based on the National Survey on the Natural Environment (1997~2003) has been published (Apr. 2007). With the opening of the National Institute of Biological Resources, the government's

will to act upon the conservation of biological resources has been declared through the 「Vision to Strengthen National Sovereignty on the Fauna and Flora of Korea (Oct. 2007)」. Also, in order to prepare the necessary measures for climate change adaptation, the first stage of the National Long-Term Ecological Research has been completed on three sectors (land, fresh waters and coasts) and 10 regions (Dec. 2004~Mar. 2007). The investigation and discovery project of foreign biological resources (2007~2014) has begun, and the Agreement on the Protection of Migratory Birds between Korea and China has been concluded (Apr. 2007), which are all examples of strengthening international exchanges in the field of biological resource management.

Last but not least, efforts have been made to establish a comprehensive management system for the national environment that considers both environmental conservation and economic development. In order to strengthen the link between the environmental plan and the land plan, a rule has been jointly established by the Ministry of Environment and the Ministry of Land, Transport and Maritime Affairs (Jul. 2007), and an organization for coordinat-

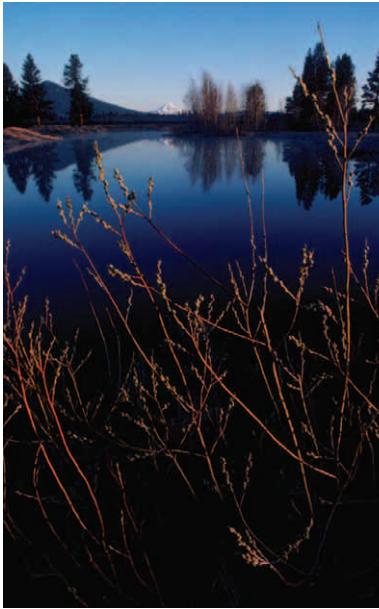


ing important matters has been organized. Along with this, guidelines for environmentally-friendly development have been arranged (Nov. 2007) to examine the environmental effects of major development plans before the execution of any development project.

#### **4. An Ecologically Sound Aquatic Environment and its Sustainable Use**

The health of the aquatic ecosystem has been restored and the management system for dangers to public waters has been strengthened. A ‘Standard for the Ecological restoration of Rivers (guidebook)’ has been established to restore the ecosystems of damaged rivers due to concrete dikes (Aug. 2007). Along with this, a project to restore the ecosystems of 63 streams has been promoted (Dec. 2007). A system for the reduction of ecotoxicity through the use of water fleas has been introduced (Dec. 2007) and the standard for permissible emissions per business has been improved (54 businesses out of the total number of 82), which shows a change from the traditional management system of organic substances such as the control of BOD and COD to the advanced management system of the aquatic environments based on the effects of organic substances on the entire ecosystem.





Efforts have been made to promote the advanced basin management system such as nonpoint pollution source control. Due to muddy water that increases when it rains, four regions including Lake Soyang had difficulties with basin management. These regions have been designated as regions of nonpoint pollution control (Aug. 2007) and the muddy water reduction project on high-land crop fields is being promoted. The non-point pollution control system has been strengthened by expanding the nonpoint pollution reporting to the entire projects on which environmental impact assessment should be conducted (Nov. 2007). To convert animal excreta into resources and for appropriate management, the “Subordinate Act for the Act on the Treatment and Usage of Animal Excreta” has been enacted (Sept. 2007) and a measure for supporting small-scale livestock farmhouses has been established (Nov. 2007).

A support system to ensure the global competitiveness of the domestic water industry has been constructed. A five-year plan for fostering the water industry has been developed (2007~2011) and the foundation for the overseas expansion of enterprises specializing in water has been formed. To meet an international standard on water supply and drainage service set by the International Organization for Standardization (Oct. 2007), a comprehensive assessment system for the domestic water industry has been constructed.

The foundation for the supply of clean and safe drinking water to the people has been further strengthened. By expanding the supply of water to vulnerable regions, the gap in the running water supply between cities and farming/fishing villages has been greatly reduced (rate of supply in farming/fishing villages: 37.7 % in 2005 → 48.0 % in 2007). Regarding large public use facilities (total floor area larger than 60,000m<sup>2</sup>) and public facilities (total floor area larger than 5,000m<sup>2</sup>), the examination and management of indoor water pipes has been made mandatory (Jan. 2007) as part of the effort to supply clean tap water.

## 5. Resource Saving and Improved Resource Circulation

The foundation for the promotion of resource circulation has been strengthened. From 2007, a five-year goal for waste recycling has been set and the 4th framework plan on resource recycling (2008~2012) has been established (Dec. 2007) to present important policy direction. While the harmful substances from waste electrical appliances and end-of-life vehicles are

regulated and the goal for the ratio of recycling has been set, the Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles (Apr. 2007) and its subordinate Act (Dec. 2007) have been enacted to set the standard for recycling.

Resource circulation policy that places importance on the quality of wastes to be recycled has been promoted. The Recycled Aggregate Quality Certification system was introduced (Jan. 2007). The higher value-added recycling of construction waste and food waste has been promoted by enhancing the quality of recycled products for feed and compost and changing the management method. For active recycling and the safe management of agricultural waste vinyl (359,000 tons as of 2005), a creative method has been applied to the existing policy centered on the establishment of public management facilities to use private facilities and technology. The use of waste heat from incineration facilities (10 facilities, 1,408 tons/day) has been promoted and the electricity generation facilities (50MW) within metropolitan landfill sites have actually begun to collect energy from the methane gas produced at their landfill sites.

The foundation for the management of harmful waste has been formed and the institutional foundation for the reduction and safe management of waste has been strengthened. While a management measure for harmful municipal waste, such as packaging materials of agrichemicals and medical waste, has been established and operated (Dec. 2007), a report system for the import and export of wastes that arouse concerns for harm to the human body (steel slag, cinders, etc.) has been introduced (Aug. 2007). The system for imposing charges on wastes has been improved (Mar. 2007) to adjust the rate of the charges to the level of waste treatment costs and the charges will be imposed on final products only.

## **6. Promotion of Environmental Friendliness of Government, Local Governments and Corporations and Closer International Cooperation**

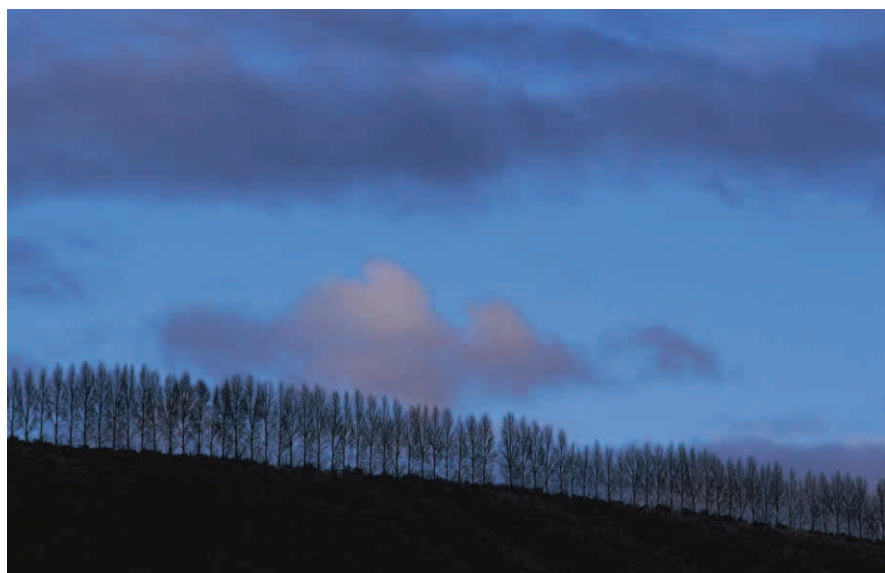
Various measures for dealing with climate change have been promoted. The greenhouse gas emission index has been developed, and a system to collect greenhouse gas emissions statistics has been established in the environmental sector, such as landfills, incineration and wastewater management, and the master plan for climate change adaptation has been established



(Dec. 2007). Also, research on the method of monitoring and impact assessment on ecological change has been promoted (2007) and the establishment of local government policy on climate change has been supported. For the creation of climate change model cities, a memorandum of understanding (MOU) has been contracted with eight local governments, three of which are Jeju island (Jul. 2007) and the cities of Gwacheon (Aug. 2007) and Changwon (Nov. 2007).

By fostering environmental technology and industry that will serve as a new growth engine and supporting such industry to advance into overseas markets, efforts have been made in securing global competitiveness. For the development of important technology that has high marketability and potential for success, two Eco-STAR task forces — the aquatic ecology restoration task force and the task force on recovering energy from waste resources and non-CO<sub>2</sub> greenhouse gases — have been recently launched (Dec. 2007). Also, a ‘Comprehensive Plan for Fostering the Environmental Industry’ has been established (Nov. 2007) for the systematic fostering of domestic environmental industries. Meanwhile, efforts have been put into the overseas expansion of domestic environmental industries, such as sending an environmental industry cooperation mission to well-known international environmental exhibitions and technology-related meetings (10 times in Shanghai, etc.).

A pilot project has been implemented for the improvement of the North Korean environment, and international environmental cooperation has been





strengthened to enhance the international status of Korea. The agreement on a project to improve the North Korean environment between Korea and UNEP has been contracted, a trust fund (one billion KRW) has been deposited (Nov. 2007) and an article on environmental regulations has been included in the ROK-US Free Trade Agreement (FTA) (Jun. 2007).

## 6-2. Major Tasks for 2008

### 1. Creation of Ecologically Sound and Healthy Urban Environment

Compared to quantitative urban growth, such as rapid urbanization and the growth of cities, people felt the environmental situation and services had not been improved as much. Under these circumstances, ecological space within cities has been expanded and systematic management of the urban environment has been promoted for the improvement of the urban environment where 90 % of the total population resides.

Firstly, scientific and systematic management of the urban environment enhanced urban sustainability. For scientific urban environment management based on environmental capacity, a regional pilot project has been promoted (2008~2009) and Green Cities have been designated. In addition, in order to obtain the conformity between urban planning and environmental planning, Chuncheon and Goseong in Gangwon-do have launched a pilot project to complement the environmental conservation plans of local governments (May 2008~2012) in order to encourage advanced urban environment management.

Secondly, Eco-space within cities has been increased. A project to increase the green space of subway stations has been promoted (2008~2009), and guidelines on investigation on the fauna of regions were set to support local governments to draw up an ecological status map, and financial assistance was provided to them by using the ecological conservation cooperation fund. Also, guidelines on the formation of urban ecological networks were arranged (Sept. 2008); investigation and assessment took place on the aquatic ecological health of urban rivers (640); and the ecological restoration projects of rivers were promoted (81 sites in 2008, 100km). Through these, an institu-



tional foundation was laid for the effective use of water, such as the recycling and reuse of rainwater, wastewater and sewage for domestic and industrial use, with the enactment of the 'Act on the Promotion and Support for the Reuse of Water' (expected to be submitted to the National Assembly in Dec. 2008).

Thirdly, urban air has been purified through a developed air policy. The emission cap on sulfur and nitrogen oxides was imposed on large businesses (Type 1) (Jan. 2008). For the second stage of the emission cap (July 2009~), an investigation on air pollutant emissions from Type 2 and 3 businesses took place (Apr. 2008~Nov.) and a plan for air quality improvement was established in cities with populations of more than 500,000 (Dec. 2008) to build the foundations for improving regional air environments.

Fourthly, environmentally-friendly urban traffic has been promoted. For the designation and operation of Low Emission Zones, the Special Act on Metropolitan Air Quality Improvement was prepared and a model promotion





program was established (Dec. 2008). Also, downtown air quality was improved by changing intra-city buses and garbage trucks to natural-gas powered vehicles (4,121 vehicles as of Apr. 2008) and by establishing the standard for permissible emissions of low-pollution vehicles (Sept. 2008). While the project to reduce emissions from in-use vehicles (111,000 vehicles in 2008) was being continuously promoted, the close inspection of in-use vehicles was extended to cities with populations of more than 500,000 (implemented in Jan. 2008) and a comprehensive computerized system was constructed for entire stages of vehicle emission management (Dec. 2008).

Last but not least, a safe and pleasant living environment was created. Regional measures for noise reduction were established; a standard for acceptable noise levels of manufactured or imported railroad cars was arranged (the revised version of the Noise and Vibration Control Act was submitted to the National Assembly in Feb. 2009); and the second 「Master Plan for Indoor Air Quality Control (2009~2013)」 was established (Dec. 2008). In order to reduce public grievances on odor from industrial complexes, green buffer zones (158,000m<sup>2</sup>) were created in the Yecheon-dong in the city of Ulsan, Sihwa and Banwol Industrial Complexes, the Seunggi riverside in the city of Incheon and the Gwangyang Bay area.

## **2. A Strong Environmental Health Policy for the Protection of the Public Health**

Firstly, infrastructure for environmental health policy was established and expanded. The number of research centers for five environmental diseases, including childhood tumors and respiratory ailments, was increased (Jun. 2008) to 11 centers nationwide in 2009. Also, the Environmental Health Act (Mar. 2008) and its subordinate acts (enforcement ordinance and regulations) were enacted; and the arrangement of an environmental health index has been promoted (2007~Dec. 2009) for the assessment on the outcomes of environmental health policies and a regional environmental health standard.

Secondly, the protection of the sensitive and vulnerable classes, including children, was strengthened. Safety management measures were arranged, such as assessments on the harmfulness of children's products and spaces, including daycare centers and schools. With this, an examination on the health impacts of environmental pollution (atopy, asthma, etc.) on mothers and infants has been conducted (2006~2010) and investigations and researches on environmental diseases have been carried out in urban areas, industrial complexes and rural areas (2005~2010).

Thirdly, efforts to strengthen the management of chemicals were strengthened. An active response was made to international chemicals regulations and a "Forum on Advanced Chemicals Management (Chairman: Vice-Minister of Environment)" was formed (Jun. 2008~) to arrange strong measures for a competitive chemical industry. Also, information on the emission of chemical substances that had been disclosed by industrial category, region and substance was made public by place of business (Aug. 2008). A comprehensive measure to foster and develop institutions for toxicity test on the human body and ecology (GLP institutions) (May 2008) was taken, and the number of test items on the harmfulness of new substances was increased from six to nine (revision of "Toxic Chemical Control Act," Jun. 2008).





Fourthly, the government responded effectively to the EU's REACH. In order for industries to successfully deal with prior registration under REACH, institutional improvements were made, such as providing support for companies and expanding domestic infrastructure. The safety control of specific harmful substances has been strengthened by operating a report system for PCBs-containing transformers (Jan. 2008~Jan. 2009) and establishing a standard for surface treatment of CCA-treated corrosion-resistant wood.

### 3. Conservation of Natural Resources and a Strong Preventive Management of the National Environment

With constantly rising demand for balanced national development and the improvement in income levels, the desire for an excellent natural ecosystem is increasing as well. For preventive national environmental control, policies for the effective protection of the national ecosystem and an improvement in the quality of life have been promoted.

Firstly, an eco-friendly national space was created by forming a network of eco-space. Investigation on ecosystems was conducted on Baekdudaegan, which ranges from the Songni Mountain to the Taebaek Mountain areas, the demilitarized zone where civilian passage is restricted, and three areas and 57 islands of Goheung-gun (2008). Based on the results of the investigation, ecosystem protection zones were designated in areas with well-preserved ecosystems, including inland wetlands, areas with excellent natural scenery, coastal sand dunes and uninhabited islands. Also, the 「Comprehensive Plan for Natural Environment Restoration」 was established (Oct. 2008) to promote restoration projects on damaged ecosystems of national parks (18 parks in 2008).

Secondly, the foundation for an international-level aquatic resource management system was built. The entire country was subject to a close inspection of biological resources in an effort to find new biological resources and to strengthen management of native and indigenous species. With this, long-term research projects on changes in the ecology of the Korean Peninsula has been promoted (2004~2013) to investigate, research and monitor changes in the national ecology due to climate change and environmental pollution.

Thirdly, for the creation of a natural environment in which wild animals and plants can coexist with humans, a pilot project for a national ecology path was promoted on the Toegye Path in Andong-si (2.9km) and a portal

site for ecological expedition was established. Educational programs in national parks were developed and relevant facilities were expanded to spread the culture of eco-tour and educational expedition.

Fourthly, a national environment management system that combines environmental conservation and development has been promoted. An environmental ecology plan has been reflected in development plans by carrying out development plans, environmental plans and environmental assessments in a comprehensive manner; and the unification of the legal basis of prior-environmental review system and environmental impact assessment was promoted for systematic management (Dec. 2008).

Last but not least, a reform in the service to support environmental assessment was promoted. A support team for the environmental assessment of industrial complexes was formed (May 2008), and a business manual was written and distributed (May 2008) to establish a helpful environmental assessment system, which assists companies to establish better plans from the beginning. The government expects that such measures will improve the quality of the assessment and simplify the procedures. Meanwhile, guidelines for the prior environmental review system of administrative plans were arranged (Dec. 2008) to maximize benefit to businesses, and a book on best practices in post management by small businesses was published. Also, an 「Environmental Impact Assessment Data Support System」 was expanded to provide quality information on assessments, such as data on environmental quality measurements and investigation on natural environment.

#### **4. An Ecologically Sound Aquatic Environment and its Sustainable Use**

Stepping out of the previous BOD-centered physico-chemical control on water quality, the water environment management paradigm was changed to a management system for an aquatic environment that is ecologically healthy as well as safe for the people to use; waterworks and drainage continued to expand in their supply for improving the living environment of the people; and a policy for sustainable use that goes along with the water circulation system was promoted.

Firstly, a customized water quality control system for safe water use was established. Measures to improve the control policy of organic substances in public basins were arranged (Dec. 2008), the Algae Prediction System was

operated (17 in 2007 → 20 in 2008) and the Tele-Monitoring System (TMS) for facilities that generate a large amount of water pollutants has been established (630 facilities by 2009) to construct water environment control systems that meet different water uses and to strengthen the monitoring system for water pollution.

Secondly, the system for the prevention and resolution of water pollution accidents was strengthened. In order to treat the run-off from water pollution accidents and initial rainwater, buffer storage tanks were installed and joint-training exercises to prepare for accidents took place (Apr, July and Aug. 2008). Meanwhile, with the introduction of an Whole Effluent Toxicity Management System (Dec. 2007), the cause of toxicity of wastewater was identified and the system for the reduction of toxicity was promoted (16 types of businesses in 2008) on facilities that generate wastewater with high ecological toxicity, which is part of the plan to further advance a control system for industrial wastewater.

Thirdly, an ecologically healthy aquatic environment was formed and damaged rivers (100km in 2008) and village ditches (20 in 2008) were restored, while an eco-belt (500,000m<sup>2</sup> in 2008) was created near rivers. To solve the problem of floating waste in estuaries that is repeatedly emerging every year, appropriate control measures were implemented (Dec. 2008). And the current local resident support system that just provides actual goods every year was changed to a more productive form of support such as a pilot project of indirect investment in agricultural corporations near the water system of the Han River (2008).







Fourthly, a control system for water pollutants has been optimized. While establishing detailed measures, such as installing pollution reduction facilities, to achieve the management goal of the Soyang River dam (an area of nonpoint pollution source control), a 「guideline for facilities for nonpoint pollution reduction and manual for maintenance」 was arranged (Dec. 2008) based on the result of a pilot project and monitoring that began in 2004.

Fifthly, a foundation for high-quality drinking water service and the supply of water by river basin was laid. Standards for establishing membrane filtration facilities were arranged (Dec. 2008) and the quality of running water was enhanced through the pilot project for the establishment of membrane filtration (Yeongdeungpo Filtration Plant). The introduction of a quality certification system for drinking water is expected to drive voluntary improvement of facilities and qualitative management, which will help build a world-class high-quality drinking water supply system. Also, a master plan for adjusting the water supply system was arranged (Dec. 2008) and four regions, including the Bukhan River, among nine major regions, became subject to close inspection.

Sixthly, the sewerage system centered on urban areas was expanded to agricultural/fishing villages and areas upstream of dams to raise the coverage of sewerage in areas below the county-level from 35.8 % in 2005 to 48 % in 2008, which reduced the gap in sewerage service between urban and rural areas. Also, in preparation for regulations on dumping sewage sludge into the sea, 588.3 billion KRW will be invested until 2011 to construct land disposal facilities.

Last but not least, for the establishment of foundation for soil and groundwater management, measures for the control of soil polluting substances, which consider both the harmfulness of pollutants and the usage of land, were established, and an improvement measure for a water quality standard for groundwater was arranged (Dec. 2008) to promote the safety of groundwater. Detailed inspection such as investigation on Norovirus was carried out in areas vulnerable to soil and groundwater pollution such as 100 metal mines, four large industrial complexes (including Seongseo in the city of Daegu) and groundwater fountains. Also, the status of soil and groundwater pollution in areas adjacent to the facilities and areas granted to U.S. Forces Korea (three regions including Gunsan) was investigated to enhance the health of residents and to minimize environmental damage.



## 5. Resource Saving and Improved Resource Circulation

Along with the reduction and safe treatment of wastes, a policy for advanced resource management was promoted that recognizes the value of waste and promotes the resource circulation with high added value and waste-to-energy system.

Firstly, the use of electronic handover documents (including radio frequency identification) became mandatory when transferring possession of industrial waste (Aug. 2008) in order to ensure the safe management system for harmful wastes. The classification system by degree of harmfulness of medical waste was improved and a detailed management guideline was arranged for the generation, collection, transfer, disposal and treatment of medical waste. Also, an import and export report system on major wastes (metal slag, cinder, etc.) with concerns of environmental pollution and harm to the human body was launched (Aug. 2008) to strengthen the management system.

Secondly, value management and circulation of waste was promoted. To activate high value-added recycling of construction waste and food waste, the rate of the obligatory use of recycled aggregates was increased (10 % → 20 %) and the government promoted the recycling of waste asphalt concrete into higher value-added recycled asphalt concrete (for road construction). The quality of feed and compost made from food waste was enhanced to promote their consumption. Also, a notice on the use of recycled ash from municipal waste incineration was arranged (Dec. 2008), and the products subject to the Extended Producer Responsibility (EPR) System and waste charge system and their impacts on recycling were analyzed (Dec. 2008) to improve related systems.

Thirdly, for the resource circulation regarding electric/electronic appliances and vehicles, the use of six major harmful substances, including lead, mercury, hexavalent chrome and cadmium, was regulated (July 2008), and the standard for improvements in material and the structure of electric/electronic appliances was arranged (Jan. 2008~), which were plans to enhance eco-friendliness in the design and manufacturing process of products. Also, the obligatory annual rate of recycling of waste electric/electronic appliances was imposed (Jan. 2008) and a system for registering waste vehicle recycling businesses was implemented (Jan. 2008).

Fourthly, for a stronger foundation for the reduction and safe management of wastes, a regulatory system for the use of disposable products was



improved (June 2008) and measures to promote the reduction and recycling of packaging materials were arranged (Dec. 2008). Meanwhile, a guideline on reducing the industrial waste of five business categories, including organic compound manufacturing businesses, was prepared and for businesses slow in their waste reduction efforts, they were guided through technological diagnosis.

Fifthly, the promotion of waste-to-energy policy was optimized. The comprehensive plan for waste-to-energy (May 2008) and the implementation plan (Dec. 2008) of the comprehensive plan were established. More waste-to-energy facilities were built, such as 57 facilities including those for Refuse Derived Fuel (RDF) from combustible waste, boilers and food waste/organic waste-to-biogas; 27 facilities for collecting landfill gas from local governments landfill sites; and 42 facilities for collecting residual heat from incineration. Also, by constructing ‘waste-to-energy towns’ in four major regions of the country (central region, eastern region, Honam region, Yeongnam region), 50 % of the planned facilities were established. The measure for giving incentives on waste-to-energy businesses (Oct. 2008) and the measure for activating the utilization of collected residual heat from incineration (Dec. 2008) were arranged.

## **6. Establishing Integrated Mechanism for Environmental Conservation, and Economic and Social Development & Responding Actively to Global Environmental Problems Such as Climate Change**

By changing the management and operation methods of every sector of the society that affects the environment in environmentally friendly ways, Korea’s sustainability has been enhanced; the government forcefully responded to climate change, one of major international issues; it prepared for the observance of various international treaties; and it promoted international environmental cooperation in new areas.

Firstly, the foundation for promoting environmental policies was strengthened to enhance national environmental sustainability. To enhance the eco-friendliness of major national policies, a plan for promoting the environmental index was established (May 2008), and the accomplishments of every local government regarding Local Agenda 21 were assessed for an award to be given to excellent governments. The ‘Environmental Education Promotion

Act' was enacted (Feb. 2008) to build a foundation for systematic environmental education. The operation of a portal site expanded the infrastructure for cyber environmental education.

Secondly, the expansion of environmental investment resulted in a win-win scenario for both the environment and the economy and higher national competitiveness. By operating four Eco-STAR task forces (40 billion/year), including the 'Advanced Water Management Task Force', the potential for the success of newly developed technologies has been maximized (Sept. 2008~) and the 'Korea Environmental Industry and Technology Institute (including export-supporting teams)' was established (Jan. 2009) to provide one-stop service for foreign expansion (consulting on strategies to advance into foreign markets, export-related negotiations and agreements, financial support, etc.). Also, environment-friendly product exhibitions and purchase promotion competitions were held (Oct. 2008) for the substantial circulation and selling of environment-friendly products at the private level.

Thirdly, a project for improving old water pipes was promoted by attracting private investment in the water supply service, including adjustments in





water supply systems and prevention of water leaks. This is to increase the efficiency of water supply and sewerage management as well as to strengthen the international competitiveness of water supply and sewerage services. With this, a council for the overseas expansion of the water industry was formed (July 2008) to provide information on the trends of foreign markets and commercial viability; and the government supported companies to find or develop new overseas projects to build the infrastructure for water supply and sewerage services.

Fourthly, to strengthen the capacity to respond to climate change, the Comprehensive Plan on Combating Climate Change was set out which includes a Carbon Point system and low-carbon consumption and production of products (June 2008). Also, a 'carbon labeling system' was introduced (a certificate was given to the 10 categories of products in 2008 on a trial basis) that displays information on the amount of greenhouse gas generated in the lifecycle of a given product. A national campaign was launched (Jun. 2008) to raise the awareness of people and local governments on the importance of CO<sub>2</sub> abatement; and the number of model cities under the agreement between the Ministry of Environment and local governments to designate model cities for climate change response increased from three to seven.

Fifthly, the response to international environmental regulations and environmental cooperation with other countries were strengthened. Korea focused its capabilities on achieving its goal at working group meetings of international negotiations to build the post-2012 climate change framework according to the Bali Action Plan and meetings of the Conference of the Parties to the UN Framework Convention on Climate Change. Korea also played a leading role in global environmental cooperation by participating actively in international cooperation mechanisms, such as holding the 10th Meeting of the Conference of the Contracting Parties of the Ramsar Convention and participating in the Antarctic Treaty, the Convention on Biological Diversity, etc.

Last but not least, the Policy Consultation Forum of the Seoul Initiative on Green Growth was held (Sept. 2008, Cebu, the Philippines) in which Korea led the discussion on the direction of policy to realize green growth in the Asia-Pacific region. The government enhanced the eco-friendliness of free trade agreements such as the ROK-EU FTA, analyzed the impact of such agreements on the environment of Korea and came up with measures to deal with it.



# >>> 07

## The Status of the Environment in Korea

### 7-1. Nature

#### Nature & Geographical Features

The Korean territory is composed of a long peninsula which stretches out in the western and southern directions from the northeast part of the Asian continent and about 3,200 islands. The total area of the territory is around 221,000 km<sup>2</sup> (South Korea takes up 99,700km<sup>2</sup>, 48 % of the entire Korean peninsula), and the eastern part of the country is high land and the western part is low.

|                              |  |
|------------------------------|--|
| Area                         | Total area of around 221,000 km <sup>2</sup><br>(South Korea: 99,700 km <sup>2</sup> , 48% of the peninsula)   |
| Geographical Feature         | High east, low west  |
| No. of Islands               | More than 3,200  |
| Length of Coastline          | 11,352 km (including islands)  |
| Annual Average Precipitation | Annual Average: 500mm~1,500mm(Around 1,274mm in South Korea, less than 1,000mm in North Korea)<br>Per person: 3,000 tons/year, 9% of world average (34,000 tons) |

#### Fauna and Flora

As for natural vegetation, the deciduous broadleaf forest, which represents the vegetation of the natural forests in Korea, is distributed over the central region; non-deciduous broadleaf forest is distributed over the southern region and the east and west coastal regions; carpinus laxiflora forest is distributed over the valleys or the slopes of mountains where granite gneiss is exposed; and warm-temperate zone non-deciduous forest is distributed over the southernmost region and the islands off the southern coast.

Currently, around 100,000 species exist in Korea, and 29,916 species have been identified through survey of documents, including 18,117 species of fauna, 8,271 species of flora and 3,528 species of fungus and protista.

Table 10. Current Status of Biological Resources in Korea (18,117 Animals, 8,271 Plants, 3,528 Others)

(As of Dec. 31, 2006)

| Broad Classification | Narrow Classification   |                     | Species (No.) |                | Broad Classification | Narrow Classification | Species (No.)                       |                              |                          |
|----------------------|---|---------------------|---------------|----------------|----------------------|-----------------------|-------------------------------------|------------------------------|--------------------------|
| Animals<br>18,117    | Vertebrates<br>1,528  | Mammals             |               | 123            |                      | Plants<br>8,271       | Monocotyledons                      | 842                          |                          |
|                      |   | Fish                |               | 905            |                      |                       | Vascular<br>plants<br>4,662         | Dicotyledons                 | 2,815                    |
|                      |   | Reptiles/Amphibians |               | 43             |                      |                       |                                     | Pteridophytes<br>Gymnosperms | 314                      |
|                      |   | Birds*              |               | 457*           |                      |                       |                                     |                              | Bryophytes               |
|                      | Invertebrates 1<br>3,564  | Sponges             | 204           | Cnidarians     | 224                  |                       | Non-<br>vascular<br>plants<br>3,609 | Diatoms                      | 1,512                    |
|                      |   | Platyhelminthes     | 123           | Rotiferans     | 159                  |                       |                                     | Flagellates                  | 316                      |
|                      |   | Acanthocephala      | 1             | Kamptozoans    | 1                    |                       |                                     | Green Algae                  | 1,064                    |
|                      |   | Bryozoans           | 145           | Clams          | 9                    |                       |                                     | Stoneworts                   | 27                       |
|                      |   | Sipunculidans       | 9             | Mollusks       | 997                  |                       |                                     | Sea algae                    | 690                      |
|                      |   | Annelids            | 80            | Tardigradans   | 49                   |                       |                                     | Others<br>3,528              | Fungi (Lichens included) |
|                      |   | Arthropods          | 1,028         | Chaetognathans | 39                   | Protozoan             |                                     |                              | 736                      |
|                      |   | Echinoderms         | 107           | Urochordatans  | 89                   | Prokaryotes           |                                     |                              | 1,167                    |
|                      | Invertebrates 2<br>13,025                                       | Insects             |               | 11,853         |                      |                       |                                     |                              |                          |
|                      |   | Arachnids (Spiders) |               | 1,172          |                      |                       |                                     |                              |                          |
|                      | <b>29,916 species in total (Fungi are included in 'Others')</b> |                     |               |                |                      |                       |                                     |                              |                          |

### Protection of Wild Animals and Plants



The government has designated endangered species of wild animals and plants, and in the case of illegal poaching and picking of these animals and plants, a fine (no more than 3 million KRW) and/or imprisonment of five years at the maximum are imposed. Thirteen organizations (as of the end of Jun. 2008) have been designated as ex-situ conservation institutes, including the Seoul Grand Park and Halla Arboretum of Jeju Island, to artificially propagate endangered animals to return them to the nature as well as systematically protect endangered wild animals and plants. Since 2003, the government has provided financial support for the better protection and restoration of endangered species.



Table 11. Designated Endangered Species of Wild Fauna and Flora

(as of June 30, 2008)

| Classification      | Total      | Category I | Category II |
|---------------------|------------|------------|-------------|
| <b>Total</b>        | <b>221</b> | <b>50</b>  | <b>171</b>  |
| Mammals             | 22         | 12         | 10          |
| Birds               | 61         | 13         | 48          |
| Amphibians/Reptiles | 6          | 1          | 5           |
| Fish                | 18         | 6          | 12          |
| Insects             | 20         | 5          | 15          |
| Invertebrates       | 29         | 5          | 24          |
| Plants              | 64         | 8          | 56          |
| Sea Algae           | 1          | -          | 1           |

\* Category I: a species facing imminent extinction because of a decrease in the population caused by a variety of human and natural factors

\* Category II: a species likely to become endangered because its population is decreasing due to a variety of human and natural factors

Table 12. Endangered Species Category I (50)

| Classification            | Species   |
|---------------------------|---|
| Mammals (12)              | Myotis formosus chofukusei, Canis lupus coreanus, Vulpes vulpus peculiosa, Panthera pardus orientalis, Panthera tigris altaica, Lynx lynx, Lutra lutra, Zalophus californianus japonica, Ursus thibetanus ussuricus, Moschus moschiferus parvipes, Cervus nippon hortulorum, Naemorhedus caudatus |
| Birds (13)                | Egretta europaeus, Ciconia boyciana, Platalea leucorodia, Platalea minor, Cygnus olor, Haliaeetus albicilla, Haliaeetus pelagicus, Aquila chrysaetos, Falco peregrinus, Grus japonensis, Eurynorhynchus pygmeus, Tringa guttifer, Dryocopus javensis  |
| Amphibians & Reptiles (1) | Elaphe schrenckii   |
| Fishes (6)                | Pseudopungtungia nigra, Gobiobotia naktongensis, Koreocobitis naktongensis, Iksookimia choii, Pseudobagrus brevicorpus, Liobagrus obesus  |
| Insects (5)               | Callipogon relictus, Metopodontus blanchardi, Polyphylla laticollis manchurica, Aporia crataegi, Eumenis autonoe  |
| Invertebrates (5)         | Charonia sauliae, Cristaria plicata, Lamprotula coreana, Helice leachi, Gammarus zeongogensis   |
| Plants (8)                | Cotoneaster wilsonii, Cymbidium lancifolium, Cymbidium kanran, Aerides japonicum, Neofinetia falcata, Cypripedium japonicum, Diapensia lapponica var. obovata, Euchresta japonica   |

Table 13. Endangered Species Category II (171)

| Classification            | Species  |
|---------------------------|--|
| Mammals (10)              | <i>Prionailurus bengalensis</i> , <i>Martes flavigula</i> , <i>Callorhinus ursinus</i> , <i>Eumetopias jubatus</i> , <i>Phoca largha</i> , <i>Phoca</i> spp., <i>Pteromys volans aluco</i> , <i>Plecotus auritus</i> , <i>Murina ussuriensis</i> , <i>Mustela nivalis</i>  |
| Birds (48)                | <i>Ixobrychus eurhythmus</i> , <i>Gorsachius goisagi</i> , <i>Ciconia nigra</i> , <i>Branta bernicla</i> , <i>Anser fabalis</i> , <i>Anser erythropus</i> , <i>Anser cygnoides</i> , <i>Cygnus cygnus</i> , <i>Cygnus columbianus</i> , <i>Anas formosa</i> , <i>Aythya baeri</i> , <i>Mergus squamatus</i> , <i>Pandion haliaetus</i> , <i>Pernis ptilorhynchus</i> , <i>Milvus lineatus</i> , <i>Accipiter gentilis</i> , <i>Accipiter gularis</i> , <i>Buteo lagopus</i> , <i>Buteo hemilasius</i> , <i>Buteo buteo</i> , <i>Aquila clanga</i> , <i>Aquila heliaca</i> , <i>Aegyptius monachus</i> , <i>Circus cyaneus</i> , <i>Circus melanoleucus</i> , <i>Circus aeruginosus</i> , <i>Falco subbuteo</i> , <i>Falco columbarius</i> , <i>Falco amurensis</i> , <i>Grus grus</i> , <i>Grus leucogeranus</i> , <i>Grus monacha</i> , <i>Grus vipio</i> , <i>Gallinago cinerea</i> , <i>Otis tarda</i> , <i>Haematopus ostralegus</i> , <i>Charadrius placidus</i> , <i>Numenius madagascariensis</i> , <i>Larus saundersi</i> , <i>Larus relictus</i> , <i>Synthliboramphus wumizusume</i> , <i>Bubo bubo</i> , <i>Strix uralensis</i> , <i>Strix aluco</i> , <i>Dryocopus martius</i> , <i>Pitta nympha</i> , <i>Galerida cristata</i> , <i>Terpsiphone atrocaudata</i>   |
| Amphibians & Reptiles (5) | <i>Kaloula borealis</i> , <i>Rana plancyi</i> , <i>Chinemys reevesii</i> , <i>Eremias argus</i> , <i>Sibynophis collaris</i>   |
| Fishes (12)               | <i>Lampetra japonica</i> , <i>Lampetra reissneri</i> , <i>Acheilognathus signifer</i> , <i>Acheilognathus somjiniensis</i> , <i>Pseudopungtungia tenuicorpa</i> , <i>Gobiobotia macrocephala</i> , <i>Gobiobotia brevisbarba</i> , <i>Microphysogobio koreensis</i> , <i>Pungitius sinensis</i> , <i>Cottus poecilopus</i> , <i>Cottus hangiongensis</i> , <i>Pungitius kaibarae</i>   |
| Insects (15)              | <i>Nannophya pygmaea</i> , <i>Challia fletcheri</i> , <i>Lethocerus deyrollei</i> , <i>Cicindela hybrida nitida</i> , <i>Cicindela anchoralis punctatissima</i> , <i>Damaster mirabilissimus mirabilissimus</i> , <i>Gymnopleurus mopsus</i> , <i>Copris tripartitus</i> , <i>Osmoderma opicum</i> , <i>Chrysochroa fulgidissima</i> , <i>Psacothoa hilaris</i> , <i>Parnassius bremeri</i> , <i>Protantigius superans</i> , <i>Spindasis takanonis</i> , <i>Fabriciana nerippe</i>  |
| Invertebrates (24)        | <i>Verrucella stellata</i> , <i>Plexauroidea complexa</i> , <i>Plexauroidea reticulata</i> , <i>Euplexaura crassa</i> , <i>Plumarella adhaerans</i> , <i>Plumarella spinosa</i> , <i>Dendronephthya alba</i> , <i>Dendronephthya castanea</i> , <i>Dendronephthya mollis</i> , <i>Dendronephthya putteri</i> , <i>Dendronephthya suenoni</i> , <i>Dendrophyllia cribrata</i> , <i>Dendrophyllia micranthus</i> , <i>Tubastraea coccinea</i> , <i>Antipathes japonica</i> , <i>Scelidotoma vadososinuata hoonsooi</i> , <i>Ellobium chinense</i> , <i>Clithon retropictus</i> , <i>Koreanohadra koreana</i> , <i>Triops longicaudatus</i> , <i>Chasmagnathus convexus</i> , <i>Ophiacantha linea</i> , <i>Pseudomaretia alta</i> , <i>Sesarma intermedium</i>   |
| Plants (57)               | <i>Psilotum nudum</i> , <i>Isoetes japonica</i> , <i>Mankyua chejuense</i> , <i>Asplenium antiquum</i> , <i>Saururus chinensis</i> , <i>Sarcandra glabra</i> , <i>Quercus gilva</i> , <i>Brasenia schreberi</i> , <i>Euryale ferox</i> , <i>Thalictrum coreanum</i> , <i>Aconitum austrokoreense</i> , <i>Aconitum koreanum</i> , <i>Paeonia obovata</i> , <i>Ranunculus kazusensis</i> , <i>Jeffersonia dubia</i> , <i>Leontice microrrhyncha</i> , <i>Drosera peltata</i> var. <i>nipponica</i> , <i>Hylotelephium ussuriense</i> , <i>Astilboides tabularis</i> , <i>Kirengeshoma koreana</i> , <i>Corylopsis gotoana</i> var. <i>coreana</i> , <i>Echinosophora koreensis</i> , <i>Milletia japonica</i> , <i>Astragalus membranaceus</i> , <i>Paliurus ramosissimus</i> , <i>Berchemia berchemiaefolia</i> , <i>Hibiscus hamabo</i> , <i>Viola websteri</i> , <i>Viola raddeana</i> , <i>Eleutherococcus senticosus</i> , <i>Cicuta virosa</i> , <i>Bupleurum latissimum</i> , <i>Rhododendron aureum</i> , <i>Arctostaphylos rubra</i> , <i>Trientalis europaea</i> var. <i>arctica</i> , <i>Osmanthus insularis</i> , <i>Abeliophyllum distichum</i> , <i>Menyanthes trifoliata</i> , <i>Scrophularia takesimensis</i> , <i>Utricularia yakusimensis</i> , <i>Lasiacanthus japonicus</i> , <i>Leontopodium coreanum</i> , <i>Aster altaicus</i> var. <i>uchiyamae</i> , <i>Trillium tschonoskii</i> , <i>Smilacina bicolor</i> , <i>Polygonatum stenophyllum</i> , <i>Lilium cernuum</i> , <i>Lycoris chinensis</i> var. <i>sinuolata</i> , <i>Iris odaesanensis</i> , <i>Iris koreana</i> , <i>Iris dichotoma</i> , <i>Cypripedium guttatum</i> , <i>Galeola septentrionalis</i> , <i>Vexillabium yakushimensis</i> , <i>Cymbidium macrorrhizum</i> , <i>Sarcanthus scolopendrifolius</i> , <i>Coccoloba langsdorfii</i> (sea algae) |



### The Control of Poaching/Illegal Trade of Wildlife

To fully eliminate poaching, the government has installed a poaching prevention task force team in the Ministry of Environment, so as to organize private poaching control groups. The government has also placed poaching rangers in local environmental offices, cities and provinces to reinforce anti-poaching operations. As a result, 804 cases of illegal poaching were detected and punished in 2007. Additionally, the government collected poaching equipment jointly with civic groups, totaling 11,348 traps and snares in hills and mountains nationwide.

Table 14. Crackdown on Poaching/Illegal Trade in Wildlife by Year

(Number of cases as of Dec. 31, 2007)

| Year | Total | Poaching | Illegal Trade | Illegal Sale of Hunting Rifles | Illegal Trade in Stuffed Animals | Others |
|------|-------|----------|---------------|--------------------------------|----------------------------------|--------|
| '01  | 1,401 | 1,166    | 86            | 16                             | 3                                | 130    |
| '02  | 1,033 | 876      | 38            | 13                             | 3                                | 103    |
| '03  | 808   | 659      | 14            | 7                              | -                                | 128    |
| '04  | 762   | 653      | 13            | 2                              | -                                | 94     |
| '05  | 603   | 540      | 7             | 2                              | -                                | 54     |
| '06  | 678   | 580      | 3             | 5                              | 2                                | 88     |
| '07  | 804   | 710      | 3             | 6                              | 1                                | 84     |

### Natural Park Management

As of the end of 2007, Korea has a total of 76 natural parks (total area of 7,809km<sup>2</sup>), covering 7.8 % of the total territory, 20 of which are national parks, 23 are provincial parks and 33 are county parks.

Table 15. Korea's Natural Parks

(km<sup>2</sup>, as of Dec. 31, 2007)

|                         | Total | National Parks | Provincial Parks | County Parks |
|-------------------------|-------|----------------|------------------|--------------|
| Number of parks         | 76    | 20             | 23               | 33           |
| Area (km <sup>2</sup> ) | 7,809 | 6,580          | 784              | 445          |

Table 16. National Park Special Protection Zones (m<sup>2</sup>, as of Jan. 17, 2008)

| Classification   | in 2007                            | in 2008 (m <sup>2</sup> ) (planned) | Increase/Decrease                                       |
|--|------------------------------------|-------------------------------------|---|
| Total  | 54<br>(209,351,842m <sup>2</sup> ) | 59<br>(216,773,583m <sup>2</sup> )  | 5<br>(7,421,741m <sup>2</sup> )                         |
| Wild Plant Habitats  | 31<br>(31,004,142m <sup>2</sup> )  | 35<br>(31,687,992m <sup>2</sup> )   | Increased by 4<br>(683,850m <sup>2</sup> )              |
| Wild Animal Habitats   | 7<br>(176,130,000m <sup>2</sup> )  | 6<br>(182,824,500m <sup>2</sup> )   | Decreased by 1<br>(6,694,500m <sup>2</sup> )            |
| Wetlands   | 1<br>(30,000m <sup>2</sup> )       | 3<br>(44,641m <sup>2</sup> )        | Increased by 2<br>(14,641m <sup>2</sup> )               |
| Valleys  | 8<br>(219,700m <sup>2</sup> )      | 10<br>(372,450m <sup>2</sup> )      | Increased by 2<br>(152,750m <sup>2</sup> )              |
| Areas under Rest-Year System<br>(Damaged areas,<br>Eco-expedition paths) | 7<br>(1,968,000m <sup>2</sup> )    | 5<br>(1,844,000m <sup>2</sup> )     | Decreased by 2<br>(decreased by 124,000m <sup>2</sup> ) |

“National park special protection zones” are designated in national parks to protect important animals and plants, especially endangered species. A species restoration project for the Manchurian black bear has been implemented in the Jirisan Natural Park to propagate the existing population of wild Manchurian black bears to the level of Minimum Viable Population through immigration and Individual Management.

“National park special protection zones” (previously called the rest-year program) also include the habitats of rare species that have rich bio-diversity and eco-expedition paths severely damaged by too many visitors. The designation of the protection zones has proven to be effective in restoring vegetation and habitats in damaged areas. Therefore, the number of protection zones will be increased in 2008 to 59 sites in 16 parks (a total of 217km<sup>2</sup>).





## 7-2. Air

### Air

One of the major changes in air quality conservation policy in 2007 is the strengthening of air quality standards. With the public's demand for clean air and the necessity for establishing air quality standards on new air pollutants, standards for nitrogen dioxide and particulate matters have been strengthened and the standard on benzene has been newly set.

#### Changes in and Strengthening of Air Quality Standards

| Category   |                            | 1978                  | 1983                   | 1991                  | 1993                               | 2001                               | 2007                               |
|--|----------------------------|-----------------------|------------------------|-----------------------|------------------------------------|------------------------------------|------------------------------------|
| Sulfur Dioxide (ppm)                             |                            | 0.05/year<br>0.15/day | 0.05/year<br>0.15/day  | 0.05/year<br>0.15/day | 0.03/year<br>0.14/day<br>0.25/hour | 0.02/year<br>0.05/day<br>0.15/hour | 0.02/year<br>0.05/day<br>0.15/hour |
| Carbon Monoxide (ppm)                            |                            | -                     | 8/month<br>20/8hours   | 8/month<br>20/8hours  | 9/8hours<br>25/hour                | 9/8hours<br>25/hour                | 9/8hours<br>25/hour                |
| Nitrogen Dioxide (ppm)                           |                            | -                     | 0.05/year<br>0.15/hour | 0.05/year<br>0.15/day | 0.05/year<br>0.08/day<br>0.15/hour | 0.05/year<br>0.08/day<br>0.15/hour | 0.03/year<br>0.06/day<br>0.1/hour  |
| Particulate Matters ( $\mu\text{g}/\text{m}^3$ ) | Total Suspended Particles  | -                     | 150/year<br>300/day    | 150/year<br>300/day   | 150/year<br>300/day                | -                                  | -                                  |
|  | Particulate Matters (PM10) | -                     | -                      | -                     | 80/year<br>150/day                 | 70/year<br>150/day                 | 50/year<br>100/day                 |
| Ozone (ppm)                                      |                            | -                     | 0.02/year<br>0.1/hour  | 0.02/year<br>0.1/hour | 0.06/8hours<br>0.1/hour            | 0.06/8hours<br>0.1/hour            | 0.06/8hours<br>0.1/hour            |
| Lead ( $\mu\text{g}/\text{m}^3$ )                |                            | -                     | -                      | 1.5/3months           | 1.5/3months                        | 0.5/year                           | 0.5/year                           |
| Benzene ( $\mu\text{g}/\text{m}^3$ )             |                            | -                     | -                      | -                     | -                                  | -                                  | 5/year*                            |



The standard on sulfur dioxide was first established in 1978; environmental standards on carbon monoxide, nitrogen dioxide, total suspended particles, ozone and hydrocarbon were established in 1983; and the standard on lead was added in February 1991. In 1993, as some pollutants level reached the targets set by the standards, such as sulfur dioxide and carbon monoxide, the standards were strengthened (sulfur dioxide in 1993, carbon monoxide in 1995). Also, with increasing need for management of particulate matters that are harmful to the human body, a standard on particulate matters (PM10) was additionally established in 1995. In 2001, standards for sulfur dioxide, particulate matters (PM10) and lead were strengthened, and total suspended particles became exempt from the environmental standard. In 2007, standards on nitrogen dioxide and particulate matters were strengthened, along with a new standard for benzene (standard on nitrogen dioxide and particulate matters from 2007, and benzene from 2010).

## Changes in the Pollution Level per Substance

### Sulfur Dioxide(SO<sub>2</sub>)

Table 17. Changes in the Annual Average Concentration of Sulfur Dioxide

(Unit: ppm)

| City<br>Year | Seoul | Busan | Daegu | Incheon | Gwangju | Daejeon | Ulsan |
|--------------|-------|-------|-------|---------|---------|---------|-------|
| 1989         | 0.056 | 0.047 | 0.048 | 0.065   | 0.021   | 0.035   | 0.026 |
| 1990         | 0.051 | 0.039 | 0.041 | 0.044   | 0.017   | 0.029   | 0.027 |
| 1991         | 0.043 | 0.038 | 0.041 | 0.041   | 0.017   | 0.028   | 0.035 |
| 1992         | 0.035 | 0.033 | 0.040 | 0.036   | 0.017   | 0.022   | 0.033 |
| 1993         | 0.023 | 0.028 | 0.035 | 0.021   | 0.014   | 0.020   | 0.032 |
| 1994         | 0.019 | 0.023 | 0.038 | 0.022   | 0.013   | 0.021   | 0.031 |
| 1995         | 0.017 | 0.023 | 0.031 | 0.023   | 0.010   | 0.017   | 0.028 |
| 1996         | 0.013 | 0.022 | 0.023 | 0.012   | 0.008   | 0.015   | 0.022 |
| 1997         | 0.011 | 0.018 | 0.016 | 0.013   | 0.009   | 0.011   | 0.019 |
| 1998         | 0.008 | 0.015 | 0.014 | 0.009   | 0.008   | 0.009   | 0.015 |
| 1999         | 0.007 | 0.014 | 0.011 | 0.008   | 0.007   | 0.009   | 0.017 |
| 2000         | 0.006 | 0.010 | 0.009 | 0.008   | 0.006   | 0.007   | 0.013 |
| 2001         | 0.005 | 0.008 | 0.008 | 0.007   | 0.004   | 0.006   | 0.012 |
| 2002         | 0.005 | 0.007 | 0.006 | 0.006   | 0.004   | 0.004   | 0.010 |
| 2003         | 0.005 | 0.006 | 0.006 | 0.007   | 0.004   | 0.004   | 0.011 |
| 2004         | 0.005 | 0.007 | 0.006 | 0.007   | 0.004   | 0.005   | 0.010 |
| 2005         | 0.005 | 0.006 | 0.006 | 0.007   | 0.004   | 0.005   | 0.008 |
| 2006         | 0.005 | 0.006 | 0.006 | 0.007   | 0.004   | 0.004   | 0.007 |
| 2007         | 0.006 | 0.006 | 0.006 | 0.008   | 0.004   | 0.005   | 0.008 |

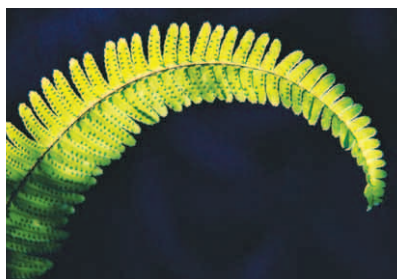


The table shows that SO<sub>2</sub> levels before 1996 in major cities exceeded an annual environmental standard of 0.02ppm, but have gradually declined due to the provision of low sulfur gasoline and the mandatory use of clean fuels. Notably, Ulsan city where large emitters are located shows higher concentrations of SO<sub>2</sub> than other cities, but the WHO recommended standard of 0.019ppm was achieved after 1997, and the overall average concentrations were 0.008ppm in 2007, lower than the environmental standard.

### Ozone(O<sub>3</sub>)

Table 18. Number of Ozone Warnings

| Year \ City | Seoul | Busan | Daegu | Incheon | Ulsan | Gyeonggi | Jeonnam | Gyeongnam |
|-------------|-------|-------|-------|---------|-------|----------|---------|-----------|
| 1995        | 2     | -     | -     | -       | -     | -        | -       | -         |
| 1996        | 10    | -     | -     | 1       | -     | -        | -       | -         |
| 1997        | 16    | -     | 1     | 2       | -     | 5        | -       | -         |
| 1998        | 17    | 3     | -     | 2       | -     | 16       | -       | -         |
| 1999        | 13    | 2     | -     | 4       | -     | 22       | -       | -         |
| 2000        | 16    | 3     | -     | 4       | -     | 29       | -       | -         |
| 2001        | 5     | 2     | -     | 2       | 3     | 17       | -       | -         |
| 2002        | 1     | 2     | -     | 4       | -     | 38       | -       | -         |
| 2003        | 2     | 5     | 7     | 2       | 4     | 23       | 4       | -         |
| 2004        | 9     | 3     | 9     | 8       | 7     | 83       | 15      | 14        |
| 2005        | 17    | 2     | 1     | 7       | 3     | 39       | 8       | 2         |
| 2006        | 3     | 9     | 2     | 1       | 4     | 17       | 5       | 7         |
| 2007        | 20    | 1     | 1     | 11      | 8     | 16       | 22      | -         |



The frequency of excessive ozone events is more meaningful than changes in annual average ozone concentrations, because exposure to high ozone concentrations during the short term poses a threat to humans. According to Article 8 of the Clean Air Conservation Act, if the concentration of ozone exceeds 0.12ppm/hr, an ozone warning is announced by local governments. The table above shows the number of ozone warnings announced by major cities and provinces.

According to the Table above, the number of ozone warnings announced is on the rise in metropolitan areas of Seoul and Incheon, and special regulation regions of Ulsan and Jeonnam. In 2007, the number increased by an especially high rate in Seoul, Incheon and Jeonnam compared to the previous year.

#### Acid Rain

Table 19. Changes in the Annual Average of Rain Acidity (pH)

| City<br>Year | Seoul    | Busan    | Daegu    | Incheon  | Gwangju  | Daejeon  | Ulsan    |
|--------------|----------|----------|----------|----------|----------|----------|----------|
| 1998         | 4.9(5.7) | 4.7(5.4) | 5.4(6.1) | 4.4(5.1) | 4.8(6.2) | 4.7(5.8) | 4.9(5.6) |
| 1999         | 5.0(5.5) | 4.8(5.4) | 5.6(5.9) | 4.6(5.9) | 5.2(5.9) | 5.0(6.1) | 5.0(5.3) |
| 2000         | 4.8(5.7) | 4.9(5.8) | 5.8(6.2) | 5.0(5.8) | 5.2(5.9) | 4.7(6.1) | 5.0(5.7) |
| 2001         | 4.7(5.8) | 5.0(5.7) | 6.0(6.0) | 4.7(5.9) | 5.0(5.5) | 4.9(5.8) | 5.1(6.0) |
| 2002         | 5.0(6.0) | 6.2(6.3) | 5.6(5.9) | 4.8(5.6) | 5.1(5.4) | 5.1(5.6) | -        |
| 2003         | 4.8(5.0) | 4.9(5.6) | 4.8(5.2) | 4.7(4.9) | 5.0(5.2) | 4.7(4.9) | -        |
| 2004         | 4.5(4.9) | 5.0(5.3) | 5.3(5.4) | 4.7(5.2) | 5.2(5.4) | 4.8(5.0) | 5.0(5.2) |
| 2005         | 4.4(4.6) | 4.8(5.4) | 5.3(5.6) | 4.5(5.5) | 4.8(5.0) | 4.6(4.8) | 5.2(5.2) |
| 2006         | 4.7(4.8) | 5.7(5.7) | 5.5(5.6) | 5.4(4.8) | 5.2(5.4) | 4.7(4.8) | 5.0(4.9) |
| 2007         | 4.8(5.0) | 5.5(5.6) | 5.6(5.7) | 4.8(5.1) | 4.9(5.5) | 4.7(4.6) | 5.2(5.3) |

※ Weighted average (arithmetic average inside brackets)

Acid rain refers to rain below an acidity of pH 5.6 and it affects every constituent of the ecosystem such as lakes, valleys, mountains, forests, plants and animals. The cause of acid rain is sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) that are emitted from the combustion of mostly fossil fuel.

The table above shows a large variation in rain acidity (pH) of different regions. The rain acidity (pH) of Seoul, Incheon and Daejeon is relatively low compared to other regions, but rain acidity in Busan and Daegu is near the natural pH state of 5.6.



## Current Status of Substances under Strengthened Environmental Standards from 2007

Table 20. Changes in the Annual Average of Concentration of NO<sub>2</sub> and Fine Particles

| Air Pollutants         |      | NO <sub>2</sub> |       |       |       |       |       |       | PM-10                      |    |    |    |    |    |    |
|------------------------|------|-----------------|-------|-------|-------|-------|-------|-------|----------------------------|----|----|----|----|----|----|
| Environmental Standard |      | 0.03 ppm/year   |       |       |       |       |       |       | 50 µg/m <sup>3</sup> /year |    |    |    |    |    |    |
| City                   | Year | 01              | 02    | 03    | 04    | 05    | 06    | 07    | 01                         | 02 | 03 | 04 | 05 | 06 | 07 |
| Seoul                  |      | 0.037           | 0.036 | 0.038 | 0.037 | 0.034 | 0.036 | 0.038 | 71                         | 76 | 69 | 61 | 58 | 60 | 61 |
| Busan                  |      | 0.030           | 0.029 | 0.026 | 0.024 | 0.023 | 0.023 | 0.022 | 60                         | 69 | 55 | 60 | 58 | 59 | 57 |
| Daegu                  |      | 0.030           | 0.023 | 0.026 | 0.026 | 0.023 | 0.023 | 0.024 | 67                         | 71 | 59 | 58 | 55 | 54 | 53 |
| Incheon                |      | 0.027           | 0.027 | 0.030 | 0.028 | 0.025 | 0.029 | 0.031 | 52                         | 57 | 61 | 62 | 61 | 68 | 64 |
| Gwangju                |      | 0.026           | 0.021 | 0.019 | 0.019 | 0.021 | 0.024 | 0.023 | 57                         | 52 | 36 | 46 | 49 | 55 | 52 |
| Daejeon                |      | 0.025           | 0.020 | 0.018 | 0.022 | 0.020 | 0.020 | 0.019 | 48                         | 53 | 43 | 49 | 48 | 49 | 49 |
| Ulsan                  |      | 0.022           | 0.019 | 0.016 | 0.022 | 0.024 | 0.022 | 0.023 | 55                         | 54 | 40 | 50 | 50 | 52 | 53 |

To rationally adjust the standard for fine particles and nitrogen dioxide in areas where the standard level is achieved or where the standard is eased compared to developed countries, stronger standards have been applied since 2007. The annual average standard of NO<sub>2</sub> has been strengthened from 0.05ppm to 0.03ppm, and fine particles from 70µg/m<sup>3</sup> to 50µg/m<sup>3</sup>. Looking at the change in the concentration of the two substances, the concentration of NO<sub>2</sub> has hardly changed, and the new standard has been achieved in all regions except Seoul and Incheon.

Fine particles (PM-10) show a decrease, with a slight increase in some cities from 2007, but when the stronger standard was applied in 2007, all regions except Daejeon have not achieved the new standard.





## 7-3. Water

### Public Waters

#### Conservation of Aquatic Environments and Groundwater

##### Water Quality in Four Major Rivers

Overall, water quality in the four major rivers in South Korea has improved since 1997. Special measures for the four major rivers have been implemented since 1998, so as to put in place the river basin management system (e.g., Total Maximum Daily Load Management System), expand environmental infrastructure, and reinforce the emission standard.

The water quality of the Han River, which is the water supply source of 20 million people in Seoul and the surrounding metropolitan area, is at a level of 1.2mg/L on average in 2007, similar to the previous year. Water sources of the four major rivers are managed at the level of 1~2mg/L.

Table 21. Bod Measurement results of four major rivers

(Unit: mg/L)

| Classification    | 95  | 96  | 97  | 98  | 99  | 00  | 01  | 02  | 03  | 04  | 05  | 06  | 07  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Han (Paldang)     | 1.3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.4 | 1.3 | 1.4 | 1.3 | 1.3 | 1.1 | 1.2 | 1.2 |
| Nakdong (Mulgeum) | 5.1 | 4.8 | 4.2 | 3.0 | 2.8 | 2.7 | 3.0 | 2.6 | 2.1 | 2.6 | 2.6 | 2.7 | 2.6 |
| Geum (Daecheony)  | 1.2 | 1.5 | 1.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.1 | 1.1 | 1.0 |
| Yeongsan (Juam)   | 1.5 | 1.1 | 1.3 | 0.9 | 0.9 | 0.8 | 0.7 | 0.9 | 1.2 | 1.0 | 0.9 | 1.1 | 0.8 |

### Rate of Meeting Aquatic Environmental Standard

All streams nationwide are classified into 194 sections, for setting target water quality (e.g., BOD levels). The rate of said streams which meet the standard was 35.6 %, which is an increase compared to the 27.6 % in 2000.

| Watershed | '00              | '01              | '02              | '03              | '04              | '05              | '06              |
|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Nation    | 27.8<br>(54/194) | 29.4<br>(57/194) | 37.6<br>(73/194) | 49.0<br>(95/194) | 36.6<br>(71/194) | 42.3<br>(82/194) | 35.6<br>(69/194) |
| Han       | 38.5             | 42.3             | 53.8             | 57.7             | 53.8             | 53.8             | 42.3             |
| Nakdong   | 20.0             | 22.5             | 32.5             | 55.0             | 32.5             | 45.0             | 32.5             |
| Geum      | 34.2             | 26.3             | 31.6             | 44.7             | 34.2             | 44.7             | 36.8             |
| Yeongsan  | 8.3              | 25.0             | 25.0             | 41.7             | 16.7             | 16.7             | 25.0             |
| Sumjin    | 16.7             | 16.7             | 33.3             | 33.3             | 16.7             | 16.7             | 50.0             |
| Others    | 23.9             | 26.1             | 32.6             | 41.3             | 30.4             | 34.8             | 30.4             |

These new target standards were set and applied from 2007, according to 114 regions of “water system management zones” designated and noticed (Oct. 2006) in accordance with Common Watershed Maps by relevant ministries of water management such as Ministry of Land, Transport and Maritime Affairs. The individual rate of water quality standard achieved of four major rivers in 2007 is as follows: the Han River (82.1 %), the Nakdong River (78.8 %), the Geum River (59.1 %), and the Yeongsan/Sumjin and other rivers (64.5 %).

| Classification | Total (114)                 |          | Han (28)                    |          | Nakdong (33)                |          | Geum (22)                   |          | Yeongsan/Sumjin(31)         |          |
|----------------|-----------------------------|----------|-----------------------------|----------|-----------------------------|----------|-----------------------------|----------|-----------------------------|----------|
|                | Number of Achieved Sections | Rate (%) | Number of Achieved Sections | Rate (%) | Number of Achieved Sections | Rate (%) | Number of Achieved Sections | Rate (%) | Number of Achieved Sections | Rate (%) |
| '07            | 82                          | 71.9     | 23                          | 82.1     | 26                          | 78.8     | 13                          | 59.1     | 20                          | 64.5     |



## Water Supply and Sewerage

### Current Status of Waterworks Supply

As of December 2007, 46,057,000 people (92.1% of the total population) benefited from waterworks provided by 164 regional waterworks suppliers (7 in metropolitan cities, 1 special self-governing province, 75 cities and 81 counties) and one Seoul Metropolitan area waterworks supplier. The capacity of waterworks facilities is 31.265 million m<sup>3</sup>/day.

The daily water supply per capita is 340ℓ, which has been declining since 2001.

This is assumed that since the amount of water used is decreasing due to the installation of water-saving devices and reuse of gray-water, also that as the result of the continuous promotion for the rate of flowing water promotion, the amount of leakage of water is decreasing

Table 22. Status of Waterworks Supply by Year

| Classification  | 1997   | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total population (1,000 persons)                      | 46,876 | 47,171 | 47,543 | 47,977 | 48,289 | 48,518 | 48,824 | 49,053 | 49,268 | 49,599 | 50,034 |
| Population Benefiting from Waterworks (1,000 persons) | 39,607 | 40,190 | 40,948 | 41,774 | 42,402 | 43,021 | 43,633 | 44,187 | 44,671 | 45,270 | 46,057 |
| Water Supply Rate(%)                                  | 84.5   | 85.2   | 86.1   | 87.1   | 87.8   | 88.7   | 89.4   | 90.1   | 90.7   | 91.3   | 92.1   |
| Capacity of Facility (1,000m <sup>3</sup> /day)       | 23,695 | 25,695 | 26,590 | 26,980 | 27,751 | 28,561 | 28,462 | 23,156 | 30,950 | 31,138 | 31,265 |
| Water Supply Amount (ℓ/day · person)                  | 409    | 395    | 388    | 380    | 374    | 362    | 358    | 365    | 363    | 346    | 340    |

※ In case of the capacity of facility in 2004, metropolitan waterworks excluded

In comparison the level of supplied waterworks by regional size, the supply rate for seven special metropolitan/metropolitan area cities is 99.1%, 97.6% for city areas, 86.2% for towns and 45.2% for myeons in rural areas.

Table 23. Supply Ratio to Size of Regions (2007)

| Classification                                    | Total Population<br>(1,000 persons) | Population Benefiting<br>from Waterworks<br>(1,000 persons) | Water<br>Supply Rate<br>(%) | Water<br>Supply<br>(1,000m <sup>3</sup> /day) | Water Supply<br>Amount<br>(l/day · person) |
|---|-------------------------------------|---|-----------------------------|---|--|
| Nation  | 50,034                              | 46,625  | 93.2                        | 15,657  | 340  |
| Special Metropolitan/<br>Metropolitan Area Cities | 23,284                              | 23,121  | 99.3                        | 7,443   | 322  |
| City areas  | 17,672                              | 17,276  | 97.8                        | 7,002   | 406  |
| Towns   | 3,938                               | 3,457   | 87.8                        | 1,212   | 212  |
| Myeons  | 5,140                               | 2,772   | 53.9                        |   |  |

Regions where water is not supplied receive water from small facilities such as a village waterworks. The population of inhabitants who use village waterworks is 1,572,000 (3.1 %), those who use small water supply facilities number 601,000 (1.2%), those who use exclusive waterworks number 273,000 (0.5%) and those who use other facilities such as wells number 1,527,000 (3.1 %).

### Current Status of Sewerage Service

As of the end of 2007, the sewerage-to-population region (registered population divided by the population in sewerage service region) is 87.1%.

The capacity of 357 sewage service facilities across the nation is 23.946 million tons per day (including trial runs and partial operations).

Table 24. Trend of Sewerage Service

| Classification                                 | '98    | '99    | '00    | '01    | '02    | '03    | '04    | '05    | '06    | '07    |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total population (1,000 persons)               | 47,174 | 47,543 | 47,977 | 48,289 | 48,518 | 48,824 | 49,052 | 49,268 | 49,624 | 50,034 |
| Population Served by Sewers<br>(1,000 persons) | 31,099 | 32,539 | 33,843 | 35,369 | 36,760 | 38,449 | 39,924 | 41,157 | 42,450 | 43,568 |
| Facilities(No.)                                | 114    | 150    | 172    | 184    | 207    | 242    | 268    | 294    | 344    | 357    |
| Sewerage-to-Population<br>Ratio (%)            | 65.9   | 68.4   | 70.5   | 73.2   | 75.8   | 78.8   | 81.4   | 83.5   | 85.5   | 87.1   |
| Daily Capacity<br>(1,000 tons/day)             | 16,616 | 17,712 | 18,400 | 19,230 | 20,233 | 20,954 | 21,617 | 22,568 | 23,273 | 23,946 |

### Current Status of Sewer Pipelines Facilities

The total length of sewer pipelines was 96,280km, as of the end of 2007, which is 73.6% of the total planned length of 130,774km of the master plan for sewerage maintenance. Of those, 49,636km (51.6%) were combined sewer system pipelines, which simultaneously remove rain and sewage water, and 46,643km (48.4%) were separate sewer system pipelines that remove rain and sewage water separately.

Table 25. Current Status of Sewer Pipelines Facilities

(Unit: km)

| Classification     | '98      | '99     | '00     | '01     | '02     | '03     | '04     | '05     | '06     | '07     |        |
|--------------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| Expanded Plan      | 96,728   | 103,280 | 107,623 | 112,567 | 116,141 | 119,521 | 120,814 | 125,709 | 127,980 | 130,774 |        |
| Facility Extension | Total    | 62,330  | 64,741  | 68,195  | 71,839  | 75,859  | 78,605  | 82,214  | 85,755  | 91,098  | 96,280 |
|                    | Combined | 40,160  | 41,437  | 42,878  | 44,534  | 45,680  | 46,167  | 47,255  | 48,257  | 48,966  | 49,636 |
|                    | Separate | 22,170  | 23,304  | 25,317  | 27,305  | 30,179  | 32,438  | 34,959  | 37,498  | 42,132  | 46,644 |
| Supply Rate (%)    | 64.4     | 62.7    | 63.4    | 63.8    | 65.3    | 65.8    | 68.1    | 68.2    | 71.2    | 73.6    |        |



## Soil and Groundwater

### Soil

Currently, 16 substances including cadmium, copper, arsenic, mercury, oil and solvents that are causes of soil contamination have been labeled as soil contaminants and are subject to regulation. For each of these substances, a “soil contamination precautionary level” for contamination has been set, which indicates reasons for concern about possible damage to human health or assets, or adverse effects on the viability of animal and plant life. And a “soil contamination regulatory level” for situations in which measures are needed beyond the precautionary level has been established.

The soil contamination precautionary level divides total land into two categories, according to land use and the Cadastral Act: a “Ga” zone has a relatively low potential for soil contamination such as rice paddies, fields and forests; and a “Na” zone has a relatively high potential including plant lots, roads and railroad land.



Table 26. Soil Contamination Precautionary Levels and Regulatory Standards (Unit: mg/kg)

| Classification      | Category  | Cd  | Cu  | As | Hg | Pb    | Cr6+ | Zn    | Ni  | F     | OP | PC | CN  | Phenol | BTEX | TPH   | TCE | PCE |
|---------------------|-----------|-----|-----|----|----|-------|------|-------|-----|-------|----|----|-----|--------|------|-------|-----|-----|
| Precautionary Level | "Ga" zone | 1.5 | 50  | 6  | 4  | 100   | 4    | 300   | 40  | 400   | 10 | -  | 2   | 4      | -    | 500   | 8   | 4   |
|                     | "Na" zone | 12  | 200 | 20 | 16 | 400   | 12   | 800   | 160 | 800   | 30 | 12 | 120 | 20     | 80   | 2,000 | 40  | 24  |
| Regulatory Level    | "Ga" zone | 4   | 125 | 15 | 10 | 300   | 10   | 700   | 100 | 800   | -  | -  | 5   | 10     | -    | 1,200 | 20  | 10  |
|                     | "Na" zone | 30  | 500 | 50 | 40 | 1,000 | 30   | 2,000 | 400 | 2,000 | -  | 30 | 300 | 50     | 200  | 5,000 | 100 | 60  |

The Ministry established 250 stations nationwide in 1987 constituting the national soil monitoring network and began routine measurements. Starting in 1997, it expanded this to regional networks and by 2001 had established 4,500 stations. In 2007, it carried out a soil contamination investigation at 2,382 sites with 1,500 stations.

Table 27. Soil Monitoring Network & Investigation Sites (Unit: km/L)

| Classification        | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Total                 | 4,500 | 3,545 | 3,605 | 3,683 | 3,902 | 3,794 | 3,882 |
| Stations Tested (No.) | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| Sites Tested (No.)    | 3,000 | 2,045 | 2,105 | 2,183 | 2,402 | 2,294 | 2,382 |





As a result of operating the national soil monitoring network, it was found that the level of contamination as of the end of 2007 was similar to that in 2006. Levels of cadmium and copper were less than 20 % of the standard, Cr<sup>6+</sup>, organic phosphorous, PCB, phenol, TCE and PCE were not detected (less than marginal detection) and levels of mercury, lead, nickel and fluorine rose slightly. The pH ranged from 4.1~9.9, and the pH average was 6.7 (natural soil: 5.7).

Table 28. Average Level of Soil Contamination: Results From the National Soil Monitoring Network  
(Unit: mg/kg)

| Classification               | Cd    | Cu    | As    | Hg    | Pb    | Cr <sup>6+</sup> | Zn     | Ni     | F       | OP    | PCB   | CN    | Phenol | Oil   |        | TCE   | PCE   |
|------------------------------|-------|-------|-------|-------|-------|------------------|--------|--------|---------|-------|-------|-------|--------|-------|--------|-------|-------|
|                              |       |       |       |       |       |                  |        |        |         |       |       |       |        | BTEX  | TPH    |       |       |
| Average Level in 2007        | 0.063 | 3.799 | 1.064 | 0.053 | 5.068 | 0.000            | 83.324 | 11.052 | 209.941 | 0.000 | 0.000 | 0.003 | 0.000  | 0.009 | 21.557 | 0.000 | 0.000 |
| Average Level in 2006        | 0.076 | 3.587 | 0.481 | 0.025 | 5.395 | 0.000            | 82.318 | 10.222 | 280.109 | 0.000 | 0.000 | 0.010 | 0.000  | 0.000 | 16.207 | 0.000 | 0.000 |
| A Level of concern (Ga zone) | 1.5   | 50    | 6     | 4     | 100   | 4                | 300    | 40     | 400     | 10    | -     | 2     | 4      | -     | -      | 8     | 4     |
| Natural Content              | 0.040 | 0.48  | 0.089 | 0.085 | 3.06  | 0.09             | 54.27  | 17.28  | -       | -     | -     | -     | -      | -     | -      | -     | -     |

※ Natural content is the result of analyzing forest soil in Korea via the "Soil Contamination Process Test Method" (National Institute of Environmental Research, Study of Assessment and Establishment of Soil Contamination Standards (1), 2004)

The national average of contamination levels did not exceed soil contamination precautionary levels (based on a "Ga" zone) and the average level of pollutants such as cadmium, copper and lead were also around 1/10~1/20 of the precautionary levels. The average level of arsenic, zinc, nickel, fluorine and oil were from 1/2 to 1/5. In addition, organic phosphorus, PCB and PCE are below detectable levels.

### Groundwater

The supply of water was thus far reliant mostly on inland water. But surface water pollution, limitations on water supply due to the construction of dams and the rise in water consumption have led to more underground water being used. As of the end of 2006, there are 1.304 million (1,304,000) facilities that develop and use underground water.

As of the end of 2006, the total use of groundwater was still only at 32.1 % (3.75bil m<sup>3</sup>/year, except salt groundwater) of the developmental potential of

Korea's groundwater (11.67bil<sup>m</sup><sup>3</sup>/year), which signifies that the value of groundwater as an alternative source of water is very high. Groundwater pollution proceeds without detection, and once groundwater is polluted, it is difficult to restore to its original status. Thus, the development and use of the underground water supply should be appropriately operated without polluting the existing groundwater.

A groundwater monitoring network has also been put in place to provide regular updates on the status of groundwater quality and to monitor trends, so that basic data for policy formulation can be assured. As a result of the 2007 groundwater quality study, which monitored 2,499 sites once or twice a year, of the 4,828 test samples, 260 (5.4 %) did not meet water quality standards.

In terms of which criteria were not met, they were general bacteria-23 %, NO<sub>3</sub>-N 20 %, Cl-18 %, pH-15 %, and TCE-14 %. The cause for NO<sub>3</sub>-N not meeting the standard was insufficient management of groundwater wells due to infiltration of excreta and agricultural compost and for TCE, the standard was not met in industrial complexes and residential regions of urban areas due to fiber and metal washing. After 2004, when the category for groundwater quality standard became what it is today, the rate of excess was around 5 % with small fluctuations, which show that there were not many changes in recent groundwater quality.

Table 29. Yearly Status of Exceeding Groundwater Quality Standards

| Classification                  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Total Sites Tested (A)          | 3,861 | 3,882 | 3,934 | 3,865 | 4,760 | 4,740 | 4,828 |
| Sites Not Meeting Standards (B) | 189   | 143   | 142   | 212   | 230   | 299   | 260   |
| Ratio (B/A, %)                  | 4.9   | 3.7   | 3.6   | 5.4   | 4.8   | 6.3   | 5.4   |





## 7-4. Wastes and Recycling

### Status of Waste Generation

Total waste generation has shown an average annual increase of 4.5 % over the past five years (2002-2006). But total waste generation in 2006 was 328,954 tons per day, increased by about 8.1 % compared to the previous year (304,357 tons/day). Waste generated is composed of municipal waste (14.8 %), industrial waste (30.7 %) and construction waste (51.4 %), which accounts for the largest portion of waste produced. This ratio indicates that a dramatic increase in construction waste arose from an increase in construction and reconstruction and from the implementation of a waste reporting system.



Municipal waste was expected to steadily rise due to a rapid increase in population and economic growth. But policies for controlling waste generation (e.g., regulations on disposable goods and a Volume-Based Waste Fee System) have led to a gradual reduction in the amount of waste.

Industrial waste has increased an annual average of 5.4 % over the past five years (2002-2006) because of an increase in industrial activities, the expansion of economic activities and energy-intensive industrial/economic structures. But industrial waste in 2006 recorded 280,110 tons per day, an increase of 9.4 % from the previous year.

Table 30. Trends in Waste Generation

(Unit: ton/day)

| Classification          | 2000                      | 2001                      | 2002                      | 2003                      | 2004                      | 2005                      | 2006                      |
|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| <b>Total</b>            | 234,283                   | 261,032                   | 277,533                   | 303,029                   | 311,666                   | 304,357                   | 328,954                   |
| <b>Municipal Waste</b>  | 46,438<br>(0.98kg/person) | 48,499<br>(1.01kg/person) | 49,902<br>(1.04kg/person) | 50,736<br>(1.05kg/person) | 50,007<br>(1.03kg/person) | 48,398<br>(0.99kg/person) | 48,844<br>(0.99kg/person) |
| <b>Industrial Waste</b> |                           |                           |                           |                           |                           |                           |                           |
| <b>Subtotal</b>         | 187,845                   | 212,533                   | 227,631                   | 252,293                   | 261,659                   | 255,959                   | 280,110                   |
| Generation Facilities   | 101,453                   | 95,908                    | 99,505                    | 98,891                    | 105,018                   | 112,419                   | 101,099                   |
| Construction Waste      | 78,777                    | 108,520                   | 120,141                   | 145,420                   | 148,489                   | 134,906                   | 168,985                   |
| Designated Waste        | 7,615                     | 8,105                     | 7,985                     | 7,982                     | 8,152                     | 8,634                     | 10,026                    |

### Status of Waste Treatment and Disposal

In the case of municipal waste, the implementation of the “Volume-based Waste Fee System” has promoted waste separation and rapidly increased recycling, but on the other hand, the rate of incineration has gradually been on the rise. The recycling rate has shown a steady increase to 57.2 % in 2006. The rate of incineration has also increased to 17 % in 2006 from 11.7 % in 2000, whereas landfilling has continued to decline to 25.8 % in 2006.

Table 31. Status of Municipal Waste Treatment

(Unit: ton/day, %)

| Classification      | 2000             | 2001             | 2002             | 2003             | 2004             | 2005             | 2006             |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Generation</b>   | 46,438           | 48,499           | 49,902           | 50,736           | 50,007           | 48,398           | 48,844           |
| <b>Landfilling</b>  | 21,831<br>(47.0) | 21,000<br>(43.3) | 20,724<br>(41.5) | 20,450<br>(40.3) | 18,195<br>(36.4) | 13,402<br>(27.7) | 12,601<br>(25.8) |
| <b>Incineration</b> | 5,441<br>(11.7)  | 6,577<br>(13.6)  | 7,229<br>(14.5)  | 7,348<br>(14.5)  | 7,224<br>(14.4)  | 7,753<br>(16.0)  | 8,321<br>(17.0)  |
| <b>Recycling</b>    | 19,166<br>(41.3) | 20,922<br>(43.1) | 21,949<br>(44.0) | 22,938<br>(45.2) | 24,588<br>(49.2) | 27,243<br>(56.3) | 27,922<br>(57.2) |

The separation of food waste from other waste has been in place since direct landfilling was banned in January 2005. For this reason, while food waste generation has been on the rise, the rate of recycling food waste as livestock feed and compost is at 94 % as of 2006.

Table 32. Status of Food Waste Generation and Treatment (Unit: ton/day, %)

| Year | Generation | Recycling  | Landfilling | Incineration |
|------|------------|------------|-------------|--------------|
| 2000 | 11,434     | 5,161(45)  | 5,185(45)   | 1,088(10)    |
| 2001 | 11,237     | 6,378(57)  | 3,856(34)   | 1,003(9)     |
| 2002 | 11,397     | 7,130(63)  | 3,345(29)   | 922(8)       |
| 2003 | 11,398     | 7,718(68)  | 2,836(25)   | 844(7)       |
| 2004 | 11,464     | 9,316(81)  | 1,607(14)   | 541(5)       |
| 2005 | 12,977     | 12,105(93) | 356(3)      | 516(4)       |
| 2006 | 13,372     | 12,603(94) | 261(2)      | 508(4)       |

The rate of recycling industrial waste has been on the rise. As of 2006, of industrial wastes, 87.2 were recycled, 5.2 % went to landfills, 3.8 % were incinerated and 3.8 % were dumped at sea, etc.

In the case of industrial waste and construction waste, their recycling rates are very high at 73.0 % and 97.0 %, respectively, because they are mostly single material items that can be recycled with ease. But they show low incineration rates of 7.6 % and 0.7 %, respectively.

Table 33. Status of Industrial Waste Treatment (Unit: ton/day, %)

| Classification                          | 2000              | 2001              | 2002              | 2003              | 2004              | 2005              | 2006              |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>Total</b>                            | 187,845           | 212,533           | 227,631           | 252,293           | 261,659           | 255,959           | 280,110           |
| <b>Landfilling</b>                      | 29,904<br>(15.9)  | 32,677<br>(15.4)  | 34,303<br>(15.1)  | 29,377<br>(11.6)  | 26,043<br>(10.0)  | 21,431<br>(8.5)   | 14,646<br>(5.2)   |
| <b>Incineration</b>                     | 11,732<br>(6.2)   | 12,105<br>(5.7)   | 10,892<br>(4.8)   | 11,338<br>(4.5)   | 11,341<br>(4.3)   | 9,669<br>(3.8)    | 10,693<br>(3.8)   |
| <b>Recycling</b>                        | 138,031<br>(73.5) | 158,842<br>(74.7) | 172,323<br>(75.7) | 200,830<br>(79.6) | 212,728<br>(81.3) | 212,681<br>(83.1) | 244,126<br>(87.2) |
| <b>Others</b><br>(Dumping at sea, etc.) | 8,178<br>(4.4)    | 8,909<br>(4.2)    | 10,113<br>(4.4)   | 10,748<br>(4.3)   | 11,547<br>(4.4)   | 11,977<br>(4.6)   | 10,645<br>(3.8)   |

※ The amount of industrial waste generation includes industrial waste, construction waste and designated waste.

### Status of Waste Recycling

Waste paper, which takes a large portion of waste separation/collection is continuously increasing since a waste separation/collection system has been put in place through the implementation of the Volume-Based Waste Fee

System. The domestic use of waste paper is 80.8 % in 2007, up 5.4 % from 2006, whereas imports of waste paper are on the decline.

Table 34. Waste Paper Recycling (Unit: 1,000 tons)

| Classification                       | 2001        | 2002         | 2003   | 2004   | 2005   | 2006   | 2007   |       |
|--------------------------------------|-------------|--------------|--------|--------|--------|--------|--------|-------|
| Paper Production                     | 9,948       | 10,660       | 10,999 | 11,182 | 11,279 | 11,244 | 11,602 |       |
| Paper Consumption (A)                | 8,521       | 9,339        | 9,965  | 9,909  | 9,868  | 9,889  | 9,893  |       |
| Use of Materials                     | Total       | 10,316       | 10,540 | 10,897 | 11,479 | 11,436 | 11,599 |       |
|                                      | Pulp        | 3,108        | 2,943  | 2,955  | 3,082  | 2,935  | 2,932  |       |
|                                      | Waste Paper | Subtotal     | 7,208  | 7,597  | 7,942  | 8,397  | 8,501  | 8,667 |
|                                      |             | Domestic (B) | 5,251  | 5,999  | 6,611  | 6,875  | 7,086  | 7,455 |
| Import                               | 1,957       | 1,598        | 1,331  | 1,522  | 1,415  | 1,212  |        |       |
| Use of Domestic Waste Paper (B/A, %) | 61.6        | 64.2         | 66.3   | 69.4   | 71.8   | 75.4   | 80.8   |       |

The use of scrap totaled about 29.6 million tons in 2007, 76.7 % of this (22.716 million tons) was generated in Korea and 23.3 % (6.884 million tons) was imported. The scrap use rate in Korea in 2007 was at 41.2 %, a slight increase from 2006.

Table 35. Yearly Scrap Metal Recycling (Unit: 1,000 tons)

| Classification                       | 2001         | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   |
|--------------------------------------|--------------|--------|--------|--------|--------|--------|--------|
| Iron Material Consumption (A)        | 38,092       | 43,720 | 45,370 | 47,218 | 47,124 | 48,299 | 55,108 |
| Use of Scrap Metal                   | Total        | 22,454 | 23,773 | 23,394 | 25,923 | 25,640 | 29,600 |
|                                      | Domestic (B) | 15,726 | 16,550 | 17,160 | 18,375 | 18,825 | 18,490 |
|                                      | Import       | 6,728  | 7,223  | 6,234  | 7,548  | 6,816  | 5,778  |
| Use of Domestic Scrap Metal (B/A, %) | 41.2         | 37.9   | 37.8   | 38.9   | 39.9   | 38.3   | 41.2   |

In the case of metal cans, 60.7 % (159,000 tons) of the 321,000 tons generated in 2007 were collected and recycled.

Table 36. Yearly Metal Can Recycling (Unit: 1,000 tons)

| Classification     | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--------------------|------|------|------|------|------|------|------|
| Generation         | 359  | 366  | 384  | 360  | 331  | 330  | 321  |
| Recycling          | 180  | 168  | 195  | 159  | 146  | 159  | 195  |
| Recycling Rate (%) | 50.2 | 45.9 | 50.8 | 44.2 | 44.1 | 48.2 | 60.7 |

Separation of waste glass from other solid wastes has been expanded



and technologies for recycling waste glass continue to be developed. While the consumption of glass bottles has declined from 2005, in 2007, the use of waste glass was 533,000 tons, an increase from 531,000 tons in 2006.

Table 37. Yearly Recycling of Waste Glass (Unit: 1,000 tons)

| Classification           | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--------------------------|------|------|------|------|------|------|------|
| Glass Bottle Consumption | 738  | 794  | 756  | 760  | 776  | 749  | 731  |
| Use of Waste Glass       | 504  | 587  | 530  | 544  | 567  | 531  | 533  |
| Recycling Rate (%)       | 68.3 | 73.9 | 70.1 | 71.6 | 73.0 | 70.1 | 72.9 |

The Korean Tire Manufacturers Association has collected waste tires and provided them to recycling companies by using 30 collectors nationwide. 23.852 million (81.1 %) of the 29.420 million waste tires generated in 2007 were collected and recycled.

Table 38. Yearly Recycling of Waste Tires (Unit: 1,000 (No.))

| Classification     | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   |
|--------------------|--------|--------|--------|--------|--------|--------|--------|
| Generation         | 16,919 | 24,023 | 23,233 | 22,446 | 24,202 | 23,689 | 29,420 |
| Recycling          | 14,315 | 17,167 | 18,561 | 18,015 | 19,176 | 19,500 | 23,852 |
| Recycling Rate (%) | 84.6   | 71.5   | 79.9   | 80.3   | 79.2   | 82.3   | 81.1   |

237,788 tons of waste lubricant oil was generated in 2007 and 163,902 tons (68.9 %) of it was collected and recycled.

Table 39. Yearly Waste Lubricant Oil Recycling (Unit: tons)

| Classification       |       | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      |
|----------------------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Generation (A)       | Drums | 1,010,925 | 1,144,850 | 1,170,110 | 1,198,720 | 1,198,720 | 1,120,970 | 1,188,940 |
|                      | Tons  | 202,185   | 228,970   | 234,022   | 239,744   | 239,744   | 224,194   | 237,788   |
| Recycling (B)        | Drums | 521,067   | 731,843   | 758,390   | 769,474   | 746,296   | 732,495   | 819,508   |
|                      | Tons  | 104,213   | 146,369   | 151,678   | 153,895   | 149,259   | 146,499   | 163,902   |
| Recycling Rate (B/A) |       | 51.8      | 64.7      | 64.6      | 64.2      | 62.3      | 65.3      | 68.9      |



## 7-5. Toxics & Chemicals

According to the Toxic Chemicals Control Act, chemicals are divided into two groups: existing chemicals and new chemicals. The former includes 37,021 chemicals, designated and informed by the Minister of Environment after consultation with the Minister of Labor, which had been commercially used in Korea before Feb. 2, 1991 and 3,710 other chemicals were designated and informed by the Minister of Environment through the hazard assessment process after Feb. 2, 1991. New chemicals refer to those other than existing chemicals.

### Management of Existing Chemicals

Hazardous substances among the existing chemicals refer to toxic chemicals, observational chemicals, use-restricted/banned chemicals and accident precaution chemicals.

- **Toxic Chemicals:** 557 hazardous substances including benzene, and toluene
- **Observational Chemicals:** 21 substances with a potential hazard such as 4,4-bisphenol A
- **Restricted Chemicals:** 8 substances including CC14, malachite green, nonylphenol



- **Banned Chemicals:** 59 substances including DDT, PCBs, benzidine, asbestos (except white asbestos), penta-/octa- BDEs
- **Accident Precaution Chemicals:** 56 substances such as phosgene, benzene and benzoyl chloride (including 36 substances also designated as toxic chemicals) with a high accident risk or the huge potential for damage if an accident occurs

### Management of New Chemicals

The handling and manufacturing of new chemicals must go through the process of hazard assessment by the National Institute of Environmental Research before being manufactured and imported. If the hazard assessment meets the standard set by Article 2 of the enforcement decree of the Toxic Chemicals Control Act, the President of National Institute of Environmental Research will classify the substance as toxic or observational.

### Management of Hazardous Substances

Anyone who intends to handle toxic chemicals (including manufacturing, transportation, sale, use and storage of toxic substances) must register (registration and business licenses: authorized to city/province). The import of toxic chemicals must go through the process of declaration (declaration submitted to the Korea Chemicals Management Association). Handling observational chemicals is not subject to regulation. These chemicals can be manufactured and imported with only a declaration to the Association. Businesses wishing to import or sell restricted chemicals need permission and export of them requires approval of the authority (approval from River Basin or Regional Environmental Offices). The distribution of banned chemicals is not allowed in Korea. Anyone who handles chemicals considered highly likely to cause accidents in more than certain quantities must set up an emergency preparedness plan and submit it to the Mayor or the Director General of the Regional Environmental Office. If relevant facilities exist within the designated zone (e.g., a national industrial complex) in line with a presidential decree, local residents should be notified of their existence.

### The Status of Yearly Distribution of Toxic Chemicals

Distribution of toxic chemicals has been continuously increasing annually: 35,064 tons in 2007, up 70.6 % from 20,554 tons in 2000.

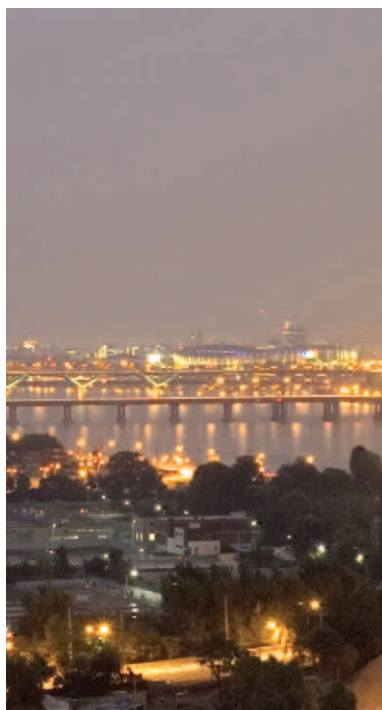


Table 40. Distribution of Toxic Chemicals by Year

(Unit: 1,000tons)

| Classification | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total(a+b)     | 19,611 | 19,985 | 20,554 | 21,159 | 24,446 | 25,833 | 31,058 | 31,788 | 32,294 | 35,064 |
| Production (a) | 15,269 | 16,409 | 16,566 | 17,616 | 20,806 | 21,791 | 26,688 | 26,103 | 27,017 | 29,019 |
| Imports (b)    | 4,342  | 3,576  | 3,988  | 3,543  | 3,640  | 4,042  | 4,370  | 5,685  | 5,277  | 6,045  |

### Promotion of Investigation on Chemicals Release and Reduction of Release

Toxics Release Inventory (TRI) is a system in which the concerned parties calculate the chemicals released into the environment (air, water, or soil) or transferred out of business sites to be recycled or treated in the process of manufacturing and report the calculated figures to the government. The government then adds them to a database so that the government, business and nongovernmental groups can share data. Businesses are facilitated to make efforts for reduction of chemicals release by being informed of the data through TRI.

Korea arranged a legal foundation for the implementation of chemicals management systems (Dec. 1996), such as enacting the Toxic Chemicals Control Act, reporting emission of chemicals, and protection for the confidential business of corporations, with the joining of the OECD in 1996. Since presenting the first investigation on release of 1999, released in 2001, the result of investigations on chemicals release is announced each year. In 2007, the result of the investigation of 2005 chemicals release was announced, and the investigation for 2006 was carried out.

Table 41. Result of Investigation on Chemicals Release

| Classification<br>Year | Generation (tons/year) |        |       |       | Transfer (tons/year) |            |         |
|------------------------|------------------------|--------|-------|-------|----------------------|------------|---------|
|                        | Total                  | Air    | Water | Soil  | Total                | Wastewater | Wastes  |
| 1999                   | 16,380                 | 14,860 | 1,316 | 204   | 30,867               | 1,333      | 29,534  |
| 2000                   | 30,143                 | 23,747 | 965   | 5,432 | 95,173               | 2,609      | 92,564  |
| 2001                   | 36,587                 | 34,518 | 433   | 1,636 | 254,324              | 62,922     | 191,402 |
| 2002                   | 34,272                 | 34,121 | 150   | 2     | 282,622              | 62,325     | 220,297 |
| 2003                   | 38,041                 | 37,919 | 115   | 7     | 323,674              | 46,849     | 276,825 |
| 2004                   | 51,021                 | 50,841 | 179   | 0.3   | 323,986              | 55,656     | 268,330 |
| 2005                   | 47,299                 | 47,048 | 250   | 0.3   | 331,125              | 53,806     | 277,319 |
| 2006                   | 47,796                 | 47,598 | 198   | 37    | 328,097              | 50,917     | 277,180 |

Note) With the extension of the items of investigation criteria in 2004 (240 items → 388 items) and the new subjects of investigation expanded (1,477 places), the amount of handled chemicals and chemicals release has increased.

## 7-6. International Environmental Cooperation

### Responding to Global Warming

Korea ranked 10th in the world in terms of CO<sub>2</sub> emissions (as of 2004, IEA) which have been on the rise due to Korea's continued economic growth and an energy-intensive industrial structure.

Among greenhouse gases, CO<sub>2</sub> emissions have increased to 88.5 % in 2002 from 83.6 % in 1990 (an annual rise of 5.7 % since 1990). Methane emissions have shown an annual decrease of 4.2 % due to a decline in farmland and the implementation of waste reduction measures. The ratio of methane emissions to other greenhouse gas emissions has dramatically dropped to 4.6 % in 2002 from 13.9 % in 1990. Greenhouse gases are believed to be emitted mainly from energy use, industrial processes and waste sectors.

Without a change in the current energy-intensive industrial structure and without dramatic measures to cut greenhouse gases, the upward trend in greenhouse gas emissions is expected to continue by 2020. In this case, if emissions are cut 10 % against the expected CO<sub>2</sub> emissions of 2020, 3.4 trillion KRW, or 0.29 % of GDP, could be lost. On the other hand, a reduction of CO<sub>2</sub> emissions by 10 % against 2010 levels could generate environmental co-benefits of \$5.16 billion because of the reduction in air pollutants, disease occurrence, death rates and agricultural damage. (Korea Energy Economics Institute, Korea Environment Institute)

While Korea sees the need for discussion on new flexible greenhouse gas reduction methods that consider social and economic situations of countries





for the sustainable development of developing countries, international pressure to participate in the effort to reduce greenhouse gas emissions will increase, as Korea is a member of the OECD and ranks 10th in the world in term of greenhouse gas emissions. Thus, active countermeasures will be necessary to meet the demand.

The government is comprehensively promoting its measures related to climate change treaties by establishing the 「Inter-Ministerial Committee on United Nations Framework Convention on Climate Change」 (1998) with the Prime Minister as the Chairman, and the succeeding 「Committee on United Nations Framework Convention on Climate Change」 (Sep. 2001).

The government established and promoted the comprehensive plan (three years) under the supervision of the Prime Minister's Office with relevant Ministries from 1999 to 2007 in three stages and established the fourth comprehensive plan (2008~2012) in December 2007 that includes the contents for building the foundation for promoting reductions in different sectors such as a voluntary agreement (VA) for industries, and for collecting statistics for greenhouse gas emissions.

While Ministry of Environment participated actively in the governmental discussion, it announced the Comprehensive Plan on Combating Climate Change (Jun. 26, 2008) with the recognition that the grass-roots participation from local governments and individual people is important in order to change into a low carbon society. In particular, considering the fact that climate change policies are implemented and practiced at the local level, the Ministry plans to encourage local government to carry out GHG emission investigation and to set up reduction target. In addition, the Ministry will select model cities for climate change response (voluntary agreements with 7 local governments, implementation of individual emission quota system and carbon point system, Jul. '07 - Jun. '08) to carry out projects customized for each localities. In addition, a waste-to-energy and non-CO<sub>2</sub> greenhouse gas task force teams have been established (2007) and are running a support program for technological development. Since March 2007, generation facilities (500MW/day) that use landfill gas have been established and are operating in metropolitan landfill sites. Also, with the official launch of negotiations on Post-2012 climate change framework after the adoption of the Bali Action Plan (Dec. 2007), an appropriate response is being made by developing the logic for a participatory method of burden sharing of greenhouse gas reductions and

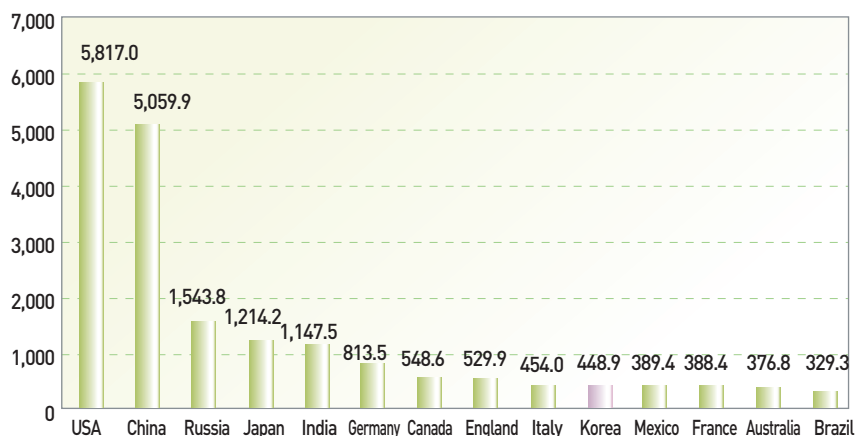
negotiations. International cooperation is being strengthened, such as forming stronger bilateral cooperation by completing MOUs with Great Britain, Canada and France, participating in Asia-Pacific Partnership on Clean Development and Climate and joining in Methane to Markets Partnership and International Partnership of the Hydrogen Economy.

Table 42. CO<sub>2</sub> Emissions of Major Countries (Fuel Combustion), 1990–2005 (Unit: Million tons CO<sub>2</sub>)

| Countries ('05 rank) | '90      |         | '95      | '00      | '02      | '03      | '04      | '05      |         |
|----------------------|----------|---------|----------|----------|----------|----------|----------|----------|---------|
|                      |          | Gravity |          |          |          |          |          |          | Gravity |
| U.S. (1)             | 4,850.5  | 23.1%   | 5,108.9  | 5,700.6  | 5,652.6  | 5,712.3  | 5,791.6  | 5,817.0  | 21.4%   |
| China (2)            | 2,210.9  | 10.5%   | 2,985.8  | 3,037.7  | 3,308.6  | 3,829.7  | 4,546.9  | 5,059.9  | 18.6%   |
| Russia (3)           | 2,188.6  | 10.4%   | 1,588.9  | 1,513.5  | 1,503.1  | 1,537.9  | 1,528.8  | 1,543.8  | 5.7%    |
| Japan (4)            | 1,058.0  | 5.0%    | 1,141.0  | 1,172.1  | 1,194.2  | 1,203.1  | 1,201.3  | 1,214.2  | 4.5%    |
| India (5)            | 586.9    | 2.8%    | 779.6    | 968.4    | 1,007.8  | 1,033.0  | 1,110.3  | 1,147.5  | 4.2%    |
| Germany (6)          | 967.6    | 4.6%    | 880.9    | 830.7    | 836.4    | 845.5    | 849.8    | 813.5    | 3.0%    |
| Canada (7)           | 428.8    | 2.0%    | 461.4    | 530.2    | 531.8    | 554.8    | 549.9    | 548.6    | 2.0%    |
| England (8)          | 557.6    | 2.7%    | 527.5    | 521.9    | 525.9    | 539.8    | 540.0    | 529.9    | 2.0%    |
| Italy (9)            | 398.4    | 1.9%    | 410.7    | 425.8    | 434.0    | 452.8    | 450.5    | 454.0    | 1.7%    |
| Korea (10)           | 227.1    | 1.1%    | 362.0    | 424.8    | 443.8    | 454.5    | 464.0    | 448.9    | 1.7%    |
| Mexico (12)          | 293.2    | 1.4%    | 310.2    | 357.3    | 360.2    | 367.9    | 373.7    | 389.4    | 1.4%    |
| France (13)          | 355.4    | 1.7%    | 357.3    | 379.3    | 378.6    | 387.2    | 386.7    | 388.4    | 1.4%    |
| Australia (14)       | 259.7    | 1.2%    | 280.0    | 339.5    | 346.7    | 348.1    | 354.7    | 376.8    | 1.4%    |
| Brazil (18)          | 192.7    | 0.9%    | 238.8    | 305.1    | 312.8    | 305.8    | 323.3    | 329.3    | 1.2%    |
| OECD                 | 11,091.6 |         | 11,569.3 | 12,496.6 | 12,541.3 | 12,774.4 | 12,884.7 | 12,909.7 |         |
| The World            | 21,024.4 |         | 21,807.8 | 23,487.2 | 24,075.6 | 25,090.1 | 26,319.9 | 27,136.4 |         |

(Source: CO<sub>2</sub> Emissions from Fuel Combustion 1971–2005 (IEA), pp.11.4–6, 2007)

Figure 3. CO<sub>2</sub> Emissions of Major Countries (Fuel Combustion, base year 2005) (Unit: Million CO<sub>2</sub> tons)



### Status of International Environmental Treaties

As global environmental problems have become a prominent issue in international society, various environmental treaties, which have a direct impact on each country's environmental policies and economic activities, have increased in number. There are about 220 international environmental treaties in the fields of air, water quality, waste and natural environment. As of the end of 2007, Korea has signed 47 treaties including the United Nations Framework Convention on Climate Change; the Vienna Convention for the Protection of the Ozone Layer; the Montreal Protocol on Substances that Deplete the Ozone Layer; the Convention on International Trade in Endangered Species of Wild Fauna and Flora; the Convention on Biological Diversity; the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; and the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa.

Table 43. Status of International Environmental Treaties & Treaties Signed by Korea

| Classification | Total | Air & Climate | Freshwater Protection | Marine & Fishery | Nature & Biological Resources Protection | Nuclear Safety | Hazardous Substances & Waste | Others |
|----------------|-------|---------------|-----------------------|------------------|--|----------------|------------------------------|--------|
| Adoption       | 221   | 14            | 15                    | 86               | 50                                       | 13             | 13                           | 30     |
| Effectuation   | 164   | 10            | 9                     | 66               | 40                                       | 12             | 8                            | 19     |
| Signing        | 47    | 8             | -                     | 16               | 7  | 7              | 2                            | 7      |

Trade restriction measures are increasing to secure the effectiveness of these conventions. With different subjects of regulation for different conventions, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Montreal Protocol, and the Convention on Biological Diversity - the effect on domestic industries also differ.

The government is faithfully adhering to these international conventions and is participating actively in negotiations for enacting and amending attached protocols of existing conventions to reflect Korea's position and to minimize negative effects.



## Regional Environmental Cooperation

### Environmental Cooperation in Northeast Asia

The countries of Northeast Asia - Korea, China and Japan - share a common environment due to geographical proximity. In addition, this region has shown rapid changes toward continuous economic growth and improvement in living standards. Therefore joint efforts for environmental conservation among states are urgently called for.

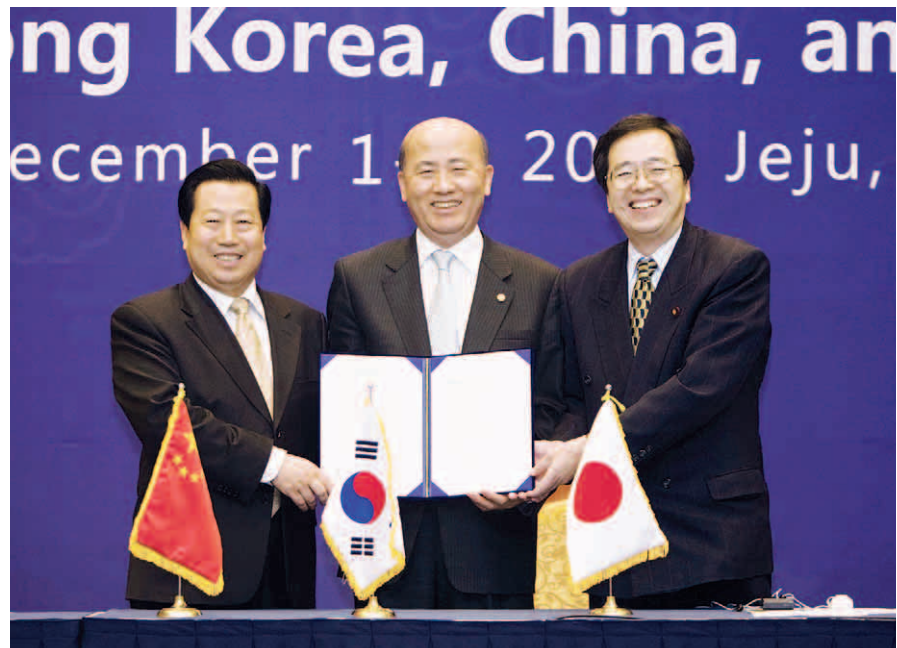
According to this need, the active promotion of multilateral environmental cooperation has been taking place in Northeast Asia since the 1992 UN Commission on Sustainable Development. Initiatives include the Northeast Asian Conference on Environmental Cooperation (NEAC), the Northeast Asia Sub-regional Program on Environmental Cooperation (NEASPEC), and the ADB-GEF project on the prevention and control of dust and sandstorms. In particular, since the Tripartite Environment Ministers' Meeting among Korea, China and Japan was formed in 1999, it has played a pivotal role in promoting environmental cooperation in the region.

Recently, with regional environmental problems, such as dust and sandstorms, coming to the fore, the need to strengthen a regional environmental cooperation system is increasing.

### The Tripartite Environment Ministers' Meeting between South Korea, China and Japan

Korea suggested the 「Tripartite Environment Ministers Meeting (TEMM)」 to promote cooperative measures for environmental problems in the North East Asian region including dust and sandstorms, acid rain, pollution in the yellow sea and management of harmful waste, and to promote the recognition of Korea, China and Japan, three important countries in the Northeast Asian region, as an environmental community. Since 1999, a regular 「Tripartite Environment Ministers' Meeting among Korea, China and Japan」 is held each year (once a year, by the three countries in rotation). The meeting is the sole ministerial meeting in the Northeast Asian region, and has been functioning as the highest ranking organization on environmental cooperation, holding nine meetings so far.

At TEMM8 that was held in Beijing in December 2006, major environmental problems of each country - dust and sandstorms (Korea), climate change



(Japan), and the transboundary movement of hazardous wastes (China) - were discussed, and the three countries agreed to joint cooperation in dealing with the problems.

As dust and sandstorms is the biggest current environmental problem in the Northeast Asian region, ministers of the three countries agreed to hold the 「Tripartite Director Generals' Meeting on dust and sandstorms」 to establish concrete cooperative methods for dealing with dust and sandstorms among the three countries. Also, the three countries will actively cooperate in sharing information on chemicals and foreign species, follow-up measures for the 'Seoul Initiative Network on Green Growth,' and holding the 10th Meeting of the Conference of the Contracting Parties of the Ramsar Convention.

TEMM9 was held in Toyama, a provincial city in Japan, at the suggestion of Korea that it is more advisable for the meeting to be held not in the capital city, to emphasize the importance of environmental conservation at the local governmental level. At the meeting, major environmental problems of each country, including dust and sandstorms, climate change and electric/electronic waste, were discussed in depth, and the three countries agreed to strengthen their cooperation at the local, ground level.

There was a special session for dust and sandstorms during the meeting, and the countries shared the recognition that dust and sandstorms in



Northeast Asia is a serious environmental problem for the region. Thus, the three countries agreed to promote the formation of a joint research teams on dust and sandstorms and the operation of joint research projects. Also, the three countries agreed to actively cooperate in matters of interest to each country, including chemicals management, biodiversity, photochemical oxidant, follow-up measures for the ‘Seoul Initiative Network on Green Growth’ and holding the 10th Meeting of the Conference of the Contracting Parties of the Ramsar Convention.

Table 44. TEMM Project

| Projects  | Contents and Status of Promotion  |
|---|---|
| 1. Lake Quality Improvement Project   | <ul style="list-style-type: none"> <li>• Build integrated water quality management system of Lake Xihu by utilizing water quality management experience to prevent lake pollution</li> <li>- create uniform guidelines for water quality management of eutrophic lakes, develop database, etc.</li> </ul>   |
| 2. Roundtable Meeting on Environmental Industry Cooperation                 | <ul style="list-style-type: none"> <li>• Hosted by the three countries in rotation, linked with environmental technology seminars and international exhibitions to promote information exchange and understanding</li> </ul>  |
| 3. Joint Environmental Training Project                                     | <ul style="list-style-type: none"> <li>• Yearly rotating basis among the three countries for environmental officials to promote the recognition of the three countries as an environmental community, and to promote mutual understanding on environmental problems and policies</li> </ul>   |
| 4. TEMM Website   | <ul style="list-style-type: none"> <li>• As part of the project for promoting the recognition of the three countries as an environmental community, disseminate the results of the Tripartite Environment Ministers Meeting, TEMM Joint Communiques and other documents on the progress of TEMM Projects, link environmental documents of each country, and the result of environmental cooperation in Northeast Asia (run by the National Institute of Environmental Research (www.temm.org))</li> </ul> |
| 5. Tripartite Environmental Education Network (TEEN)                        | <ul style="list-style-type: none"> <li>• As the sole cooperation project by the private sector, investigate environmental education programs and develop a database to share information through networks</li> </ul>  |
| 6. Joint Research Project on Long-Range Trans-boundary Air Pollutants (LTP) | <ul style="list-style-type: none"> <li>• Joint study on measuring and modeling the concentration of the emission of long-range trans-boundary air pollutants in the Northeast Asian region</li> </ul>   |
| 7. Acid Deposition Monitoring Network in East Asia (EANET)                  | <ul style="list-style-type: none"> <li>• Promote the sharing of information and cooperation among 13 countries of East Asia on acid deposition (domestic monitoring network: Jeju, Imsil, Ganghwa, Naejang Mountain)</li> <li>- Payment of international share of acid rain (\$30,000 per year from 2005)</li> </ul>  |
| 8. Northeast Asia Center for Environmental Data and Training (NEACEDT)      | <ul style="list-style-type: none"> <li>• Train technicians and professionals in environmental pollution and promote collection, comparison and analysis of documents on the current status of environmental pollution of each country</li> <li>- publish report on comparison from 2001~2003</li> <li>- present the results of the Northeast Asia Environment Data Center (June, '04, Beijing)</li> </ul>   |

## Environmental Cooperation with Southeast Asia

### ASEAN+3 Environment Ministers' Meeting

After the establishment of ASEAN+3 (Korea, China and Japan) in 1997, Ministers' meetings of ASEAN countries and the three countries in Northeast Asia expanded into various fields including economy, labor and environment. With the expansion, the meeting became a regular one with the holding of the first ASEAN+3 Environment Ministers' Meeting in 2002. In October 2008, the seventh meeting was held in Hanoi, Vietnam.

The research on 'the Restoration of Degraded Forest Ecosystem in Southeast Asian Tropical Region' is a representative of the ongoing ASEAN-Korea environmental cooperation projects. The first stage of the project was completed from 2000 to 2005, and \$1.05 million of the Special Cooperation Fund was invested in the second stage, which was completed in June 2008. The project proposal for the third stage has been submitted. Among the cooperation projects are field studies, regional research programs, training programs for ASEAN countries, an international workshops and scientific meetings.

Moreover, an educational training program for public officials of the 10 ASEAN countries is organized each year. At the training courses on resource recycling and waste management of Korea for public officials of ASEAN member states, Korea's waste management system, and technologies for RDF, incineration, pyrolysis and waste management are introduced. The Sudokwon Landfill Site Management Corporation and food waste composting facility in Yangju are the sites for field trip.

### Environmental Cooperation with Vietnam

Korea signed its first environmental MOU on environmental cooperation among Southeast Asian countries with Vietnam, with the two parties agreeing to hold regular high-level talks. The Korea-Vietnam Environmental Ministers' Meeting was first held in 2000, biennially, but since 2004, the meeting is held every year. The fifth meeting was held in Hanoi in 2007.

So far, Korea and Vietnam have engaged in the personnel exchange of 315 environmental public officials through education and training programs. Major details include air pollution prevention technology and environmental technology training courses by KOICA; and long- or short-term international



environmental policy training courses by the Korea Institute of Environmental Science and Technology, and National Institute of Environmental Research.

In the environmental industry and technology field, MOUs have been finalized between Korea Environment & Resources Corporation and the Vietnam Productivity Center, and between the Environmental Management Corporation and the Vietnam Institute for Environmental Science in 2004. Technology exchanges between affiliated organizations have also begun since the conclusion of the MOUs.

Korea has held the Korean Environmental Industry and Technology Fair (1st: October 2005, 2nd: April 2006, 3rd: December 2006, 4th: April 2007) annually since 2005, and supports the participation of Korean companies in international environmental technology fairs held in Vietnam (2004: VIIF2004, 2006: International Environmental Technology Fair, 2007: International Environmental Technology Fair).

## **Strengthening Environmental Cooperation with Other Regions**

### **Middle Eastern and Central Asian Countries**

Ministry of Environment completed the first MOU for environmental cooperation with Iran in March 2005, and recently, it completed an MOU with Azerbaijan in May 2008. In July 2008, an environmental cooperation MOU was contracted with Kuwait.

### **Environmental Cooperation with Africa**

In November 2006, the first Korea-Egypt Environment Ministers' Meeting was held in Cairo, and the topics of discussions ranged from the transfer of CNG bus-related technology, improvements in the water quality of the Nile, hazardous waste management to the exchanges of environmental industry. The two countries completed an MOU on environmental cooperation.

In May 2007, the first Korea-Tunisia Environment Ministers' Meeting was held in Tunis, Tunisia, where discussions on technology for air pollution measuring and monitoring, recycling of electronic components and the exchanges of environmental industry were brought up, and the agreement on environmental cooperation was signed.

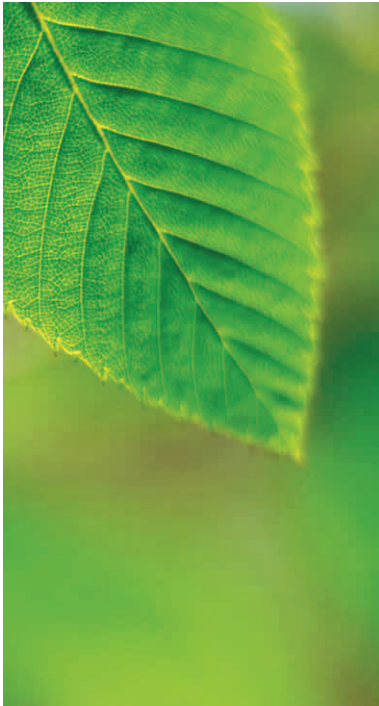
In September 2008, the first Korea-Mozambique Environment Ministers' Meeting was held in Seoul, where discussions on exchanges of environmental experts were brought up, and the MOU on environmental cooperation was signed.

### **Environmental Cooperation with European and American Countries**

Korea is continuously promoting environmental cooperation with the developed countries of North America and Europe to improve the domestic environment by introducing developed environmental policies, systems and technology. Korea has completed environmental cooperation MOUs with the United States, Canada, England, France, Denmark, the Netherlands, Germany and Norway and is implementing a joint cooperation project by holding joint seminars and exchanging professionals.

After completing the MOU with the United States in March 1987, various forms of cooperation have taken place, including nine joint research projects on environmental technology cooperation such as studying the causes of hindrance to the administration of metropolitan cities with US-AEP environmen-





tal partnership. Recently, as a part of a follow-up project for the ROK-US FTA, the ROK-US Environmental Cooperation Agreement has been contracted and 20 projects will be jointly promoted, including a cooperative project on the management of foreign species.

Most cooperation efforts with environmentally developed countries are focused mainly on sharing environmental information, sending research teams, exchanging human resources and holding seminars. The ROK-France joint commission was organized (Oct. 2004), and issues of environmental problems of both countries have been discussed. Also, visits to Europe are being made to observe developed facilities and policies in various fields, such as basin management (France, Switzerland, and Germany in Jun. 2004), drainage facility establishment project (England, France, Austria, Germany in Sept. 2004), international soil management (Germany in Oct. 2004), and environmental policy training (EU in Nov. 2004). Personnel from Europe visit the Ministry of Environment, such as the Swedish Ambassador to Korea (Feb. 2004) and the Danish Ambassador to Korea (Mar. 2004), to discuss environmental cooperation between the countries. Recently, the Korea-England Environment Ministers' Meeting (May 27, 2008) and the Korea-Norway Environment Ministers' Meeting (Jul. 4, 2008) were held, and an environmental cooperation MOU was completed with each country.

In terms of Korea's relationship with the EU, after signing the Korea-EU Framework Agreement (Apr. 1st, 2001), Korea delegated environmental officials to EU headquarters (Apr., 2002) and has been monitoring the trend of the EU's environmental policy, including new environmental policies such as End of Life Vehicles directive (ELV), Restriction of Hazardous Substances directive (ROHS), Waste Electrical and Electronic Equipment directive (WEEE), and Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), and reflecting them in Korean environmental policy. In addition, as subsequent projects of the Korea-EU FTA, the revision of the Korea-EU Framework Agreement and the 7th Korea-EU Joint Commission of Korea-EU cooperation will be held in Seoul at the end of 2008, and will be discussed.

In addition, Ministry of Environment will be completing an MOU with Central and South American countries such as Brazil, Ecuador and Chile to promote environmental cooperation focusing on biodiversity, water quality and waste.



## 8-1. Comprehensive Plan for National Climate Change Adaptation

### 1. Background

The damage and impact of climate change on the Korean Peninsula is above the world average and is increasingly deepening, which calls for the establishment and promotion of adaptation measures at the state level.

| Classification | Temperature Rise<br>(over the past 100 years) | Seawater Temperature Rise<br>(over the past 100 years) | Sea Level Rise<br>('61~'03) |
|----------------|---|--|-----------------------------|
| World          | 0.74°C  | 0.5°C  | 1.8 mm/year                 |
| Korea          | 1.5°C   | 1.03°C ('68~'07)                                       | 5.1 mm/year (Jeju)          |

※ The amount of damage due to atmospheric disaster in Korea was 17.7 trillion won over the past 10 years ('96~'05) and is trending upwards.

Moreover, the national plan for climate change has been focused on reducing greenhouse gases, and thus, it is necessary to have a balanced plan for climate change mitigation and adaptation. Even if greenhouse gas emissions are reduced, global warming is predicted to continue for decades since greenhouse gases that have already been released in the past stay in the atmosphere for 50 to 200 years. Thus, the decision for establishing a master plan for national climate change adaptation was made at the Committee on Climate Change in May '07.



## 2. Prospect for Future Climate Change in Korea

The future (2071~2100) temperature of the Korean Peninsula is projected to rise by 5°C at maximum, compared to the past 30 years (1971~2000), and an increase in precipitation of 17%. (Figure 4)

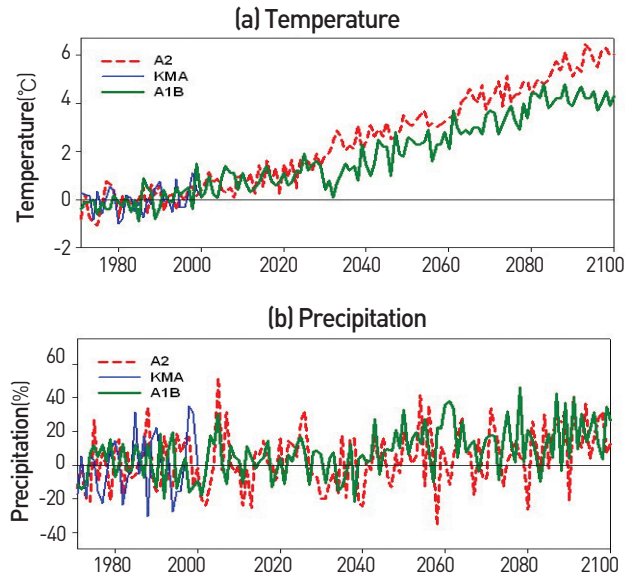


Figure 4. Changes in Korea's (a) annual average temperature and (b) annual average precipitation according to AIB and A2 scenario (1971~2100)

(Source: National Institute of Meteorological Research, 2006)

| SRES Scenario | Temperature (°C) |      |      | Precipitation (%) |      |       |
|---------------|------------------|------|------|-------------------|------|-------|
|               | 2071~2100        |      |      | 2071~2100         |      |       |
| A1B           | +4.0             |      |      | +17.0             |      |       |
| A2            | 2020             | 2050 | 2080 | 2020              | 2050 | 2080  |
|               | +1.5             | +3.0 | +5.0 | +5.0              | +7.0 | +15.0 |

The sea level will rise by more than 50cm by the year 2100.

### Prospect for Effects of Climate Change on Different Sectors

(Agriculture) National average of productivity of rice in 2080 will decrease by 14.9% from the current amount

- Productivity will decrease significantly in coastal areas, and the rate of decline will be large especially in Jeollanam-do and Chungcheongnam-do. (Figure 5)



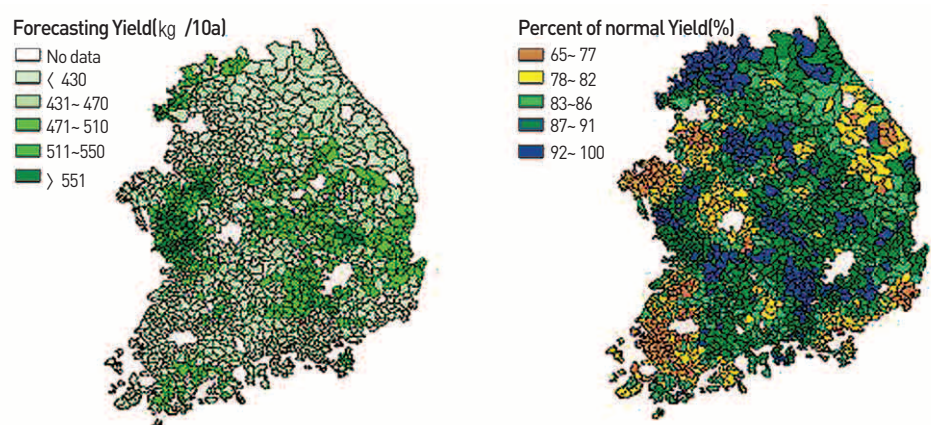
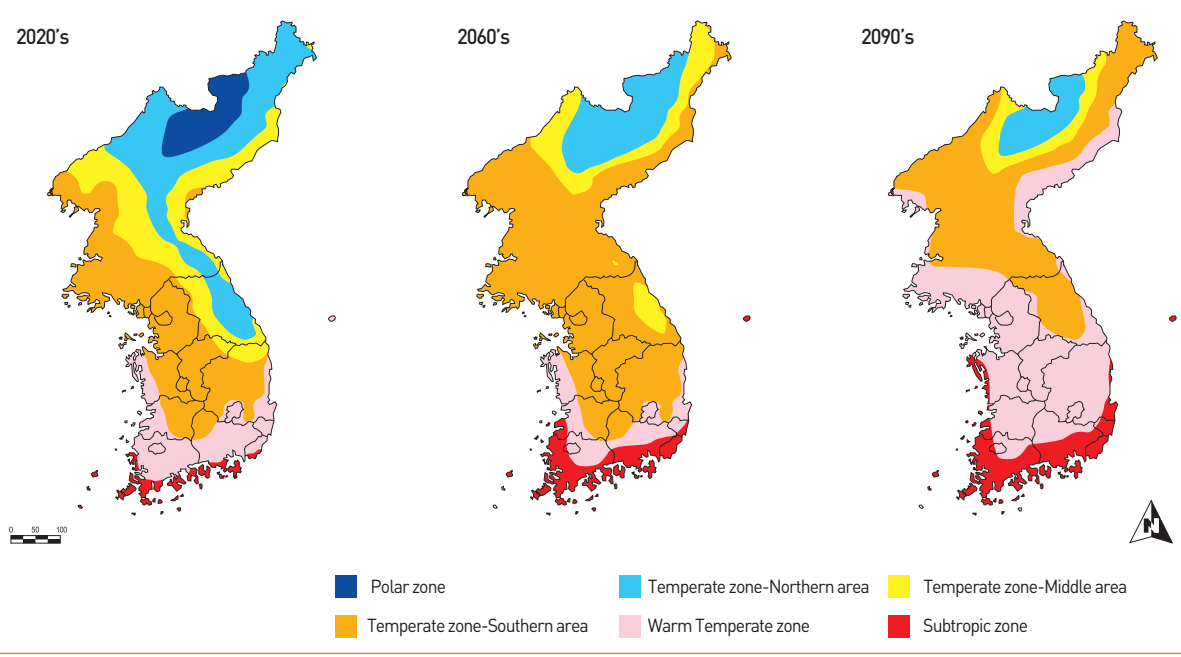


Figure 5. Prediction for changes in rice productivity from the present (1971~2000) to the future (2080's) based on A2 scenario (Source: Rural Development Administration, 2007)

(Forest) Ideal range for breeding of major species of trees will mostly move northward.

- Subtropical climate regions will appear centered on islands of the south in the 2020's. The cold region of the north will disappear in the 2060's.
- Most of South Korea's regions will have changed into warm temperate zones by 2090, with the exception of the Gangwon region (Figure 6)

Figure 6. Changes in the climate zone of forest vegetation according to A2 scenario (Source: Korea Forest Research Institute, 2007)



(Water Management) Damage caused by flood and drought will increase throughout Korea

- The lower reaches of the Han River and the Nakdong River will be the weakest against flood, and the scope of weak areas around the Geum River and the Nakdong River will become wider. (2051~2080)
- The possibility of an increase in the damage due to drought is large in the basins of the Seomjin River and the Youngsan River compared to other basins. (2051~2080)

(Territory Management) Areas within the Korean Peninsula with the potential of inundation will increase with the rise of the sea level.

| Sea Level Rise | Potential Inundated Population (persons) | Potential Inundated Area (km <sup>2</sup> ) | Remark                      |
|----------------|--|---|-----------------------------|
| 0.5 m          | 268,745                                  | 856.126                                     | 1.4 times the area of Seoul |
| 1.0 m          | 312,855                                  | 984.304                                     | 1.6 times the area of Seoul |

(Fisheries) The frequency of the appearance of subtropical species of fish will increase in the marine areas near the Korean Peninsula with the rise in the seawater temperature.

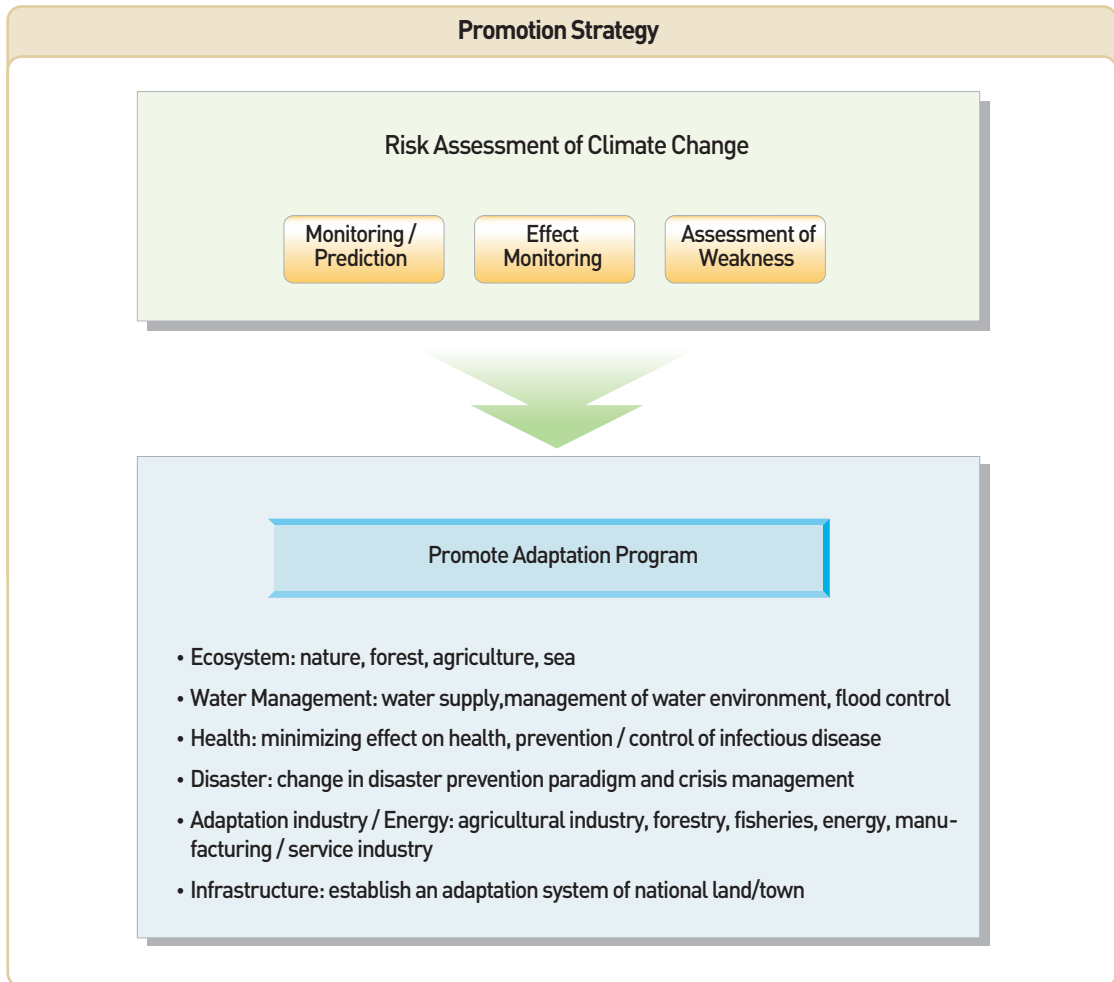
- Codfish and herring that inhabit the Yellow Sea are representative of cold current species, but there is a high possibility that these species will rapidly disappear.

(Health) With the increase in the period of intense heat and air pollution, early death of the aged population will increase and the life expectancy will decline.



### 3. Vision, Goals and Promotion Strategy

|               |  |
|---------------|--|
| <b>Vision</b> | Establishment of a safe society and support for green growth through climate change adaptation   |
| <b>Goals</b>  | <p>〈Short-Term Goal (∼'12)〉 : Strengthen comprehensive and systematic capacity for climate change adaptation</p> <ul style="list-style-type: none"> <li>- Fully complete a map of time and spatial weakness of the Korean Peninsula</li> <li>- Achieve 70 % of developed countries' level in terms of prediction and observation technology</li> </ul> <p>〈Long-Term Goal (∼'30)〉 : Decrease risk of climate change and realize opportunities</p> <ul style="list-style-type: none"> <li>- Decrease atmospheric disaster by 10 % of the level of the past 10 years (1996-2005)</li> <li>- Achieve climate change adaptation-related production to the level of 1 % of GDP</li> </ul> |



#### 4. Tasks for Different Sectors (183 Tasks)

##### Establish climate change risk assessment system

##### Upgrade climate change observation and prediction capacity

By extending the radar of climate change observation and establishing a three-dimensional observatory network, closely observe the processes of climate change on the Korean Peninsula and enhance the capability to predict future climate change by developing a next generation earth-system model.



**Long-term monitoring of the effects of climate change**

Monitor over the various effects that occur on land, in freshwater and on the coast due to climate change on the Korean Peninsula for a long term to protect Korea's ecosystem from climate change and strengthen preparatory management to minimize its harmful effects.

**Assess effects and weaknesses of different sectors**

Carry out scientific assessments on the effects of future climate change on the Korean Peninsula will bring to ecosystems, water quality/water resources, health, disaster, industry/energy and infrastructure, and on the weakness that will follow.

**Promote climate change adaptation programs for different sectors****Program for adaptation of ecosystems**

Protect biological species and resources of the ecosystems of the Korean Peninsula from risks of future climate change and establish a plan to prevent the propagation and spread of foreign species that penetrate into the country.

**Program for water resources and water environment management**

Develop a plan for the stable provision of water preparing for possible future water shortage due to climate change and devise measures to minimize the impact of climate change.

**Program for health management**

Protect public health by planning various measures to minimize effects of climate change on public health.

**Program for disaster management**

Prepare a standardized plan for national disaster response and for changing disaster prevention paradigm by linking national development planning and disaster prevention policy, and strengthen the system for crisis management by extending the utilization of an accident insurance system to minimize damages caused by climate change.



**Program for adaptation industry**

Prepare plans to design and foster various adaptation industries such as disaster prevention industry, meteorological industry, climate related medical industry and nature restoration industry that can utilize climate change as an opportunity for green growth; and establish a plan for managing demand and supply for effective energy in preparation for climate change.

**Program for protecting infrastructure**

Prepare a plan for disaster prevention and safety measures that can minimize the effects of climate change on the safety of infrastructure, and secure the capacity to buffer the effects of climate change within towns by designing schools with parks, creating forests in apartment complexes, and making rooftop gardens to alleviate global warming.

**Secure domestic and foreign cooperation, and institutional foundation**

**Foster adaptatioFability**

Prepare the conditions necessary to carry out policies for climate change adaptation by supporting the promotion of adaptation measures and preparing a legal/institutional foundation and build infrastructure such as a national

climate change adaptation center that will perform strategic studies and support for climate change adaptation.

**Domestic and foreign cooperation, and education/promotion**

Form a foundation for domestic and foreign cooperation and enforce education and promotion such as the Green Start Campaign to enhance the understanding of policies for climate change adaptation.

**Implementation**

Each ministry will establish and implement detailed enforcement plans and annual performance plans, perform self-assessment, then submit the results and performance plans for the following year to Ministry of Environment which supervises the overall implementation of the policy; and Minister of Environment will establish an inventory based on the results it receives, and publish a statement on national climate change adaptation.

**Participating Government Ministries (14)**

Prime Minister’s Office; Ministry of Environment; Ministry of Strategy and Finance; Ministry of Education, Science and Technology; Ministry of Public Administration and Security; Ministry of Culture, Sports and Tourism; Ministry for Food, Agriculture, Forestry and Fisheries; Ministry of Knowledge Economy; Ministry for Health, Welfare and Family Affairs; Ministry of Land, Transport and Maritime Affairs; Korea Meteorological Administration; Rural Development Administration; Korea Forest Service; and the National Emergency Management Agency

Also, in the case of an amendment to the Comprehensive Plan on Combating Climate Change, the Comprehensive Plan on Adaptation will be reestablished in line with the changes in the Comprehensive Plan on Combating Climate Change.

## 8-2. Waste-to-Energy Policy

### Condition and present status of waste management in Korea

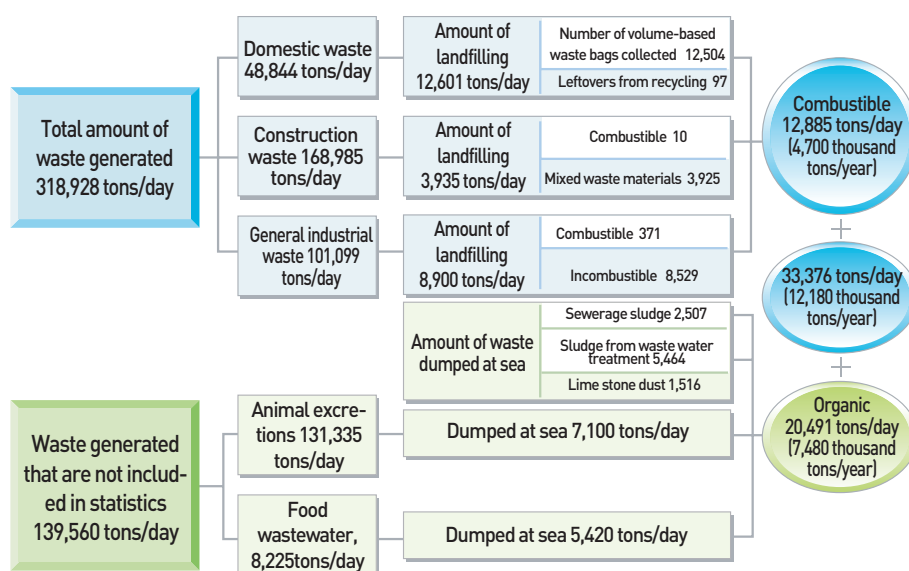
Looking at the condition of waste management in Korea, first, there is a limit to the disposal of waste through the landfill method since land area is small relative to the size of the economy, and socially, there is a tendency for domestic waste to be generated excessively per unit area due to population density and a service industry-centered industrial structure. Moreover, economically, the construction of new towns, urban development and the development of the heavy metal industry all lead to the increase in the cost for waste treatment and disposal.

As of 2006, the amount of waste generated in a day is 318,928 tons (designated waste from waste generated is exempt from the subject of energy recovery), which has been on a gradual rise since 2000. Of waste generated, 83.6 % is recycled, 8.0 % goes to landfills, 5.4 % is incinerated, and 3.0 % is dumped at sea.





Looking at the potential amount of materials from which to recover energy, based on the status of the disposal of waste in 2006, the total amount is 33,376 tons/day, which means that 12,180 thousand tons of disposed waste per year can be used for the recovery of energy. This includes 12,885 tons/day of combustibles, 7,971 tons/day of organics, and 12,520 tons/day of sea-dumped animal excretions and food wastewater, which is measured separately from the general waste disposal of 2006.



### The Need to Promote 「Waste-to-Energy」 Policy

The recent rapid increase in the price of crude oil is deepening the instability of the energy market, and the need to secure new renewable energy sources that can substitute for fossil fuels is very urgent. Domestically, new renewable energy accounts for 2.24 % of the total primary energy in 2006, and the energy from waste accounts for 76 % of the new renewable energy, which shows that recovering energy from waste is the most effective method for the supply and expansion of new renewable energy.

With the UNFCCC (Jun. '92) and the Kyoto Protocol (Dec. '97), regulation on materials causing global warming have been strengthened, and with the



adoption of the Bali Roadmap (Dec. '07), it is expected that there will be increasing pressure for Korea to commit greenhouse gas reduction target after 2012. Energy recovery from waste is being internationally recognized as a reliable method to reduce greenhouse gases to countermeasure the effects of climate change; and the EU is pushing for its goal to reduce 320 million tons of carbon dioxide emissions through energy recovery from waste by 2010.

With the strengthening of the standard for dumping organic waste at sea from 2012, disposal on land is inevitable, and for the preservation of the marine environment and for the safety of fisheries, the dumping at sea of sewerage sludge and animal waste will be prohibited from 2012, and food wastewater dumping from 2013.

### The Current Status of 「Waste-to-Energy」

Waste recycling policy has achieved its anticipated outcome by recycling 83.6 % (260 thousand tons/day) of the total 320 thousand tons/day of waste generated, which allowed the increase of recycling by 50 % and the decline in the rate of landfilling by 80 % compared to 10 years ago. However, not only do combustible wastes and organic wastes - wastes that can be used for energy - go to landfills or are incinerated, but they also have the possibility of provoking secondary pollution.

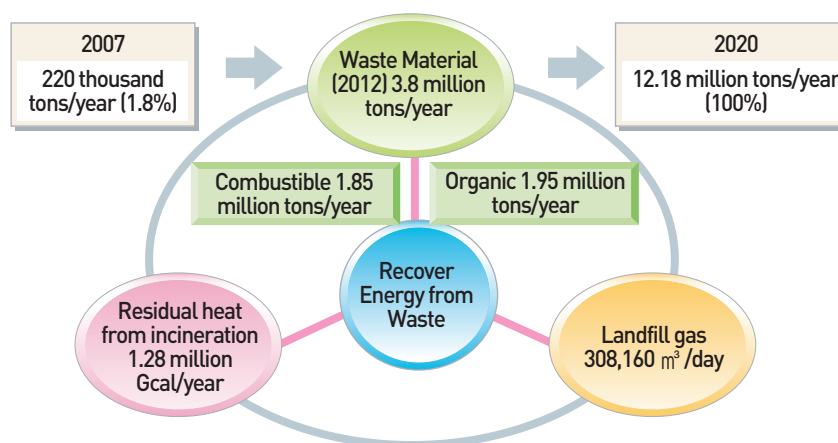
In order to counter rising oil prices, it is necessary to establish the 3Es paradigm that controls the environment, economy, and energy in an integrated manner, which surpasses the recycling-level of the 2Es era that integrates the environment and the economy, and to change policies.



### Promotion Goal and Strategy

The goal for 2012 is to recover 31 % (3.8 million tons/year) of 12.18 million tons/year - which is the total amount of waste with the potential for energy recovery, 1.28 million Gcal/year of residual heat from incineration, and 308,160 m<sup>3</sup>/day of landfill gas; and in 2020, the goal is to recover energy from 100 % of the total 12.18 million tons/year.

The following promotion strategies, such as a paradigm shift and the macro approach, will be needed to promote energy recovery from waste.



| Classification       | Until Now   | From Now   |
|----------------------|---|--|
| Paradigm             | 2E Goal Era<br>(Environment, Economy)                               | 3E Goal Era<br>(Environment, Economy, Energy)                                |
| Development Strategy | Separated approach on waste-energy<br>(Micro Approach)              | Integrated approach on waste-energy<br>(Macro Approach)                      |
| Growth Power         | Recycling/saving resources  | Develop potential energy/<br>secure new resources                            |
| Competitive Power    | Low Cost/Low Efficiency   | Real Cost/High Efficiency  |
| National Goal        | Create comfortable living environment by appropriate waste disposal | Create the foundation of a society in which resources circulate (Zero-Waste) |



### Promotion Measures

In order to promote energy recovery from waste systematically and effectively, detailed plans for implementation, such as determining the demand for industries of energy recovery from the waste of districts and local governments, adjusting and confirming detailed plans for implementation and searching for ways to expand and concentrate facilities, will be arranged by December 2008.

In order to promote industries for energy recovery from waste, various systems for promotion have to be established and an “advisory committee (forum) of related professionals” will be formed from June 2008 with professors and researchers as the committee members to question and assess policies and technology according to the direction of policies and the establishment and promotion of an implementation plan. Hereafter, the “administrative consultation body for project promotion” and the “joint council between civil and public sectors” will be formed and operated, comprised of relevant officials of city/town and city/county/district.

Also, in order to form a close cooperation/support system with relevant authorities, a “policy consultation body” between relevant authorities and affiliated organizations will be formed to mutually share information, cooperate each other and resolve problems by approaching the matter at a macro level with a pan-national perspective; and it will promote a collaborative model project, expand new renewable energy and form a foundation for the comprehensive promotion of production based on the project.

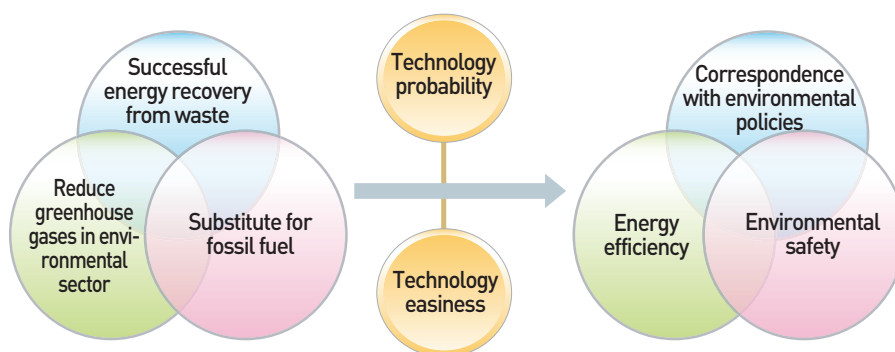
As a political direction to accelerate energy recovery, to the government considers to reduce or discontinue the support provided by the National Treasury to establish landfill and incineration facilities in local communities and from 2009, support of the National Treasury and the range of loans will be expanded to financially support the establishment and operation of facilities for recovering energy from waste. Moreover, from 2009 to 2010, the standard for landfilling waste will be strengthened, and policies will be improved to impose costs for landfilling and limiting the establishment of incineration facilities to derive energy recovery.

Energy recovery facilities solve the side effects that follow the excessive establishment of facilities by local governments or individual businesses; promote the expansion of the facilities to secure economies of scale; and secure economic efficiency by collectivizing energy recovery facilities, reducing logis-

tics expenses linking with electric power generating facilities, concentrating facilities to minimize environmental problems .

While arranging the direction of policies to accelerate energy recovery from waste and related laws, the promotion and advertisement of waste-to-energy is necessary for the public. A medium- and long-term comprehensive plan for advertisement will be established to inform the need for promoting policies on energy recovery and to change the perspective of the local people. In accordance with the advertisement plan, customized promotion strategy will be carried out.

In order to improve domestic technology for recovering energy from waste, which is currently at a primary level, Eco-STAR project team will be joined to promote the development of technology that corresponds with environmental policies, energy efficiency and environmental safety.



### Future Promotion Plan

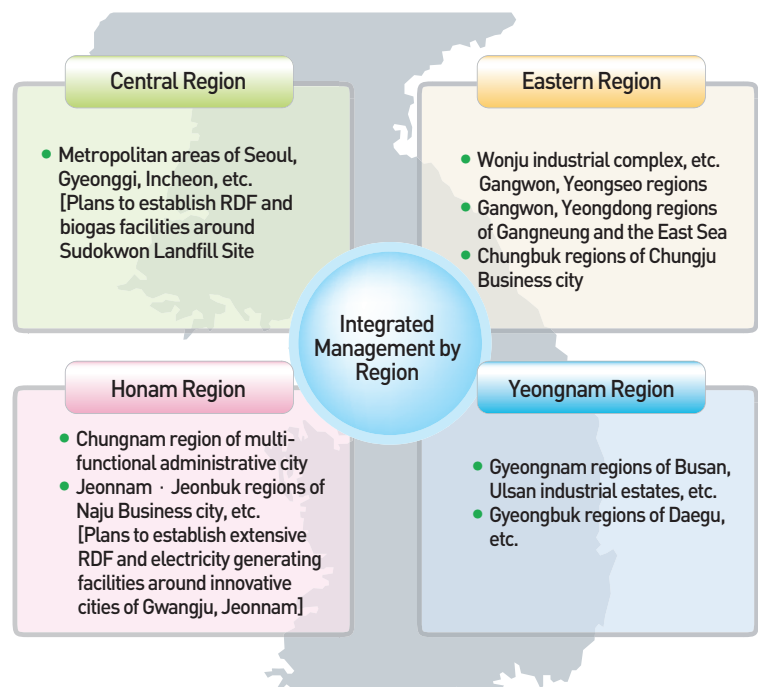
The number of facilities for energy recovery from waste are to be expanded to 57 (14,190 tons/day), such as facilities for recovering solid fuel from combustible waste (RDF), facilities for drying and recovering energy from sewerage sludge, facilities for combining food wastewater and organics to recover biogas and generate electricity.

| Classification |                                   | Total                   |       | Town  |       | Individual |       |     |
|----------------|-----------------------------------|-------------------------|-------|-------|-------|------------|-------|-----|
| Total (sites)  |                                   | 14,190                  | (57)  | 7,180 | (16)  | 7,010      | (41)  |     |
| Facilities     | RDF Production                    | 5,840                   | (20)  | 2,400 | (4)   | 3,440      | (16)  |     |
|                | Electricity generating Facilities | 2,800                   | (10)  | 1,400 | (4)   | 1,400      | (6)   |     |
|                | Organic                           | Sludge-to-Energy        | 1,280 | (4)   | 1,000 | (1)        | 280   | (3) |
|                |                                   | Food Wastewater-to-Gas  | 2,690 | (11)  | 1,820 | (4)        | 870   | (7) |
|                |                                   | Recovering Combined Gas | 1,580 | (12)  | 560   | (3)        | 1,020 | (9) |



Also, 27 facilities for collecting landfill gas from landfill sites of local governments (214 m<sup>3</sup>/minute) and 42 facilities for collecting residual heat of incinerators of local governments (630 thousand Gcal/year) will be expanded and the establishment of private sector RDF production facilities (370 tons/day), facilities for drying and recovering solid fuel from sewerage sludge (1,070 tons/day) and 27 facilities for collecting residual heat (650 thousand Gcal/year) will be encouraged.

The country will be divided into four regions (central region, eastern region, Honam region and Yeongnam region) to integrate, link and centralize facilities for recovering solid fuel from combustible waste, facilities for recovering biogas from organic waste and development facilities through the construction of a 「Waste-to-Energy Town」 to attract around 50 % of the materials for the establishment plan; and small regional individual facilities will be expanded according to the characteristics of each region to form a demand/supply relationship between electricity generating facilities within towns.



In order to promote the waste-to-energy project, a total of 3,240.8 billion won of financial investment is needed. The representation of this by financial resources and years is shown on the following table. The standard of support by the National Treasury has been calculated based on the rate of aid that is used to support the establishment of pre-existing facilities for waste treatment; and the plan for financial investment can be changed according to the financial status of the central and local governments and the situation of business promotion and the private market in the process of promoting future comprehensive plans.

(Unit: 100 million won)

| Classification                    | Total             | 2008          | 2009            | 2010             | 2011              | 2012             |
|-----------------------------------|-------------------|---------------|-----------------|------------------|-------------------|------------------|
| <b>Total</b>                      | 32,408<br>(100%)  | 347<br>(1.1%) | 2,066<br>(6.4%) | 8,043<br>(24.8%) | 12,779<br>(39.4%) | 9,173<br>(28.3%) |
| National Treasury                 | 9,856<br>(30.4%)  | 177           | 887             | 2,723            | 3,742             | 2,327            |
| Local Expenses                    | 9,460<br>(29.2%)  | 50            | 938             | 2,819            | 3,530             | 2,123            |
| Private Investment                | 12,844<br>(39.6%) | 80            | 233             | 2,401            | 5,407             | 4,723            |
| Investment from Public Enterprise | 248<br>(0.8%)     | 40            | 8               | 100              | 100               | -                |

### Expected Result

In the case of advancing the promotion goal until 2012, the following results will be expected to resolve both domestic and international problems we face today: an annual amount of 1,337.3 billion won of economic value will be created; a useful method of reducing greenhouse gases will be secured; the social and environmental effects will include the creation of 17,000 jobs; environmental load will be reduced; complaints of the residents and NYMBY phenomenon will be resolved; and dumping waste at sea will be prevented and prohibited.

| Total               | Reduction in Waste Treatment Expenses | Substitution of Crude Oil           | Reduction of Greenhouse Gases          |
|---------------------|---------------------------------------|-------------------------------------|--|
| 1,337.3 billion won | 857.3 billion won                     | 430.4 billion won                   | 49.6 billion won                       |
|                     | (Incineration expenses, etc.)         | (4.92 million barrels of crude oil) | (3.8 million tons of CO <sub>2</sub> ) |

### 8-3. Whole Effluent Toxicity Management System

#### Background

With industrial development, the use and distribution of hazardous chemical substances is dramatically increasing. According to an investigation by Ministry of Environment, 100,000 types of hazardous chemicals are manufactured and used worldwide and 39,000 types domestically. Each year, around 400 new types of chemicals are imported or manufactured. Hazardous chemicals can have a significant effect on the human body and aquatic ecosystems even in extremely small quantities, and thus, strict and thorough management is required.

However, the policies currently in operation for the management of substances hazardous to water quality and discharge of them to water systems in Korea are insufficient for the safe management of hazardous chemicals.





Firstly, for the management of industrial wastewater discharge, which is the biggest source of discharge, there are only 32 substances that have standards on allowed discharge including traditional water pollutant substances, including organics, nitrogen, and phosphorous, and heavy metals and hazardous chemicals, such as phenol and mercury. On the other hand, developed countries such as the United States and European countries have strict permission and management systems, having standards on acceptable discharges for around 120 substances.

In addition, Korea's industrial wastewater management system has set standards on acceptable discharges on individual pollutants, and is closely observing those levels. However, with the rapid increase in the number of pollutants, there is time and physical limits for dealing with individual unknown toxic substances. Thus, the current situation calls for a revolutionary management system to deal with increasing water pollutants from industrial wastewater.

### **Current Status of Policy Promotion**

Ministry of Environment has introduced a whole effluent toxicity management system to comprehensively control the toxicity of hazardous substances discharged from industrial wastewater to public waters, and to establish a water quality management system focusing on the receptors, such as risk management of water ecosystems. The system inspects the toxicity effects of discharged wastewater or hazardous substances within discharged wastewater on organisms and organism groups, and the sources of industrial wastewater emission are managed according to the degree of effect.

With the introduction of the system, Ministry of Environment has completed eight research projects for a feasibility study from 2002 to 2007. Through the study, plans for the method of operating a management system for the discharge of ecological toxicity, the time and subject of operation and the method of testing ecological toxicity have been presented. Based on the results of the studies, a revision was made in the law (Dec. 2007) to emphasize the setting of an effluent standard on whole effluent toxicity of the facilities that discharge industrial wastewater. Accordingly, businesses must observe the effluent standard on whole effluent toxicity; and in case the standard is exceeded, there is no economic sanction such as the imposing of fines, but administrative measures follow, such as orders for improvement.



Looking closely at the major contents of the revised law, whole effluent toxicity represents the rate of acute toxicity of industrial wastewater on organisms subject to experiment; and the *Daphnia Magna*, which is commonly used worldwide to measure whole effluent toxicity, has been selected as the subject. The fatality of wastewater is measured 24 hours after *Daphnia Magna* has been exposed, and the standard of whole effluent toxicity is represented using the Toxicity Unit (TU).

The standard of whole effluent toxicity is applied to public treatment facilities such as industrial wastewater treatment plants (except for end trainage treatment facilities) and 35 business types (in Korea, facilities discharging industrial wastewater are classified into 82 types under the Water Quality and Water Ecosystem Conservation Act) that use large amounts and types of hazardous chemicals. Businesses that drain wastewater into secondary treatment facilities, such as wastewater treatment facilities or industrial wastewater treatment plants, are exempt from the standards.

The operation will begin from 2011 and 2012 according to the size of the businesses. Businesses located in regions where the maintenance of public treatment facilities and high water quality standard are required, will be applied with a strict discharge standard of “TU1,” and other businesses will be applied with a standard of “TU2.”

### Future Promotion Plan

Currently, a legal standard for a whole effluent toxicity management system exists, but the foundation for promoting the system has not been arranged. An experimental facility for regional ecological toxicity has not been sufficiently prepared, and the technological development for reducing whole effluent toxicity is considerably insufficient. Also, industries are being put in a situation where they have to consider not only reducing the discharge of pollutants, but also the biological and ecological safety of discharged water in the future.

Accordingly, Ministry of Environment is planning on promoting various supporting research projects and consolidating the administrative system to reduce the burden on industries, to construct the foundation for implementing policies, and to make a soft landing of policies.

Firstly, experimental facilities related to ecological toxicity will be extended to public experimental facilities that are already distributed in the regions;

and the people in charge of the public sector and the staffs in charge of industries will be educated on the experimental method to test for ecological toxicity.

Also, the status of the ecological toxicity of wastewater treatment facilities and businesses will be investigated to analyze the cause of whole effluent toxicity. A guideline for the technology to reduce toxicity will be arranged and distributed to each business. Moreover, based on the result of the investigation on the status of whole effluent toxicity, businesses that exceed the standard will be subject to gratuitous technological support until 2011 when the system begins, so that the businesses can reduce toxicity. Successful cases of reducing ecological toxicity in businesses through technological support will be spread to other businesses.

In addition, a comprehensive portal site on the management of whole effluent toxicity will be created so that information accumulated through various research and support projects can be posted and will be available for businesses whenever necessary.

Last but not least, the Ministry of Environment will hold more than one regular workshop a year on the management of whole effluent toxicity to present the readiness of the system, such as the result of supporting research projects, which will encourage businesses to prepare for the whole effluent toxicity management system. Also, by around 2010, an international symposium will be held to study cases of developed countries, and to inspect the final status of domestic readiness.

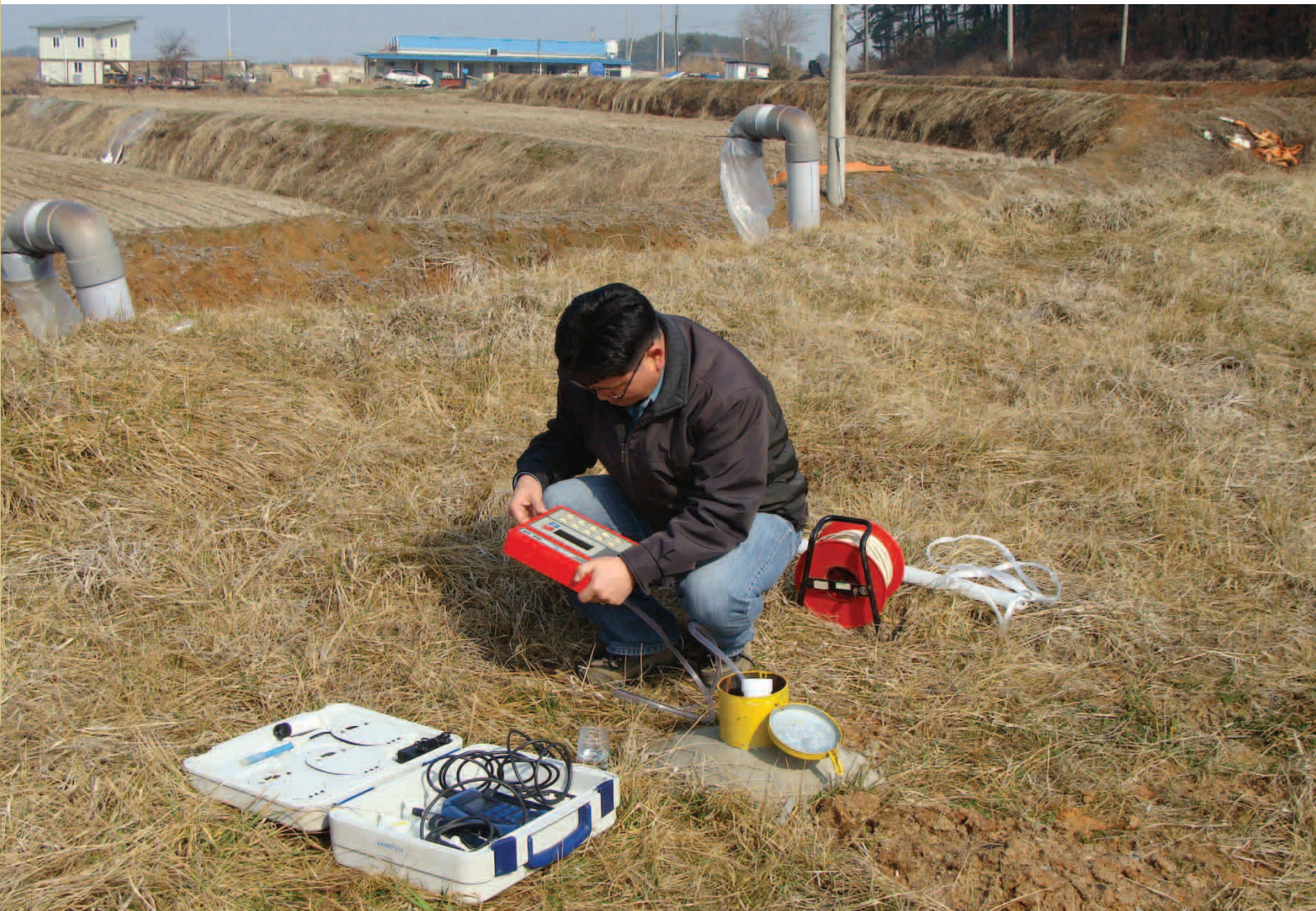


## 8-4. Environmental Management on Avian Influenza (AI) Burial Sites

### Background

Avian Influenza (AI) is a virus that arises from poultry, such as chicken and duck, or wild birds. It is a type of animal infectious disease and, once infected, poultry such as chicken, turkey, and ducks show serious symptoms including respiratory ailment, diarrhea and reduction in the rate of egg laying. Also, since there are various sera, and variations occur easily, humans can be infected in few cases.

AI is transferred mainly through excretion and direct contact with humans or mice. Sometimes, the polluted floating matters within the air can be transferred by the wind. Thus, prompt removal of the pollutant, such as through the culling of poultry, is required once AI breaks out.



If AI breaks out, each organization must immediately cull and bury or incinerate the poultry (mostly buried), according to the “AI Emergency Procedure Guideline (Ministry for Food, Agriculture, Forestry and Fisheries).” The guideline is focused on preventive measures; and although regulation on preventing environmental pollution exists, the content is too brief, and the implementation in the field is insufficient. Killing birds to cut off the transfer of the disease without considering the environment may provoke secondary environmental pollution, which will threaten the health of the residents and incur additional costs for post management.

When considering the health of the people and the long-term social cost, immediate and systematic environmental management to prevent secondary pollution in the region of the AI outbreak is no less important than the culling of domestic animals.

### **Current Status of AI Outbreak**

Highly pathogenic AI was first discovered in Gimje on April 1, 2008, and spread rapidly throughout 11 cities/towns up to Gyeongsan and Yangsan, and 19 city/county/provinces by May 14. Different from the outbreak of AI in 2003 and 2006, it spread throughout the whole country in a short period of time, leaving 381 burial sites.

### **Status of Environmental Management of AI Outbreak Regions**

The Ministry of Environment formed a ‘Joint task force team for preventing environmental pollution between headquarter and regional environmental offices’ right after the outbreak in April 2008 to check the situation of environmental management of burial sites, and received reports every day until the outbreak came to a lull. Also, groundwater near burial sites have been checked to monitor whether or not it was polluted, and the river water and groundwater of outbreak sites have been checked to see whether there are remains of AI virus. As a result of the groundwater analysis, 50 % of sites tested exceeded the standard of domestic groundwater quality, but seeing that the level of nitrates, nitrogen and general bacteria hasn’t increased rapidly, the excess is not due to the direct effect of burying the culled animals, but from regional characteristics of stock farming houses where there are animal excretion and manure. Currently, groundwater around burial sites is collected and analyzed once a month to continue to check whether burying affects the



region. AI virus analysis on groundwater and streams of Jeonbuk, Jeonnam, and Gyeonggi regions show no detection of AI virus genes.

The Ministry of Environment investigated the rate of odor generation in 218 burial sites of culled poultry in Gimje, Jeongeup and Pyeongtaek from April 16 to May 10, and promoted urgent odor prevention measures such as spraying deodorants. In burial sites where odor preventive measures are being implemented, the concentration of odor lessened by more than 90 % compared to the past.

Currently, there is a standard for burying and a regulation on preventive measures for environmental pollution in surrounding areas in the 「Enforcement Regulation on the Prevention of Contagious Animal Diseases」, but there is a limit in preventing the actual environmental pollution. The standard for burial treatment and post management is so vague and obscure that most sites do not properly observe the standards. Also, since the burial method is also insufficient, it is difficult to entirely isolate the transfer of pollutants from burial sites to the outside. Thus, Ministry of Environment has arranged a ‘plan for improving the standards on burying’ to complement the standards for establishing burial sites and post management. Various methods are presented in the plan, including additional factors of consideration when selecting a burial site, a burial method to minimize the possibility of secondary environmental pollution by using HDPE Sheet or bentonite and a regular monitoring method of the surrounding groundwater. Ministry of Environment is in consultations with the Ministry for Food, Agriculture, Forestry and Fisheries to reflect the plan in the 「Enforcement Regulation on the Prevention of Contagious Animal Diseases」.

With the rainy season of June~July ahead, Ministry of Environment inspected post management in burial sites by going into the field over two periods. Most local governments were putting forth an effort in post management by designating responsible managers of burial sites for regular inspection; however, some burial sites had sunk, causing concern for generation of odor and leachate. Ministry of Environment called for persistent complementary measures for burial sites, such as securing soil and anti-flood measures. In July, 2, 100 public officials of the Jeonju government gathered for a training course on the point of environmental management of AI burial sites.

Also, Ministry of Environment procured 54.6 billion KRW from the National Treasury to provide safe drinking water for residents. Thirteen cities/counties

that drink groundwater from within a radius of 3km of an AI outbreak region will be subject to the plan, and 300m<sup>3</sup>/day of water reservoir, and 754km of drain/water pipe will be established to connect to the local water supply.

### Future Promotion Plan

As the effect of environmental pollution does not show up in a short period, Ministry of Environment is planning on persistent monitoring and managing of burial sites. On June 4, Ministry of Environment released ‘guidelines for an environmental management plan for burial sites,’ and provided direction for 11 cities/provinces where AI broke out in the current year. Each local government established an ‘environmental management plan,’ such as measures for impact investigations on soil and groundwater and post management, based on the guidelines. According to the plan, the local governments will monitor the neighboring environment of burial sites for a certain period and responsible managers for burial sites will be designated to perform regular inspections.

Also, Ministry of Environment is planning various studies for the systematic and scientific environmental management of AI outbreak regions. In 2003, 2006 and 2008, 15 burial sites throughout the country will be selected for soil and ground environmental impact inspection and a guideline for biological safety assessment of burial sites will be released for the reuse of burial sites.



## 8-5. Environmental Management of the Taean Oil Spill Incident

### Current Status and Problems

At around 07:15 on Dec. 7, 2007, an oil tanker (146,000 tons) and a crane ship collided in the West Sea, 8km northwest of the Taean shore of Malripo, which resulted in a large-scale oil pollution accident, with a crude oil outflow of 12,547kℓ(10,915 tons). The site of the oil pollution accident is one with islands of exceptional ecological scenery (11 islands affected of a total of 14 islands in the vicinity). And being part of the Taean Coast National Park (34km of the total 230km of the coast), there are 2,500 various animal and plant species inhabiting the land and sea.

Thanks to private and governmental cooperation, most visible traces of oil were removed. However, the restoration of the local ecosystem is expected to take a considerable amount of time and according to the result of a research on the actual condition of the ecosystem (Dec. 26, 2007~Jan. 31, 2008), the



(Source: Korea Coast Guard)





(Source: Korea Coast Guard)

concentration of oil components in sediment below the sea increased by 5.8 times and seaweeds were reduced by 50 % per unit area compared to before the accident.

### Measures

By July 2008, Ministry of Environment had supported the removal of oil with 14,047 human labor (total number of man-days) and oil removal equipment such as absorbent towels, established and implemented onsite “oil waste treatment control teams,” committed 25 waste management corporations, and collected and treated 33,000 tons of waste produced in the process of removing oil, such as waste absorbent towels (Dec. 2007~Jun. 2008).

Table 45. Support for Oil Removal Equipment

| Absorbent Towel | Oil Fence | Absorbent Boom | Absorbent Roll | Oil Dispersant |
|-----------------|-----------|----------------|----------------|----------------|
| 7,160kg         | 420m      | 1,023m         | 2,645m         | 440ℓ           |

※ Human labor (No.): Headquarters and subsidiary organizations of Ministry of Environment (2,386), affiliates (7,270), relevant associations (4,391)

Professionals from the Korea National Park Service, the National Institute of Environmental Research and the National Institute of Biological Resources



(Source: Korea Coast Guard)

formed an 「Ecosystem Research Team」 to carry out research on wild birds and the ecosystem of damaged regions (Dec. 10, 2007~Jan. 31, 2008). In joint operation between the public and governmental sectors, including local environmental offices, environmental organizations and neighboring veterinary hospitals, a 「Wild Animal Rescue Headquarters」 was created and saved injured wild birds such as wild ducks and cormorants.

Fishermen of traditional fisheries who could not earn their living immediately after the accident were subject to the resident support project (1.4 billion KRW supported 15,000 residents as of Jun. 2008), which was carried out in the form of a job-producing project (daily average of 700 people, daily wage of 60~70 thousand KRW) to remove oil elements on the coast and rock bed.

Examination on the acute health impact of residents was carried out (Dec. 2007~Aug. 2008, 160 million KRW); and an examination of the health impact after the accident was carried out on the residents by Ministry of Environment (National Institute of Environmental Research), the Ministry for Health, Welfare and Family Affairs (Korea Centers for Disease Control and Prevention) and environmental organizations.

## Future Promotion Plan



(Source: Korea Coast Guard)

Firstly, the foundation facilities for support for residents in the Taean region and its parks will be supported. The resident support project through a job-producing project for removing oil in the Taean region will continue (4.5 billion KRW in 2008). In order to conserve the Taean Coast National Park region and

to activate the local economy, the establishment of convenient facilities will be supported, such as infrastructure for parks, parking lots and campsites.

Secondly, a plan for restoring the ecosystem of the Taean Coast National Park will be established by the second half of 2008. The ecosystem will be restored by refurbishing the damaged habitat of seaweed and restoring temporary roads and polluted coastal sand dunes.

Thirdly, the value of the economic loss from damaged natural resources due to the oil accident will be analyzed. The calculation of economic loss of natural resources in the damaged region, and the degree of damage will be utilized in charging compensation to the International Oil Pollution Compensation Funds.

Fourthly, monitoring operations on the changes in the ecosystem of the affected areas will continue. When monitoring the conditions of habitation and the changes in the ecosystem by season and year in the Taean Coast National Park, the conservation zone of back marsh, and the resting sites of migrating birds, the condition of residual oil in the foreshore will be examined constantly to be used in restoring the affected areas.

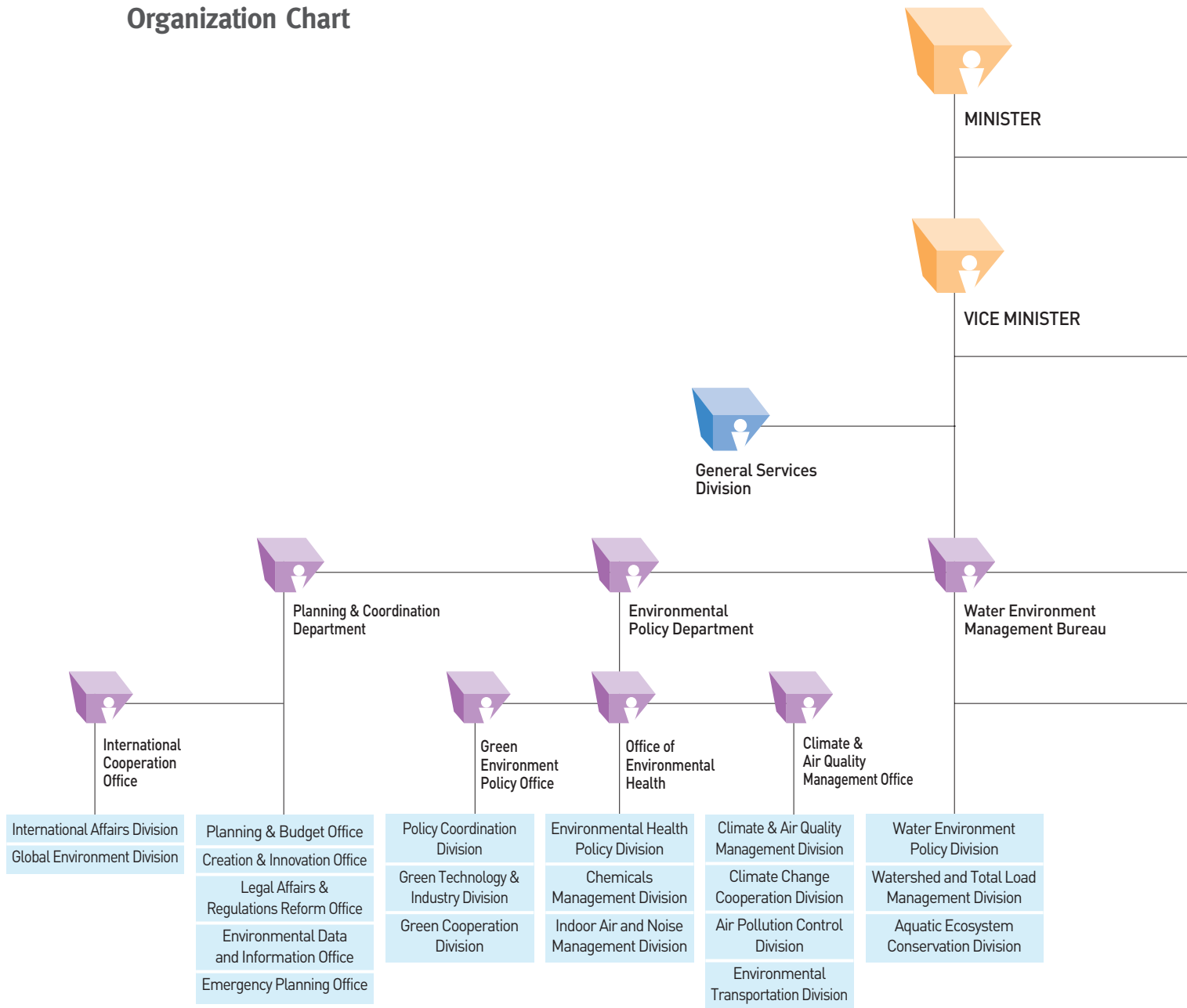
Fifthly, mid- and long-term examinations on the health impact on local residents will be carried out. With the Taean-gun Health Center as the base, health impact examinations, checkups and consultations will take place for the residents of affected areas (on 9,000 residents in 2008 at a cost of 3 billion KRW); and the designation of the Taean-gun Health Center as an 'environmental health center' will be promoted according to the 「Environmental Health Act」.

# >>> Appendix

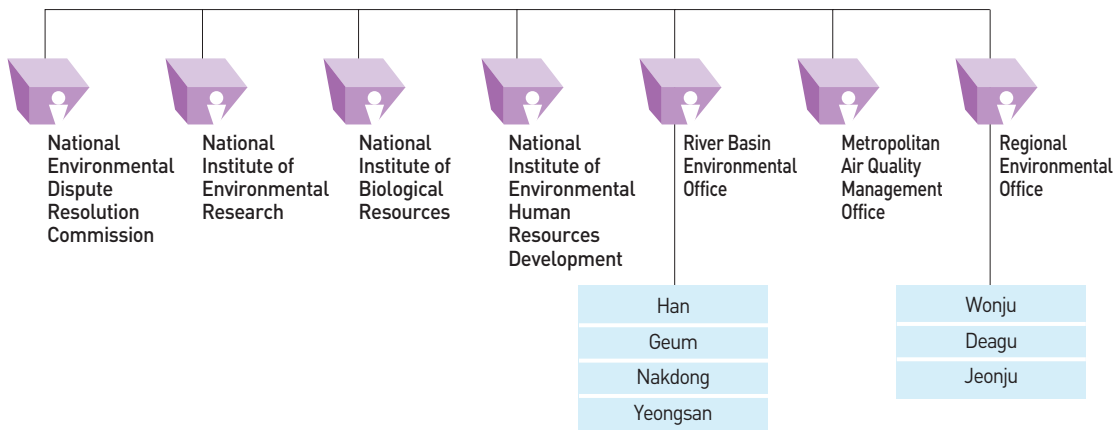


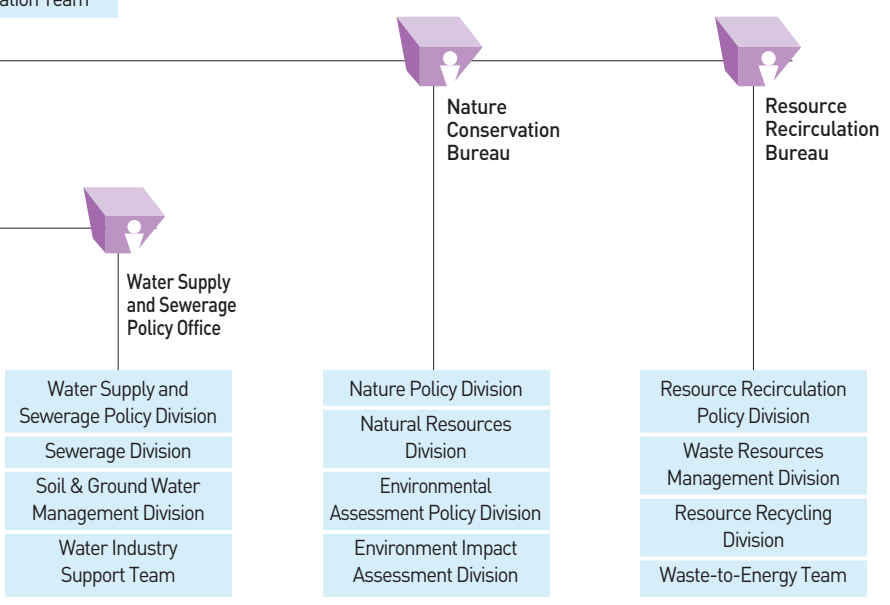
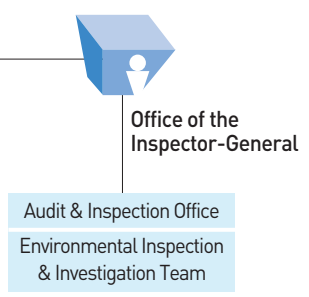
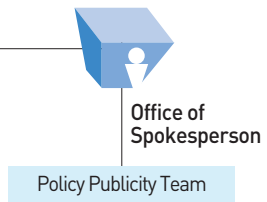


# Organization Chart

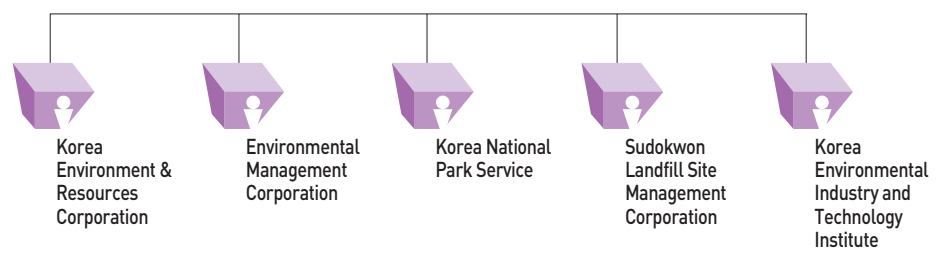


## Subsidiary Organization





**Affiliates**



## Personnel (1,756)

(as of March 2009)

| Subsidiary Organization(1,238) |       |      |      |        |                                       |         |      |          |  |                                     |       |        |
|--------------------------------|-------|------|------|--------|---------------------------------------|---------|------|----------|--|-------------------------------------|-------|--------|
| MOE                            | NEDRC | NIER | NIBR | NIEHRD | River Basin Environmental Office(503) |         |      |          | Metropolitan Air Quality Management Office | Regional Environmental Office (225) |       |        |
|                                |       |      |      |        | Han                                   | Nakdong | Geum | Yeongsan |  | Wonju                               | Daegu | Jeonju |
| 518                            | 21    | 300  | 102  | 30     | 144                                   | 138     | 108  | 113      | 57   | 76                                  | 92    | 57     |

## 2009 Budget

(Unit : KRW100 Million)

| Category   | 2008 Budget(A) | 2009 Budget(B) | Increase/Decrease(B - A) | %           |
|--|----------------|----------------|--------------------------|-------------|
| <b>Total</b>                                       | <b>35,914</b>  | <b>40,922</b>  | <b>5,008</b>             | <b>13.9</b> |
| <b>Business Expenses</b>                           | <b>34,280</b>  | <b>39,022</b>  | <b>4,742</b>             | <b>13.8</b> |
| • Water Supply/Sewage Services & Water Quality     | 21,274         | 24,942         | 3,668                    | 17.2        |
| - Water Supply/Sewage Services                     | 17,959         | 20,581         | 2,622                    | 14.6        |
| - Water Quality                                    | 3,315          | 4,361          | 1,046                    | 31.5        |
| • Waste Management                                 | 2,869          | 3,189          | 320                      | 11.1        |
| • Air Quality Improvement                          | 3,522          | 3,180          | △342                     | △9.7        |
| • Nature Conservation                              | 2,778          | 3,591          | 813                      | 29.3        |
| • General Environmental Protection                 | 3,836          | 4,121          | 288                      | 7.4         |
| - Environmental Policy & International Cooperation | 1,929          | 2,196          | 267                      | 13.8        |
| - Environmental Research /Education                | 378            | 422            | 44                       | 11.6        |
| - Environmental Management, etc                    | 1,529          | 1,503          | △26                      | △1.7        |
| <b>Labor Expenses/Basic Expenses</b>               | <b>1,634</b>   | <b>1,900</b>   | <b>266</b>               | <b>16.3</b> |



## Head Office and Roles

| Office/Bureau                           | Functions   |
|---|---|
| Office of Spokesperson                  | <ul style="list-style-type: none"> <li>• Establishment and coordination of public relations plans and strategies on major policies</li> <li>• Management of public relations activities within a division and support for press conferences</li> </ul>  |
| Office of the Inspector General         | <ul style="list-style-type: none"> <li>• Audit &amp; inspection issues and the inspection by MOE and its subsidiary organizations</li> <li>• Comprehensive coordination of investigation and regulation activities on pollutant emitting facilities</li> </ul>  |
| General Services Division               | <ul style="list-style-type: none"> <li>• Management of personnel, security, documents and employee welfare</li> <li>• Purchase, procurement, management of goods, capital management, accounting, and settlement</li> </ul>   |
| Planning & Coordination Department      | <ul style="list-style-type: none"> <li>• Administrative innovation, the establishment of major task plans, budget allocation and management of organizations and employees</li> <li>• Public service centers, the establishment and amendment of statutes, emergency plans and environmental informatization</li> </ul>   |
| Environmental Policy Department         | <ul style="list-style-type: none"> <li>• Formation of comprehensive mid-and long-term plans for environmental protection</li> <li>• Support for the development of environmental technology and industry</li> <li>• Environmental education and cooperation with private environmental organizations</li> <li>• Environmental health and control of toxic chemicals</li> <li>• Prevention of environmental pollution in daily lives including indoor air quality, noise and dust</li> </ul> |
| Climate & Air Quality Management Office | <ul style="list-style-type: none"> <li>• Air quality improvement and the establishment of basic plans for the management of air quality in metropolitan areas</li> <li>• Establishment of comprehensive plans for the management of air pollutant-emitting businesses</li> <li>• Measures to prevent automobile exhaust and to encourage the use of low-polluting fuels</li> <li>• Establishment of mid- and long-term plans to address climate change</li> </ul>                           |
| International Cooperation Office        | <ul style="list-style-type: none"> <li>• International environmental cooperation between countries, regions and organizations</li> <li>• International cooperation on climate change and affairs on multinational treaties</li> </ul>   |
| Water Environment Management Bureau     | <ul style="list-style-type: none"> <li>• Formation of basic policies to preserve water quality</li> <li>• Establishment of water quality management plans for each watershed and related area</li> <li>• Investigation of water ecosystems and plans for investigation and restoration</li> <li>• Management of industrial wastewater, livestock wastewater and non-point sources</li> </ul>  |
| Water Supply and Sewerage Policy Office | <ul style="list-style-type: none"> <li>• Establishment of basic waterworks plans and implementation of measures to control water demand</li> <li>• Implementation of measures to nurture and support water industry</li> <li>• Establishment of framework plans on sewerage and household wastewater treatment</li> <li>• Formation of comprehensive measures to preserve soil and groundwater</li> </ul>   |
| Nature Conservation Bureau              | <ul style="list-style-type: none"> <li>• Development of basic policy for nature conservation</li> <li>• Conservation of ecosystem and management of national parks</li> <li>• Environmental Impact Assessment and Prior Environmental Review System</li> </ul>  |
| Resource Recirculation Bureau           | <ul style="list-style-type: none"> <li>• Establishment of framework plans and comprehensive measures for waste treatment</li> <li>• Development of framework plans for household and industrial waste management</li> <li>• Formation of framework plans for waste recycling and support for recycling industry</li> <li>• Formation of framework plans for waste-to-energy</li> </ul>  |

## Contact Information and Websites of Subsidiary /Affiliated rganizations

| Organization   | Telephone        | Website  |
|--|------------------|--|
| National Env' l Dispute Resolution Commission (NEDRC)                  | {82} 2-504-9303  | <a href="http://edc.me.go.kr/">http://edc.me.go.kr/</a>          |
| National Institute of Environmental Research (NIER)                    | {82} 32-560-7027 | <a href="http://nier.go.kr/">http://nier.go.kr/</a>              |
| National Institute of Biological Resources                             | {82} 32-590-7000 | <a href="http://nibr.go.kr/">http://nibr.go.kr/</a>              |
| National Institute of Environmental Human Resources Development (EHRD) | {82} 32-560-7774 | <a href="http://ehrd.me.go.kr/">http://ehrd.me.go.kr/</a>        |
| Han River Basin Environmental office                                   | {82} 31-790-2420 | <a href="http://hg.me.go.kr/">http://hg.me.go.kr/</a>            |
| Nakdong River Basin Environmental Office                               | {82} 55-211-1790 | <a href="http://ndg.me.go.kr/">http://ndg.me.go.kr/</a>          |
| Geum River Basin Environmental Office                                  | {82} 42-865-0800 | <a href="http://gg.me.go.kr/">http://gg.me.go.kr/</a>            |
| Yeongsan River Basin Environmental Office                              | {82} 62-605-5114 | <a href="http://yeongsan.me.go.kr/">http://yeongsan.me.go.kr</a> |
| Metropolitan Air Quality Management Office                             | {82} 31-481-1312 | <a href="http://mamo.me.go.kr">http://mamo.me.go.kr</a>          |
| Wonju Regional Environmental Office                                    | {82} 33-764-0982 | <a href="http://wonju.me.go.kr">http://wonju.me.go.kr</a>        |
| Daegu Regional Environmental Office                                    | {82} 53-760-2502 | <a href="http://daegu.me.go.kr">http://daegu.me.go.kr</a>        |
| Jeonju Regional Environmental Office                                   | {82} 63-270-1810 | <a href="http://jeonju.me.go.kr">http://jeonju.me.go.kr</a>      |
| Korea Environment & Resources Corporation                              | {82} 32-560-1588 | <a href="http://www.envico.or.kr">http://www.envico.or.kr</a>    |
| Environmental Management Corporation                                   | {82} 32-590-4000 | <a href="http://www.emc.or.kr/">http://www.emc.or.kr/</a>        |
| Korea National Park Service  | {82}2-3279-2700  | <a href="http://www.knps.or.kr/">http://www.knps.or.kr/</a>      |
| Sudokwon Landfill Site Management Corporation                          | {82} 32-560-9300 | <a href="http://www.slc.or.kr">http://www.slc.or.kr</a>          |
| Korea Environmental Industry and Technology Institute                  | {82} 2-380-0500  | <a href="http://www.keiti.re.kr">http://www.keiti.re.kr</a>      |

## Environmental Laws

| Current Status  | Enacted Date  | Revised Date                       |
|---|---------------|------------------------------------|
| Framework Act on Environmental Policy                         | Aug. 1, 1990  | Mar. 28, 2008                      |
| Clean Air Conservation Act                                    | Aug. 1, 1990  | Mar. 21, 2008                      |
| Framework Act on Sustainable Development                      | Aug. 3, 2007  | Aug. 3, 2007                       |
| Environmental Education Promotion Act                         | Mar. 21, 2008 | Sept. 22, 2008<br>(Effective Date) |
| Environmental Health Act                                      | Mar. 21, 2008 | Mar. 22, 2009<br>(Effective Date)  |
| Indoor Air Quality Control in Public Use Facilities, etc. Act | Dec. 30, 1996 | Oct. 17, 2007                      |

| Current Status  | Enacted Date   | Revised Date                      |
|---|----------------|-----------------------------------|
| Noise and Vibration Control Act   | Aug. 1, 1990   | Mar. 21, 2008                     |
| Foul Odor Prevention Act  | Feb. 9, 2004   | Mar. 21, 2008                     |
| Special Act on Metropolitan Air Quality Improvement   | Dec. 31, 2003  | Mar. 28, 2008                     |
| Water Quality and Ecosystem Conservation Act  | Aug. 1, 1990   | Mar. 21, 2008                     |
| Act Relating to the Han River Water Quality Improvement and Community Support                     | Feb. 8, 1999   | Aug. 3, 2008                      |
| Act on the Nakdong River Watershed Management and Community Support                               | Jan. 14, 2002  | Dec. 27, 2008                     |
| Act on the Guem River Watershed Management and Community Support                                  | Jan. 14, 2002  | Dec. 27, 2008                     |
| Act on the Yeongsan & Sumjin River Watershed Management and Community Support                     | Jan. 14, 2002  | Dec. 27, 2008                     |
| Natural Environment Conservation Act  | Dec. 31, 1991  | Mar. 28, 2008                     |
| Act on Special Measures for the Control of Environmental Offenses                                 | May 31, 1991   | May 17, 2007                      |
| Environmental Dispute Adjustment Act  | Aug. 1, 1990   | Mar. 21, 2008                     |
| Act on Antarctic Activities and Environmental Protection (jointly enacted)                        | Mar. 22, 2004  | Feb. 29, 2008                     |
| Act on Promotion of the Purchase of Environment-Friendly Products                                 | Dec. 31, 2004  | Mar. 21, 2008                     |
| Act on Environmental Test and Examination   | Oct. 4, 2006   | Mar. 21, 2008                     |
| Environment Improvement Expenses Liability Act  | Dec. 31, 1991  | May 17, 2007                      |
| Natural Park Act  | Jan. 4, 1980   | Mar. 21, 2008                     |
| Special Act on the Ecosystem Conservation of Islands such as Dokdo Island                         | Dec. 31, 1997  | May 17, 2007                      |
| Wetland Conservation Act (jointly enacted)  | Feb. 8, 1999   | Mar. 21, 2008                     |
| Environmental Impact Assessment Act   | Dec. 31, 1999  | Mar. 28, 2008                     |
| Soil Environment Conservation Act   | Jan. 5, 1995   | May 17, 2007                      |
| Act on the Protection of the Baekdudaegan Mountain System (jointly enacted)                       | Dec. 31, 2003  | Feb. 29, 2008                     |
| National Trust Act on Cultural Heritage & Natural Environment Assets (jointly enacted)            | Mar. 24, 2006  | Mar. 28, 2008                     |
| Wildlife Protection Act   | Feb. 9, 2004   | Feb. 29, 2008                     |
| Environmental Management Corporation Act  | May. 21, 1983  | Mar. 21, 2008                     |
| Act Relating to Special Accounting for Environmental Improvement                                  | Jan. 5, 1994   | Feb. 29, 2008                     |
| Development of and Support for Environmental Technology Act                                       | Dec. 22, 1994  | Mar. 21, 2008                     |
| Toxic Chemicals Control Act   | Aug. 1, 1990   | Mar. 21, 2008                     |
| Persistent Organic Pollutants (POPs) Control Act  | Jan. 26, 2007  | Apr. 27, 2007                     |
| Waste Control Act   | Dec. 31, 1986  | Dec. 21, 2007                     |
| Act on the Disposal of Sewage, Excreta & Livestock Wastewater (annulled)                          | Mar. 8, 1991   | Sept. 28, 2007<br>(Annulled Date) |
| Act on the Management and Use of Livestock Manure (jointly enacted)                               | Sept. 27, 2006 | Mar. 21, 2008                     |
| Act on the Promotion of Saving and Recycling of Resources   | Dec. 8, 1992   | Mar. 21, 2008                     |
| Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles (jointly enacted)   | Apr. 27, 2007  | Feb. 29, 2008                     |
| Act on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal               | Dec. 8, 1992   | Feb. 29, 2008                     |
| Act on the Promotion of Construction Waste Recycling  | Dec. 31, 2003  | Feb. 29, 2008                     |
| Promotion of Installation of Waste Disposal Facilities and Assistance, etc. to Adjacent Areas Act | Jan. 5, 1995   | Feb. 29, 2008                     |
| Sudokwon Landfill Site Management Corporation Act   | Jan. 21, 2000  | Apr. 11, 2007                     |
| Korea Environment & Resources Corporation Act   | Dec. 27, 1993  | Mar. 21, 2008                     |
| Sewerage Act  | Aug. 3, 1966   | Mar. 21, 2008                     |
| Water Supply and Waterworks Installation Act  | Dec. 31, 1961  | Mar. 21, 2008                     |
| Management of Drinking Water Act  | Jan. 5, 1995   | Mar. 21, 2008                     |

## Environmental Quality Standards

### Air

| Air Pollutants                      | Standard  | Measurement Method                  |
|-------------------------------------|---|-------------------------------------|
| Sulfur Dioxide (SO <sub>2</sub> )   | ≤0.02ppm (an annual average)<br>≤0.05ppm (24-hr average)<br>≤0.15ppm (1-hr average) | PulseUV.Fluorescence Method         |
| Carbon Monoxide (CO)                | ≤9ppm (8-hr average)<br>≤25ppm (1-hr average)                                       | Non-Dispersive Infrared Method      |
| Nitrogen Dioxide (NO <sub>2</sub> ) | ≤0.03ppm (an annual average)<br>≤0.06ppm (24-hr average)<br>≤0.1ppm (1-hr average)  | Chemiluminescent Method             |
| Particulate Matters (PM10)          | ≤50μg/m <sup>3</sup> (an annual average)<br>≤100μg/m <sup>3</sup> (24-hr average)   | β-Ray Absorption Method             |
| Ozone (O <sub>3</sub> )             | ≤0.06ppm (8-hr average)<br>≤0.1ppm (1-hr average)                                   | U.V. Photmetric Method              |
| Lead (Pb)                           | ≤0.5μg/m <sup>3</sup> (an annual average)   | Atomic Absorption spectrophotometry |
| Benzene                             | ≤5μg/m <sup>3</sup> (an annual average; to be applied from 2010)                    | Gas Chromatography                  |

Note : 1. 1-hr average: the 999th percentile value less than the standard

8-hr and 24-hr average: the 99th percentile value less than the standard

2. PM10 stands for Particular Matter of less than 10 millionths of a metre (10 micrometers or 10μm) in diameter.

### Noise

(Leq dBA)

| Region        | Subjected Area               | Standard          |                     |
|---------------|------------------------------|-------------------|---------------------|
|               |                              | Day (06:00~22:00) | Night (22:00~06:00) |
| General Area  | Exclusively Residential Zone | 50                | 40                  |
|               | General Residential Zone     | 55                | 45                  |
|               | Commercial Zone              | 65                | 55                  |
|               | Industrial Zone              | 70                | 65                  |
| Roadside Area | Residential Zone             | 65                | 55                  |
|               | Commercial Zone              | 70                | 60                  |
|               | Industrial Zone              | 75                | 70                  |








## Water & Aquatic Ecosystem

### Rivers and Streams

#### - Standard for Human Health Protection (River, Streams and Lakes)

| Pollutants                      | Standard Value (mg/L)                  |
|---------------------------------|--|
| Cadmium (Cd)                    | ≤0.005                                 |
| Arsenic (As)                    | ≤0.05                                  |
| Cyanide (CN)                    | Not Detected (Limit of Detection 0.01) |
| Mercury (Hg)                    | ND (LOD 0.001)                         |
| Organic Phosphorus              | ND (LOD 0.0005)                        |
| Polychlorinated Biphenyls (PCB) | ND (LOD 0.0005)                        |
| Lead (Pb)                       | ≤0.05                                  |
| Hexachromium (Cr6+)             | ≤0.05                                  |
| Alkyl Benzene Sulfate (ABS)     | ≤0.5                                   |
| Carbon Tetrachloride (CCl4)     | ≤0.004                                 |
| 1,2-Dichloroethylene            | ≤0.03                                  |
| Tetrachloroethylene (PCE)       | ≤0.04                                  |
| Dichloromethane                 | ≤0.02                                  |
| Benzene                         | ≤0.01                                  |
| Chloroform                      | ≤0.08                                  |
| Di-Ethylhexyl Phthalate (DEHP)  | ≤0.008                                 |
| Antimony (Sb)                   | ≤0.02                                  |

- Standard for the Living Environment

| Grade       | State(Character) | Standard  |           |          |                                     |                                    |                 |        |
|-------------|------------------|---|-----------|----------|-------------------------------------|------------------------------------|-----------------|--------|
|             |                  | pH  | BOD(mg/L) | SS(mg/L) | DO(mg/L)                            | Coliforms (No./100m <sup>l</sup> ) |                 |        |
|             |                  |   |           |          |                                     | Total Coliforms                    | Fecal Coliforms |        |
| Very Good   | Ia               |  | 6.5~8.5   | ≤1       | ≤25                                 | ≥7.5                               | ≤50             | ≤10    |
| Good        | Ib               |  | 6.5~8.5   | ≤2       | ≤25                                 | ≥5.0                               | ≤500            | ≤100   |
| Fairly Good | II               |  | 6.5~8.5   | ≤3       | ≤25                                 | ≥5.0                               | ≤1,000          | ≤200   |
| Fair        | III              |  | 6.5~8.5   | ≤5       | ≤25                                 | ≥5.0                               | ≤5,000          | ≤1,000 |
| Fairly Poor | IV               |  | 6.0~8.5   | ≤8       | ≤100                                | ≥2.0                               | -               | -      |
| Poor        | V                |  | 6.0~8.5   | ≤10      | No floating matters such as garbage | ≥2.0                               | -               | -      |
| Very Poor   | VI               |  | -         | >10      | -                                   | <2.0                               | -               | -      |

Remarks

1. Water Quality by Grade & State of Aquatic Ecosystems

- a. Very Good : Higher concentrations of DO (Dissolved Oxygen), no pollutant, excellent condition of ecosystems, and residential use after a simple purification process (e.g., filtration and sterilization)
- b. Good : High DO levels, few pollutants, good condition of ecosystems, and residential use after a general purification process (e.g., sedimentation, filtration, and sterilization)
- c. Fairly Good : Good DO levels, a few pollutants, good and moderate condition of ecosystems, and residential/ swimming pool use after a general purification process (e.g., sedimentation, filtration, and sterilization)
- d. Fair : Moderate concentrations of DO, general pollutants, moderate condition of ecosystems, residential use after an advanced purification process (e.g., sedimentation, filtration, carbon block filtration, and sterilization) and industrial use after a general purification process
- e. Fairly Poor : Low concentrations of DO, many pollutants, an agricultural use, and an industrial purpose after an advanced purification process
- f. Poor : Lower concentrations of DO, a significant amount of pollutants, an industrial use after an advanced purification process (e.g., sedimentation, filtration, carbon block filtration, sterilization, and reverse osmosis), and no effect of bad or unpleasant odor on daily life
- g. Very Poor : Little DO, polluted water, and few fish to survive
- h. A certain grade of water can be used for lower-grade water purpose.
- i. An appropriate water treatment in line with the status of pollution by item (e.g., pH) and the method of water treatment, allows lower-grade water to be used for higher-grade water purpose.

**- Water Quality by Grade & Biological Features of Aquatic Ecosystem**








| Grade                 | Biological Indicator Species   |   | Habitats & Features   |
|-----------------------|--|---|---|
|                       | Benthos  | Fish  |   |
| Very Good~Good        | Gammarus, Korean Fresh Water Crayfish, Drunella Aculea, Cincticostella, Levanidovae, Plecoptera, Rhyacophila, Glossosoma KUa, Hydatophylax, Nigrovittatus McLachlan, Psilotreta Kisoensi | Trout, Moroco SP, Fresh Water Salmon, Chinese Minnow, etc.                  | <ul style="list-style-type: none"> <li>- Crystal clear water, and high flow velocity</li> <li>- Rocks and pebbles at the bottom</li> <li>- Very little attached algae</li> </ul>                                  |
| Good~Fair             | Melanian snail, Glossiphonia, Rhoenanthus (Potamanthindus), Ephemera Orientalis, Uracanthella Rufa, Caenis Rishinoae, Psephenoides sp. 1, Macronema Radiatum McLachlan                   | Shiri, Dark C Sweetfish, Mandarin Fish, etc.                                | <ul style="list-style-type: none"> <li>- Clear water, and normally high or moderate flow velocity</li> <li>- Rock and gravel at the bottom</li> <li>- A bit attached algae</li> </ul>                             |
| Fair~Fairly Poor      | Lymnaeidae, Arhynchobdellidae, Water boatman, Orthetrum Albistylum Specisum,   | Dace fish, Korean Piscivorous Chub, False [Goby] Minnow, Stone Moroko, etc. | <ul style="list-style-type: none"> <li>- Low water turbidity, and normally low flow velocity</li> <li>- Small gravel and sand at the bottom</li> <li>- Much attached green algae</li> </ul>                       |
| Fairly Poor~Very Poor | Physa Acuta, Tubifex, Red Sea Bass, Mothfly, Hover fly   | Crucian [Prussian] Carp, Carp, Loach, Catfish, etc.                         | <ul style="list-style-type: none"> <li>- High water turbidity and low flow velocity</li> <li>- Sand and silt at the bottom; and the color of water is black.</li> <li>- Much attached brown/gray algae</li> </ul> |

## Lakes

### - Standard for Human Health Protection

This standard is the same as that of rivers and streams for human health protection

### - Standard for the Living Environment

| Grade       |     | Standard  |         |               |                        |              |               |               |                               |                            |                    |
|-------------|-----|---|---------|---------------|------------------------|--------------|---------------|---------------|-------------------------------|----------------------------|--------------------|
|             |     | State<br>(Character)  | pH      | COD<br>(mg/L) | SS<br>(mg/L)           | DO<br>(mg/L) | T-P<br>(mg/L) | T-N<br>(mg/L) | Chl-a<br>(mg/m <sup>3</sup> ) | E-Coliforms<br>(No./100mL) |                    |
|             |     |   |         |               |                        |              |               |               |                               | Total<br>Coliforms         | Fecal<br>Coliforms |
| Very Good   | Ia  |    | 6.5~8.5 | ≤2            | ≤1                     | ≥7.5         | ≤0.01         | ≤0.2          | ≤5                            | ≤50                        | ≤10                |
| Good        | Ib  |    | 6.5~8.5 | ≤3            | ≤5                     | ≥5.0         | ≤0.02         | ≤0.3          | ≤9                            | ≤500                       | ≤100               |
| Fairly Good | II  |    | 6.5~8.5 | ≤4            | ≤5                     | ≥5.0         | ≤0.03         | ≤0.4          | ≤14                           | ≤1,000                     | ≤200               |
| Fair        | III |    | 6.5~8.5 | ≤5            | ≤15                    | ≥5.0         | ≤0.05         | ≤0.6          | ≤20                           | ≤5,000                     | ≤1,000             |
| Fairly Poor | IV  |  | 6.0~8.5 | ≤8            | ≤15                    | ≥2.0         | ≤0.10         | ≤1.0          | ≤35                           | -                          | -                  |
| Poor        | V   |  | 6.0~8.5 | ≤10           | No floating<br>garbage | ≥2.0         | ≤0.15         | ≤1.5          | ≤70                           | -                          | -                  |
| Very Poor   | VI  |  | -       | >10           | -                      | <2.0         | >0.15         | >1.5          | >70                           | -                          | -                  |

#### Remarks

1. When the ration of total nitrogen to total phosphorate is less than 7, the criteria of total phosphorate shall not be applied, and on the other hand, the ratio is more than 16, the criteria of total nitrogen shall not be applied.
2. Water quality by grade and the status of aquatic ecosystems is the same as the first column of A. Rivers and Streams, (2) the Standard for the Living Environment.
3. Design of characters is the same as the first column of A. Rivers and Streams, (2) the Standard for the Living Environment.



## Groundwater

1. Ground water used for drinking shall be subject to the standard of drinking water in accordance with the Article 5 of the Drinking Water Management Act.
2. In the case of groundwater for residential/agricultural/fishing/industrial uses

(Unit: mg/L)

| Category   | Water Use                            | Living Water       | Agricultural Water ·<br>Fishery Water | Industrial Water |
|--|--------------------------------------|--------------------|---------------------------------------|------------------|
|  |                                      |                    |                                       |                  |
| General<br>Pollutants<br>(5 in total)                | pH                                   | 5.8~8.5            | 6.0~8.5                               | 5.0~9.0          |
|  | No. of E-Coliforms                   | ≤5,000 (MPN/100mℓ) | -                                     | -                |
|  | Nitrate Nitrogen(NO <sub>3</sub> -N) | ≤20                | ≤20                                   | ≤40              |
|  | Chloride (Cl <sup>-</sup> )          | ≤250               | ≤250                                  | ≤500             |
|  | Total Colony Count                   | ≤100CFU/1mℓ        | -                                     | -                |
| Specific<br>Hazardous<br>Substances<br>(15 in total) | Cadmium (Cd)                         | ≤0.01              | ≤0.01                                 | ≤0.02            |
|  | Arsenic (As)                         | ≤0.05              | ≤0.05                                 | ≤0.1             |
|  | Cyanide (CN)                         | ND                 | ND                                    | ≤0.2             |
|  | Mercury (Hg)                         | ND                 | ND                                    | ND               |
|  | Organic Phosphorus                   | ND                 | ND                                    | ND               |
|  | Phenol                               | ≤0.005             | ≤0.005                                | ≤0.01            |
|  | Lead (Pb)                            | ≤0.1               | ≤0.1                                  | ≤0.2             |
|  | Hexachromium (Cr <sup>+6</sup> )     | ≤0.05              | ≤0.05                                 | ≤0.1             |
|  | TCE (Trichloroethylene)              | ≤0.03              | ≤0.03                                 | ≤0.06            |
|  | PCE (Tetrachloroethane)              | ≤0.01              | ≤0.01                                 | ≤0.02            |
|  | 1.1.1-Trichloroethane                | ≤0.15              | ≤0.3                                  | ≤0.5             |
|  | Benzene                              | ≤0.015             | -                                     | -                |
|  | Toluene                              | ≤1                 | -                                     | -                |
|  | Ethyl Benzene                        | ≤0.45              | -                                     | -                |
|  | Xylene                               | ≤0.75              | -                                     | -                |

### Remarks

1. Residential Water : used for domestic purposes including laundry, dishes, and toilets, except for drinking, agriculture, fishery, and the industry.
  2. Agricultural / Fishery Water : used for agriculture in accordance with article 2 of enforcement regulations of the Framework Act on Agriculture and Rural Community, and for fishery in conformity with article 2(3) of the Special Act on Rural Development
  3. Industrial Water : used for industrial businesses equipped with waste discharge facilities in accordance with article 2(5) of the Water Quality Conservation Act
  4. Fishery water and groundwater shall not be subject to the chloride standard, when the concentration of chloride ions does not pose a threat to the public health and groundwater is used for the intended purpose designated by the Minister of Environment.
- ※ Common criteria : agriculture/fishery/industry water also used for domestic purposes (e.g., laundry, dishes, etc) shall be subject to the standard for residential water.

## Drinking Water

| Classification                 | Water Quality Inspection Item            |   | Tap Water | Spring Water | Deep Ocean Drinking Water | Drinking water from Community facility(mountain pond, etc.) | Remarks                              |  |
|--------------------------------|--|---|-----------|--------------|---------------------------|---|--------------------------------------|--|
|                                | Total Colony Counts                      | Low Temp. Colony(21℃)<br>Medium Temp. Colony(35℃) |           |              |                           |   |                                      |  |
| Microorganism                  | Total Colony Counts                      | Low Temp. Colony(21℃)<br>Medium Temp. Colony(35℃) | -         | 100CFU/mL    | 100CFU/mL                 | -   |                                      |  |
|                                | Total Coliforms                          |   | ND/100mL  | ND/250mL     | ND/250mL                  | ND/100mL  |                                      |  |
|                                | Fecal Streptococci                       |   | -         | ND/250mL     | ND/250mL                  | -   |                                      |  |
|                                | Pseudomonas aeruginosa                   |   | -         | ND/250mL     | ND/250mL                  | -   |                                      |  |
|                                | Spore-forming Sulfite-reducing anaerobes |   | -         | ND/50mL      | ND/50mL                   | -   |                                      |  |
|                                | Salmonella                               |   | -         | ND/250mL     | ND/250mL                  | -   |                                      |  |
|                                | Shigella                                 |   | -         | ND/250mL     | ND/250mL                  | -   |                                      |  |
|                                | Fecal Coliforms                          |   | ND/100mL  | -            | -                         | ND/100mL  |                                      |  |
|                                | Escherichia Coli                         |   | ND/100mL  | -            | -                         | ND/100mL  |                                      |  |
|                                | Yersinia                                 |   | -         | -            | -                         | ND/2L   |                                      |  |
| Hazardous Inorganic Substances | Pb; Lead                                 |   | 0.05mg/L  | 0.05mg/L     | 0.05mg/L                  | 0.05mg/L  | 2011: 0.01mg/L                       |  |
|                                | F; Fluoride                              |   | 1.5mg/L   | 2.0mg/L      | 2.0mg/L                   | 1.5mg/L   |                                      |  |
|                                | As; Arsenic                              |   | 0.05mg/L  | 0.05mg/L     | 0.05mg/L                  | 0.05mg/L  | 2011: 0.01mg/L (except spring water) |  |
|                                | Se; Selenium                             |   | 0.01mg/L  | 0.01mg/L     | 0.01mg/L                  | 0.01mg/L  |                                      |  |
|                                | Hg; Mercury                              |   | 0.001mg/L | 0.001mg/L    | 0.001mg/L                 | 0.001mg/L   |                                      |  |
|                                | CN; Cyanide                              |   | 0.01mg/L  | 0.01mg/L     | 0.01mg/L                  | 0.01mg/L  |                                      |  |
|                                | Cr <sup>6+</sup> ; Hexachromium          |   | 0.05mg/L  | 0.05mg/L     | 0.05mg/L                  | 0.05mg/L  | 2011: for all types of Chrome        |  |
|                                | NH <sub>3</sub> -N; Ammonium Nitrogen    |   | 0.5mg/L   | 0.5mg/L      | 0.5mg/L                   | 0.5mg/L   |                                      |  |
|                                | NO <sub>3</sub> -N; Nitrate Nitrogen     |   | 10mg/L    | 10mg/L       | 10mg/L                    | 10mg/L  |                                      |  |
|                                | Cd; Cadmium                              |   | 0.005mg/L | 0.005mg/L    | 0.005mg/L                 | 0.005mg/L   |                                      |  |
| Hazardous Inorganic Substances | Volatile Organic Material                | B; Boron  |           | 1.0mg/L      | 1.0mg/L                   | 1.0mg/L   | 1.0mg/L                              |  |
|                                |  | Bromate   |           | -            | -                         | 0.01mg/L  | -                                    |  |
|                                |  | Strontium   |           | -            | -                         | 4mg/L   | -                                    |  |
|                                |  | Phenol  |           | 0.005mg/L    | 0.005mg/L                 | 0.005mg/L   | 0.005mg/L                            |  |
|                                |  | 1.1.1-Trichloroethane                             |           | 0.1mg/L      | 0.1mg/L                   | 0.1mg/L   | 0.1mg/L                              |  |
|                                |  | PCE; Tetrachloroethylene                          |           | 0.01mg/L     | 0.01mg/L                  | 0.01mg/L  | 0.01mg/L                             |  |
|                                |  | TCE; Trichloroethylene                            |           | 0.03mg/L     | 0.03mg/L                  | 0.03mg/L  | 0.03mg/L                             |  |
|                                |  | Dichloromethane                                   |           | 0.02mg/L     | 0.02mg/L                  | 0.02mg/L  | 0.02mg/L                             |  |
|                                |  | Benzene   |           | 0.01mg/L     | 0.01mg/L                  | 0.01mg/L  | 0.01mg/L                             |  |
|                                |  | Toluene   |           | 0.7mg/L      | 0.7mg/L                   | 0.7mg/L   | 0.7mg/L                              |  |
|                                |  | Ethylbenzene                                      |           | 0.3mg/L      | 0.3mg/L                   | 0.3mg/L   | 0.3mg/L                              |  |
|                                |  | Xylene  |           | 0.5mg/L      | 0.5mg/L                   | 0.5mg/L   | 0.5mg/L                              |  |
|                                |  | 1.1 Dichloroethylene                              |           | 0.03mg/L     | 0.03mg/L                  | 0.03mg/L  | 0.03mg/L                             |  |
| Tetrachlorocarbon              |  | 0.002mg/L   | 0.002mg/L | 0.002mg/L    | 0.002mg/L                 |   |                                      |  |
| 1,4-dioxane                    |  | 0.05mg/L  | 0.05mg/L  | 0.05mg/L     | 0.05mg/L                  | Applied starting from 2011                                  |                                      |  |

| Classification                                       |                                  | Water Quality Inspection Item | Tap Water | Spring Water | Deep Ocean Drinking Water | Drinking water from Community facility(mountain pond, etc.) | Remarks                    |
|--|----------------------------------|-------------------------------|-----------|--------------|---------------------------|---|----------------------------|
| Hazardous Inorganic Substances                       | Pesticide                        | Diazinon                      | 0.02mg/L  | 0.02mg/L     | 0.02mg/L                  | 0.02mg/L  |                            |
|  |                                  | Parathion                     | 0.06mg/L  | 0.06mg/L     | 0.06mg/L                  | 0.06mg/L  |                            |
|  |                                  | Fenitrothion                  | 0.04mg/L  | 0.04mg/L     | 0.04mg/L                  | 0.04mg/L  |                            |
|  |                                  | Carbaryl                      | 0.07mg/L  | 0.07mg/L     | 0.07mg/L                  | 0.07mg/L  |                            |
|  |                                  | 1,2-Dibromo-3-Chloropropan    | 0.003mg/L | 0.003mg/L    | 0.003mg/L                 | 0.003mg/L   |                            |
|  | Disinfection Residues            | Free Residual Chlorine        | 4.0mg/L   | -            | -                         | -   |                            |
|  |                                  | THMs; Trihalomethanes         | 0.1mg/L   | -            | -                         | -   |                            |
|  |                                  | Bromodichloromethane          | 0.03mg/L  | -            | -                         | -   | Applied starting from 2009 |
|  |                                  | Dibromochloromethane          | 0.1mg/L   | -            | -                         | -   | Applied starting from 2009 |
|  |                                  | Chloroform                    | 0.08mg/L  | -            | -                         | -   |                            |
|  |                                  | Chloralhydrate                | 0.03mg/L  | -            | -                         | -   |                            |
|  |                                  | Dibromoacetonitrile           | 0.1mg/L   | -            | -                         | -   |                            |
|  |                                  | Dichloroacetonitrile          | 0.09mg/L  | -            | -                         | -   |                            |
|  |                                  | Trichloroacetonitrile         | 0.004mg/L | -            | -                         | -   |                            |
| HAA; Haloacetic acid                                 | 0.1mg/L                          | -                             | -         | -            |                           |   |                            |
| Materials that are Offensive to Human Sensory System | Hardness                         | 300mg/L                       | 500mg/L   | 500mg/L      | 1,200mg/L                 |   |                            |
|  | Consumption of KMnO <sub>4</sub> | 10mg/L                        | 10mg/L    | 10mg/L       | 10mg/L                    |   |                            |
|  | Odor (except disinfection)       | ND                            | ND        | ND           | ND                        |   |                            |
|  | Taste (except disinfection)      | ND                            | ND        | ND           | ND                        |   |                            |
|  | Cu; Copper                       | 1mg/L                         | 1mg/L     | 1mg/L        | 1mg/L                     |   |                            |
|  | Color                            | 5 PCU                         | 5 PCU     | 5 PCU        | 5 PCU                     |   |                            |
|  | ABS; Alkyl Benzene Sulfate       | 0.5mg/L                       | ND        | ND           | 0.5mg/L                   |   |                            |
|  | pH                               | 5.8~8.5                       | 5.8~8.5   | 5.8~8.5      | 5.8~8.5                   |   |                            |
|  | Zn; Zinc                         | 3mg/L                         | 3mg/L     | 3mg/L        | 3mg/L                     |   |                            |
|  | Cl <sup>-</sup> ; Chloride       | 250mg/L                       | 250mg/L   | 250mg/L      | 250mg/L                   |   |                            |
|  | Total Solids                     | 500mg/L                       | 500mg/L   | 500mg/L      | 500mg/L                   |   |                            |
|  | Fe; Iron                         | 0.3mg/L                       | 0.3mg/L   | 0.3mg/L      | 0.3mg/L                   |   |                            |
|  | Mn; Manganese                    | 0.3 mg/L                      | 0.3mg/L   | 0.3mg/L      | 0.3mg/L                   | 2011: 0.05mg/L (only for tap water)                         |                            |
|  | Turbidity                        | 0.5 NTU                       | 1 NTU     | 1 NTU        | 1 NTU                     |   |                            |
| SO <sub>4</sub> <sup>2-</sup> ; Sulfate              | 200mg/L                          | 200mg/L                       | 200mg/L   | 200mg/L      |                           |   |                            |
| Al; Aluminum   | 0.2mg/L                          | 0.2mg/L                       | 0.2mg/L   | 0.2mg/L      |                           |   |                            |
| Water Purification Standard                          | Viruses                          | 99.99% removed                | -         | -            | -                         |   |                            |
|  | Giardia lamblia                  | 99.9% removed                 | -         | -            | -                         |   |                            |

## Discharge Water Quality

### Sewerage Treatment Facility

| Classification | Standard       | BOD<br>(mg/L) | COD<br>(mg/L) | SS<br>(mg/L) | T-N<br>(mg/L) | T-P<br>(mg/L) | Total Coliforms<br>(No./ml) |
|----------------|----------------|---------------|---------------|--------------|---------------|---------------|-----------------------------|
| Sewerage Act   | Specific Areas | ≤10           | ≤40           | ≤10          | ≤20           | ≤2            |                             |
|                | Other Area     | ≤20           | ≤40           | ≤20          | ≤60           | ≥8            | ≤3,000                      |

#### Remarks

- Of special management areas at the Han river watersheds, designated in accordance with article 22 of the Framework Act on Environmental Policy, the Paldang special countermeasure area for the protection of water quality and the Jamsil water reservoir shall be subject to the standard for the special management area since January 1st 2002.
- The Han river watersheds (except for the Jamsil water reservoir) and the Nakdong /Geum/Youngsan/Sumjin river watersheds shall be subject to the standard for the special management area since January 1st 2004.  
However, they shall be subject to regional standards, if discharge water from sewerage treatment facilities does not inflow into major rivers and streams and there is no water supply facility at the discharge point in accordance with article 3(15) of the Water Supply & Waterworks Installation Act.
- Regions excluding the areas subject to the standard for the special management zone shall follow regional standards, but shall be subject to the aforementioned special standard since January 1st, 2008.
- Regarding total nitrogen and total phosphate, the areas subject to the standard for the special management zone shall follow regional standards in the winter season of December to March.
- The standard for the number of coliforms shall be applied to all areas since January 1st, 2003. A more reinforced standard for discharge water, i.e., 1,000coliforms/ml shall be applied to the areas below.
  - Clean areas under annexed list 5 of enforcement regulations of the Water Quality Conservation Act.
  - The areas within 10km of upstream distance from water source protection areas and boundaries, in accordance with article 5 of the Water Supply and Waterworks Installation Act
  - The areas within 15km of upstream distance from water supply facilities, in accordance with article 3(15) of the Water Supply and Waterworks Installation Act

### Wastewater Treatment Facility

| Period                     | Standard | BOD<br>(mg/L) | COD<br>(mg/L) | SS<br>(mg/L) | T-N<br>(mg/L) | T-P<br>(mg/L) | Total Coliforms<br>(No./mℓ) |
|----------------------------|----------|---------------|---------------|--------------|---------------|---------------|-----------------------------|
| By Dec. 31, 2007           |          | ≤30(30)       | ≤40(40)       | ≤30(30)      | ≤60(60)       | ≤8(8)         | -                           |
| Jan. 1, 2008.–Dec.31, 2012 |          | ≤20(30)       | ≤40(40)       | ≤20(30)      | ≤40(60)       | ≤4(8)         | ≤3,000                      |
| From Jan. 1, 2013          |          | ≤10(10)       | ≤40(40)       | ≤10(10)      | ≤20(20)       | ≤2(2)         | ≤3,000(3,000)               |

#### Remarks

1. The standards for water discharged from waste treatment facilities of industrial and agro-industrial complexes are decided and notified by the Minister of Environment, with a request from an operator of the aforementioned facility. Pollutants (e.g., phenol) which discharge water contains refer to ones which are treatable at the facilities within the permissible discharge standard applied to specific areas, in accordance with article 8, annexed list 5 (2) of the Water Quality Conservation Act.
2. The parentheses in the Table above show the standard for the quality of water discharged from the waste treatment facility at agro-industrial complexes.

### Public Treatment Facility for Human/Livestock Waste

| Classification                     | Standard | BOD<br>(mg/L) | COD<br>(mg/L) | SS<br>(mg/L) | Total Coliforms<br>(No./mℓ) | Others<br>(mℓ/L)      |
|------------------------------------|----------|---------------|---------------|--------------|-----------------------------|-----------------------|
| Human Waste Treatment Facility     |          | ≤30           | ≤50           | ≤30          | ≤3,000                      | T-N : ≤60<br>T-P : ≤8 |
| Livestock Waste Treatment Facility |          | ≤30           | ≤50           | ≤30          | ≤3,000                      | T-N : ≤60<br>T-P : ≤8 |

## Soil

(Unit: mg/kg)

| Soil Contaminants (16 in Total)                      | Precautionary Level |           | Regulatory Level |           |
|--|---------------------|-----------|------------------|-----------|
|  | "Ga" Zone           | "Na" Zone | "Ga" Zone        | "Na" Zone |
| Cadmium  | 1.5                 | 12        | 4                | 30        |
| Copper   | 50                  | 200       | 125              | 500       |
| Arsenic  | 6                   | 20        | 15               | 50        |
| Mercury  | 4                   | 16        | 10               | 40        |
| Lead   | 100                 | 400       | 300              | 1,000     |
| Hexachromiun   | 4                   | 12        | 10               | 30        |
| Zinc   | 300                 | 800       | 700              | 2,000     |
| Nickel   | 40                  | 160       | 100              | 400       |
| Fluorine   | 400                 | 800       | 800              | 2,000     |
| Organic Phosphorus Compounds                         | 10                  | 30        | -                | -         |
| PCB  | -                   | 12        | -                | 30        |
| Cyanide  | 2                   | 120       | 5                | 300       |
| Phenol   | 4                   | 20        | 10               | 50        |
| <b>Oil (except animal and plant types)</b>           |                     |           |                  |           |
| - Benzene · Toluene · Ethyle Benzene · Xylene (BTEX) | -                   | 80        | -                | 200       |
| - Total Petroleum Hydrocarbon (TPH)                  | 500                 | 2,000     | 1,200            | 5,000     |
| Trichloroethylene (TCE)                              | 8                   | 40        | 20               | 100       |
| Tetrachloroethylene (PCE)                            | 4                   | 24        | 10               | 60        |

### Remarks

1. "Ga" Zone : the land used for paddy fields, orchards, ranches, forest, streams, water supply, building lots, school lots, parks, amusement parks, and religion activities, and physical activities (only in the areas of grass and trees), in accordance with the land category of the Cadastral Act
2. "Na" Zone : the land used for plant lots, roads/ railroads, and multipurpose lots, in accordance with the land category of the Cadastral Act

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