

# **Environmental management in Korea: Insights and observations from the 2007 Australia-Korea Young Leaders Exchange Program**



Gyeongbokgung Palace, Seoul

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The views expressed in this report are those of the author and do not necessarily reflect those of the Australian or Queensland governments or the Australia-Korea Young Leaders Exchange Program organisers.

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The views expressed in this report are mine alone and not those of the Australian or Queensland governments or those of the program organisers.



Korea National Museum

## Terminology

Throughout this report, all reference to ‘Korea’ can be taken to mean the Republic of Korea (or South Korea). North Korea is technically known as the Democratic People’s Republic of Korea (DPRK) but is referred to in this report by the simpler and shorter format. The Korean Peninsula means North and South Korea.

Korean currency is the won (KRW). Exchange rate as at February 2008 is 1000 KRW = AU\$1.17.

## List of abbreviations

4WDs	four-wheel drives
AKF	Australia-Korea Foundation
AKYLEP	Australia-Korea Young Leaders Exchange Program
BINGOs	Big International NGOs
BOD	biochemical oxygen demand
CBD	central business district
CDM	clean development mechanism
CMEJ	Citizens Movement for Environmental Justice
CNG	compressed natural gas
COD	chemical oxygen demand
DFAT	Australian Department of Foreign Affairs and Trade
DPRK	Democratic People’s Republic of Korea
DPRK	Democratic People’s Republic of Korea
EIA	environmental impact assessment
EIS	environmental impact statement
EPA	Environmental Protection Agency
GDP	gross domestic product
GHG	green house gas
IT	information technology
KEI	Korea Environment Institute
KNPS	Korean National Parks Service
KRW	won
K-Water	Korea Water Resources Corporation
LA 21	Local Agenda 21
LFG	landfill gas
LPG	liquefied petroleum gas
MOE	Korean Ministry of Environment
NGOs	Non-Government Organisations
NIMBY	‘not-in-my-backyard’
NRM	natural resource management
OECD	Organisation for Economic and Cooperative Development
PCSD	Presidential Commission for Sustainable Development
Posco	Pohang Iron and Steel Company
QPWS	Queensland Parks and Wildlife Service
R&D	research and development
RIAP	Research Institute for Asia and the Pacific
ROK	Republic of Korea
RVs	recreational vehicles
SMEs	small and medium sized enterprises
TMS	telemonitoring system
WWF	Worldwide Fund for Nature



Korea National Museum

## **EXECUTIVE SUMMARY**

The first Australia-Korea Young Leaders Exchange Program was held in November 2007. The program is an Australian Government initiative funded by the Australia-Korea Foundation. The program develops the leadership skills in specific professional areas of potential and/or current leaders from both Australia and Korea, aged between 25 and 45.

The 2007 exchange operated from 16–25 November 2007 and focused on environmental issues. The ten-person delegation participated in briefings and meetings with environmental leaders in Korea and visited various institutions and industries throughout the country. The environmental policies and practices of the Korean Government, local councils and industries were inspected and evaluated.

This report brings together the observations and resources collected from the exchange. It describes the political and environmental situation in Korea and the outcomes of site inspections, meetings and briefings over the period of the exchange. Major observations, themes and reflections are documented.



Kimchi preserving pots, Daesung monastery

## 1. INTRODUCTION

### 1.1 About the Australia-Korea Young Leaders Exchange Program

In October 2007, I was one of 10 Australian leaders selected to participate in the first Australia-Korea Young Leaders Exchange Program (AKYLEP). The program is an Australian Government initiative funded by the Australia-Korea Foundation (AKF) and managed by the University of Sydney Research Institute for Asia and the Pacific (RIAP).

The program develops the leadership skills in specific professional areas of potential and/or current leaders from both Australia and Korea, aged between 25 and 45. The 2007 exchange operated from 16–25 November 2007 and focused on environmental issues. Delegates with expertise in conservation, carbon trading, renewable energy, waste management, water management, mining and petroleum were sought.

The 2008 AKYLEP will involve a delegation of young Korean leaders traveling to Australia. The theme has yet to be confirmed but is likely to comprise young Korean politicians (D. Stammer, pers. comm.).

The aims of the program are to:

- engage in briefings and meetings with Korean counterparts and institutions
- network with international environmental leaders
- experience the practical aspects of international environmentalism
- discover, refine and extend understanding of current and emerging environmental issues
- enhance knowledge of Korean culture, language and business
- gain international experience (RIAP 2007).

We participated in a number of leadership briefings and meetings with environmental counterparts in Korea. In addition, we visited various institutions and industries, and had the opportunity to develop an understanding of contemporary Korean culture and society.

The delegation was extremely diverse:

- age range of 25–44 years
- equal mix of men and women
- geographic spread from Perth to Melbourne to Alice Springs and in between
- many professional fields represented including research and development; environmental audit, planning and regulation; sustainable building design; business sustainability; waste and water management, conservation and natural resource management
- three levels of government represented plus private sector consultancies and think tanks.

Program participants, itinerary and major contacts are included at Appendices 1–3.

Further details about the program can be found at

<http://www.usyd.edu.au/riap/leadership/AKYLEP/about.shtml>

### 1.2 Personal goals

I set the following personal goals from the program:

- obtain first-hand exposure to environmental management approaches in South Korea, one of the major growth nations in Asia
- develop my knowledge and understanding of Korean culture and society
- exchange environmental management knowledge with program participants and our Korean counterparts
- establish global networks and contacts with Koreans and other exchange participants
- return to my agency and apply what was learnt so as to improve our environmental management
- through all of the above, build my leadership skills so that I can make a difference to the conservation and environmental management issues facing Australia and the Asia–Pacific region more broadly.



In short, the exchange represented an ideal opportunity for personal growth, career development, learning and two-way dialogue, all in a short period of time.

### 1.3 Report purpose and structure

This report aims to bring together the observations and resources collected from the exchange. It is structured as follows:

- Section 1. Introduction (about the exchange program, aims and personal goals)
- Section 2. Korea: A snapshot
- Section 3. Environmental issues and policies in Korea
- Sections 4–12. Summary of site inspections, meeting and briefings
- Section 13. Observations and reflections
- Section 14. References and web resources

## 2. KOREA: A SNAPSHOT

A snapshot of Korea follows — the system of government, politics, culture, history, economy and environment are discussed. Material was sourced from briefings and documentation received in Sydney and Korea, complemented by online and literature searches conducted after the trip.

The following briefings and meetings were particularly valuable and are acknowledged:

- pre-departure briefing and dinner in Sydney with AKF board members, and staff from Australian Department of Foreign Affairs and Trade (DFAT), Korea-Australasia Research Centre (University of NSW) and RIAP
- comprehensive briefing by researchers within the Korea Environment Institute (KEI) in Seoul. KEI is a government-funded research institute and operates under the auspices of the Office of the Prime Minister. It has the following aims:
  - research and development of environmental policies and technology
  - professional assessment of environmental impact statements (KEI has statutory responsibilities under the *Environmental Impact Assessment Act*)
  - contribution to the prevention and resolution of environmental problems
- briefing from researchers at Korea University
- briefing on the presidential elections by Assistant Professor Kihong Eom, Department of Political Science and Diplomacy, Kyungpook National University
- valuable insights into Korean life from staff of the National Strategy Institute and Ms Hye-Young Jeong.

### 2.1 Korea in brief

The Korean Peninsula is part of north-east Asia and comprises North and South Korea, known as the Democratic People's Republic of Korea (DPRK) and Republic of Korea (ROK) respectively (Figure 1). South Korea (hereafter referred to as Korea) is located on the southern end of the Korean Peninsula. North Korea is the northern neighbour. The Yellow Sea and China are to the west, the Sea of Japan and Japan to the east.

Korea has an area of 99,000 sq.km and population of 49 million, of whom 10.4 million live in Seoul, the capital city. Overall, 47 million people (80 percent of the population) live in just 20 percent of the country. The Seoul megapolis has a population of 23.5 million, making it the second largest urban area in the world after Greater Tokyo (Robinson et al. 2007). By way of comparison, Tasmania has an area of 68,500 sq.km and a population of around 480,000 people. Considered to be the most monocultural country in the world, Korea is also one of the most populous with a population density of 483 people/sq.km compared to Vietnam at 253 people/sq.km and Australia at 2 people/sq.km (Park 2007).



Seoul cityscape

**Figure 1. Korean Peninsula and north-east Asia**



Korea is at the centre of highly sensitive international relations involving China, the US, Japan, North Korea, and historically Russia. The Korean Peninsula has effectively been at war for 60 years and remains a perennial flashpoint. Korea is considered by Western intelligence agencies to be the best insight and ‘watching post’ into China (M. Williams, pers. comm.).

The history of the Korean Peninsula throughout the 19th and 20th centuries permeates Korean politics, society and culture today. Korea has a history of upheaval characterised by Japanese invasions from 1592–1598, and again in 1895, followed by colonisation from 1895–1945. The separation of the Korean Peninsula into the two Koreas after World War II failed to maintain peace with the bloody and divisive Korean War (1950–1953) following soon after. An important outcome of the war was the creation of the Demilitarised Zone (DMZ) along the boundary of the two countries, effectively a no-go and no-man’s land that to this day is zealously guarded and defended by both countries (discussed in greater detail in Section 10).

The build up of armed forces on the Peninsula is enormous (with a Korean army of 1.8 million and North Korea 2 million) and the source of ongoing security and diplomatic tension. Two years national service is mandatory for Korean men aged under 30. Glaring disparity exists between North Korea and Korea in political ideology (North Korea is the world’s only remaining Stalinist dictatorship, Korea is a modern democracy), economic development and human rights.

The Korean Constitution came into effect in 1948 and introduced an American-style presidential system with parliamentary features. The executive comprises a president elected by direct popular vote for a five-year single term and a unicameral (single house) legislature of 299 seats. The legislature is known as the National Assembly with members having four-year terms. Elections for the National Assembly occur under a different cycling than those for president (Eom 2007).

Korea is widely considered to be an economic miracle — immediately after the Korean War (1954) it had a GDP equivalent to Somalia, now it is equivalent to Australia. Agriculture was historically the economic base of Korea, however this importance has progressively declined over the past 30 years. Economic growth since the 1960s has transformed the country from an agricultural to industrial society (Robinson et al. 2007). Extensive urbanisation has occurred over this time — in 1970, 31 million people (41 percent of the population) lived in cities, in 2005 this had increased to 47 million people (81 percent) (Park 2007).

The Korean Government has a vision to be one of the world's top four industrial superpowers by 2010 (Ministry of Commerce, Industry and Energy website) and seems well on its way to achieving this. Prior to the 1997 Asian economic crisis, Korea sustained double-digit growth figures. In recent times, this has dropped to a more modest five percent. Korea sustains the 10th largest economy in the world (Australia is 13th). Major industrial exports are steel, cars, electronics and televisions. Rice, fruit, small crops and vegetables are important agricultural products.

Australia and Korea are very important trading partners. For instance, Australia exports more product (in this case iron ore and coal) to Posco (Pohang Steel Company) than any other single company in the world.

Koreans are extremely IT savvy. The country has been at the forefront of technological development and supports world-class IT infrastructure, broadband services that Australians would die for, 14 million broadband subscribers and 40 million mobile phone users.

The 17th Korean presidential elections occurred in December 2007. The major political parties are the liberal-leaning National Congress for New Politics and the conservative Grand National Party (party of President-elect Myung-bak Lee, former mayor of Seoul). The main election issues were economic management, social welfare, education, diplomacy and security. The environment received scant interest with the only real issues being installation of new nuclear power plants and a new golf course. Korean people are generally not interested in the environment and do not see it as an important election issue (Eom 2007).



Koreans protesting against Chinese human rights abuses, Insadong, Seoul

### 3. ENVIRONMENTAL ISSUES AND POLICIES IN KOREA

#### 3.1 Environmental issues

Forested mountains cover 65 percent, agricultural land 20 percent and urbanised areas the remaining 15 percent of Korea (Park 2007). The mountain areas and offshore islands are still largely undeveloped. Due to this terrain, most of the country is not suitable for residential or industrial development. Accordingly, the population is highly compressed such that 80 percent of people live on 20 percent of the land mass (Park 2007).

Following massive degradation in WWII and the Korean War (1950–53), Korea has been the subject of one of the world's largest reforestation programs.

Korea is the world's ninth largest emitter of CO<sub>2</sub> and emissions continue to rise. Energy consumption is enormous with 65 percent used by industry. The vast majority (90 percent) of energy is imported, much from Australia. Nuclear power is important and increasingly so, with 20 reactors in place and more planned. A major issue is storage of nuclear waste — since 1986 the Korean Government has been searching to no avail for a suitable waste disposal site; waste continues to be produced and held in temporary storage (Robinson et al. 2007). The Korean community is opposed to waste sites near their cities and increasingly has a 'not-in-my-backyard' (NIMBY) mentality that will complicate securing sites in the future.



Posco steel making plant  
(Pohang Iron and Steel Company)

The environment did not become a community or political issue until the mid-1990s. This coincided to some extent with increased environmental activity of major non-government organisations (NGOs) that had previously focused on labour and human rights issues. Major NGOs include the Korean Federation for Environmental Management (85,000 members), National Trust, Centre for Energy Alternatives and Citizens Coalition for Environmental Justice (discussed further in Section 11.2). NGOs monitor the environmental performance of big companies such as Samsung, Posco, Daewoo, SK Energy and Hyundai through a report card approach.

The major environmental issues currently facing Korea include air and water pollution, rampant urbanisation, disposal of solid and nuclear waste, drift netting, leisure and recreational impacts on natural areas and acid rain (experienced for 100 days/year). Reclamation of coastal wetlands along the west coast for agricultural, industrial and residential development occurs on a massive scale. These areas are also extremely important for migratory waterbirds and fisheries. Transborder issues are significant. Dust and sandstorms caused by drought, land degradation and desertification in north-west China are a huge environmental health issue in both Korea and Japan (Professor Chung-Sok Suh, pers. comm. 2007).

Major threatening processes to nature conservation include illegal hunting and trapping of wildlife; habitat destruction and fragmentation from construction of roads, infrastructure and new urban areas; coastal zone development; damming of rivers and demand for limited natural resources like sand, gravel and stone (Park 2007). Like many other Asian countries, wildlife is scarce and sparse as a result of centuries of hunting and collection.

Emerging environmental issues include achieving a balance between economic growth and the environment, shift to non-fossil fuels (nuclear, renewable energy sources), obtaining better environmental performance among small and medium sized companies (currently very poor in comparison with big companies like Samsung and Posco), and safety of Chinese nuclear reactors. Improving public awareness and understanding of environmental issues remains a major challenge (Professor Chung-Sok Suh, pers. comm. 2007).

Researchers and political commentators consider that the environment is likely to emerge as a driving factor in good business and competition in the future.



Korean nuclear power plant

## 3.2 Environmental governance and policy

### Governance

Environmental management in Korea is governed through 42 pieces of legislation (Han 2007a). The Korean Ministry of Environment (MOE) is the lead environmental agency and responsible for protection of the natural environment and prevention of environmental pollution. The MOE's mission is to 'protect the national territory from threats of environmental pollution and improve the quality of life for the public so that people can enjoy the ambient natural environment, clean water and clear skies' (MOE website).

The MOE has diverse responsibilities including:

- environmental policy
- regulation of air and water quality
- levying fees and charges
- development and maintenance of water and sewerage infrastructure and water supply
- environmental impact assessment
- nature conservation policy including establishment of protected areas and wildlife protection (MOE 2006).

In a Queensland context, the MOE encompasses the environmental policy and regulatory functions of the EPA and service utilities functions of local government. The MOE also has nature conservation policy responsibilities but it does not have direct responsibilities for protected area management.

MOE has 472 staff with a further 1124 staff in subsidiary organisations such as R&D institutes, river basin offices and regional offices. The total budget is 3 trillion KRW (AU\$3.6 billion). In contrast, the EPA annual budget in 2006 was AU\$287 million (EPA 2006). The majority (60 percent) of the Korean MOE annual budget is allocated towards water and sewerage infrastructure and water quality management. Only 157 billion KRW (AU\$187 million) or 5 percent is spent on nature conservation (MOE 2006).

The organisational structure, budget and functions of MOE are summarised in Appendix 4. Corporate public information and policy offices provide ministry-wide services while functional bureaus are in place for nature conservation, air, water quality, water supply and sewerage, and resource circulation/waste. A range of subsidiary and affiliated organisations fall within the gambit of MOE. The National Parks Authority is an 'affiliated' agency of MOE although it was unclear what governance arrangements are in place for these. The level of staffing and resourcing for the Korean National Parks Service (KNPS) is not known.

KNPS (assumed to be also known as the National Parks Authority, see Appendix 4) exists as an entity within the broader MOE. Established in 1987, the KNPS is headed by a chairman who leads three divisions responsible for planning, conservation and visitor services. There are 25 national park offices throughout the country (KNPS website).

### **Major policies**

MOE has developed *Green Korea 2006 — A beautiful environment and a healthy future* as the policy framework and strategic plan to guide environmental management over the next 10 years. The *Green Korea 2006* vision is to build a more sustainable and advanced nation. Strategic goals are to:

- maintain and increase environmental capacity of the Korean Peninsula
- establish a society that realises environmental equity between and within generations
- create a system for sustainable resource use
- build a stable and eco-friendly economic system (MOE 2006).

The plan highlights recent major policy achievements and provides a snapshot of the state of the environment covering nature conservation, air, water, soil, groundwater, waste and international co-operation. Environmental standards for air, noise, water and soil are defined (MOE 2006).

The Korean Government established the Presidential Commission for Sustainable Development (PCSD) in 2000. The commission has an elaborate governance structure with numerous committees including a special committee for conflict co-ordination. The commission's functions are to develop policy and plans for sustainable development. A new *Sustainable Development Act* is planned for 2008 (Ro 2007).

The main policy instrument is the *National Sustainable Development Strategy 2006–2010* (Republic of Korea 2007). The strategy is structured around triple-bottom-line performance indicators and features an interesting monitoring and evaluation strategy, including a commitment to the preparation of a *State of Sustainable Development Report* every two years.

### **Environmental impact assessment**

Environmental impact assessment (EIA) formed part of the *Environmental Preservation Act 1977*, Korea's first piece of comprehensive environmental legislation. Until 1986, EIA was implemented on public projects carried out by government agencies and public organisations and therefore had only limited effect (Lee 2007). Amendments to the Act in 1986 saw this scope broadened.

Further reform occurred with the introduction of the *Environmental Impact Assessment Act 1993*, strengthening the range of projects subject to EIA. Legislative amendment in 1997 gave responsibilities to the Korea Environment Institute (KEI), a subsidiary organisation of the MOE, to review EIA statements and make recommendations on improvements. The *Impact Assessment Act on Environment, Transportation and Natural Disaster 2000* replaced the *EIA Act*.

Triggers for requiring an environmental impact statement (EIS) and approval are size and capacity dependent, for instance:

- urban developments and mines — 300,000sq.m
- electricity plants — 10,000kw
- ports and harbours — 10,000sq.m
- dredging — 100,000sq.m
- land reclamation — 1,000,000sq.m
- coastal sand excavation — 250,000sq.m.



Recycling station, Insadong, Seoul

Interestingly, the MOE is *not* an approval agency for an EIS — under the legislation, a ‘sponsor’ agency (such as Transport, Industry) approves the development, although the practical application is that the MOE has a defining role (Young-Joon Lee pers. comm. 2007). The role of KEI in the EIA process is also intriguing. The institute has an Environmental Impact Division comprising 30 staff with PhDs that provide advice on whether an EIS should be accepted, modified or declined. KEI reviewed 750 EIA documents in 2005 of which 260 were EISs (Lee 2007).

Major outcomes from the EIA process appear to centre heavily on retention of open green space within housing complex developments. This has been so effective that by the 2000s, 20 percent of development areas are parks. Other outcomes were not highlighted.

The Korean Government is also investigating the use of trans-border EIA systems throughout north-east Asia (Russia, China, North Korea, Mongolia, South Korea) as a means of reducing environmental impacts from neighbouring countries.

Other important environmental policies are described in Kang (2006), Lee (2006) and Lee and Song (2005).

### 3.3 Economic instruments and energy tax reform

#### Environmental fees and charges

A useful outline of all charges and an evaluation of effectiveness in environmental protection is available (Kang 2007). The MOE operates 24 environmental charges or fees that generate 1 trillion KRW (AU\$1.17 billion) or 30 percent of the annual ministry budget. Charges target waste, air and water pollution, and conservation of natural resources. By way of comparison, the EPA generates only AU\$14.5 million or 6 percent of annual budget from fees and charges (EPA 2006).

Economic instruments include:

- air and water emission charge (targeting BOD/COD, suspended solids, air particulate matter, SO<sub>2</sub>)
- deposit refund system for recyclable goods
- ecosystem conservation charge — costs are levied on developers who ‘destruct ecosystems’. A fee is payable based on the area of habitat damaged (250 KRW/sq.m or AU\$0.29 up to a maximum of 500 million KRW or AU\$586,000). There is no price differential for damaging or destroying habitats that are sensitive versus those that are already degraded or damaged.
- water use charge (user pays principle)
- volume-based waste charge — this has been highly effective in reducing solid wastes going to landfill and in increasing recycling rates
- product-based waste charge for non-recyclable products and/or items that contain toxic chemicals (Kang 2007).

### **Energy tax reforms**

Korea has a very large population that is highly dependent on cars. With rapid economic growth, Koreans have an increasing level of disposable income, much of which is being directed to ownership and operation of cars. Diesel powered recreational vehicles (RVs) and four-wheel drives (4WDs), known high pollution emitters, are increasingly popular. RVs are also popular because the cost of diesel has historically been far cheaper than petrol (47 percent of petrol price in 2000 increasing to 63 percent in 2004). About 42 percent of all air-polluting substances originate from car emissions.

As a result of these factors, air quality in Seoul is the poorest of all large Organisation for Economic and Cooperative Development (OECD) cities. Air quality is expected to further deteriorate in future as income grows and demand for cars increases.

Energy tax policy focuses on increasing the consumer price of diesel (in comparison to petrol) with a target of diesel being 80 percent of the price of petrol by July 2007. Policy also aims to maintain liquefied petroleum gas (LPG) at a low price (50 percent of price of petrol) (Kang 2007).

### **3.4 Climate change**

Like other countries across the globe, Korea's climate is changing. Over the past 50 years mean temperatures, number of heavy rain events and sea surface temperatures have all increased, and number of rain days decreased.

Korea is the ninth largest global emitter of green house gas (GHG) emissions and growing. In 1990, Korea emitted 310 Mt CO<sub>2</sub>, increasing to 590 Mt CO<sub>2</sub> by 2004 or 1.8 percent of global emissions. Industrial processing and energy industries are the sectors with the highest emissions. Heavy industry (cement, steel, refineries and petrochemicals) consumes a relatively large proportion of energy in Korea (30 percent) compared with other developed countries (e.g. Japan 20 percent, US 14 percent). The outlook is pessimistic with emissions predicted to increase to 790 Mt CO<sub>2</sub> by 2030 (Han 2007b).

Significant ecosystem changes have been predicted arising from climate change with extensive replacement of boreal conifer forests by subtropical deciduous forests. Rice yields are forecast to decline by 15 percent (or 802 kg/ha) by 2080 (Han 2007b).

The Korean Government has developed a *Climate Change National Action Plan 2005–07* with strategies centred on:

- GHG emissions measurement
- development of GHG reduction technology including budgeting of AU\$2.2 billion for R&D over five years. Policy emphasis here is on energy efficiency and alternative energy sources.
- Clean Development Mechanism (CDM) projects. CDM is an arrangement under the Kyoto Protocol allowing industrialised countries (such as Korea) to invest in projects that reduce emissions as an alternative to more expensive emission reductions. Korea has a number of registered CDM projects including Sihwa Tidal Power Plant (see Section 8) and Sudokwan landfill gas electricity generation, both among the largest emissions reduction projects of their type in the world.
- climate change science
- partnerships with local governments
- industry reduction efforts. Posco (Pohang Steel Company – see Section 7) eliminating sintering and coking stages from their steel production process is a high profile example.
- enhancing public awareness (Han 2007b).

The *National Action Plan 2005–07* looks primarily at improved energy efficiency particularly by heavy industry and car manufacturers, diversification of energy sources (tidal, nuclear and solar) and reduction of fossil-fuel dependency (Han 2007b). Replacing 23,000 diesel buses with compressed natural gas (CNG) is underway. However, concepts such as the carbon market and climate adaptation do not appear as well advanced.



Han (2007b) critiqued the Korean Government approach to climate change and considered that significant challenges lie ahead including that:

- a lack of analysis of climate change impacts has hindered aggressive policy
- long-term effects of climate change on sustainable development and national competitiveness have not been taken into account in policy
- deficient legal frameworks and systems do not induce or mandate participation in climate change measures
- public and government awareness is inadequate.

### 3.5 Nature conservation

Protected areas (national and provincial parks) cover 788,000ha or 1.8 percent of the country. There are 20 national, 23 provincial and 33 county provincial parks. National and provincial parks are established under the *Natural Parks Act* and managed by the KNPS and local authorities respectively. Over 500 small reserves (total 139,000ha) established under the *Wildlife Protection Act* protect specific plants, animals and habitats. The Government has a target of protected areas covering 3 percent of the country by 2017. There are four marine resource conservation areas covering 188,000ha established under the *Prevention of Marine Pollution Act* and managed by the Ministry of Maritime Affairs and Fisheries.

Major national parks include Bukhansan National Park (8000ha) immediately to the north of Seoul. Every year it attracts more than 10 million visitors who visit for hiking and relaxation away from hectic city life. Other popular national parks include Jirisan and Seoraksan. The entrance fees to parks vary but average about 3000 KRW (AU\$0.30). Camping fees are 3000–6000 KRW (AU\$0.30–0.60). Mountain shelters with basic facilities are available in many parks.

There are five World Heritage sites: Bulguksa, Changdeokgung, Haeinsa, Hwaseong and Seokguram Grotto. None of these sites were visited nor featured in any discussions with Korean officials nor are they discussed in *Green Korea 2006*. Similarly, national parks did not feature prominently in the itinerary.



Bukhansan National Park



The *Wildlife Protection Act* lists 221 species as being endangered. High profile species include the Manchurian black bear (or half-moon bear), musk deer, water deer and red fox (MOE 2006). Species such as the Siberian tiger, grey wolf, sika deer and amur leopard are considered extinct in the Korean wild (Robinson et al. 2007).

Long-necked Stint

Nature conservation policies are listed in *Green Korea 2006* (MOE 2006) without much detail about targets or specific directions and include:

- protection of scenic areas from development
- declaration of protected areas
- establishment of ecological corridors throughout the country
- systematic investigation of biological resources and opening the National Biological Resources Centre
- restoration of endangered species
- strengthened management of invasive species
- strengthened environmental impact assessment processes (MOE 2006).



Mungyeong Ecological Park

Major management issues for nature conservation include:

- low public awareness of biodiversity conservation
- fragmented responsibilities, poor communication and conflicts between multiple managing agencies
- inadequate resourcing meaning that management objectives cannot be met
- multiple protected areas designations and inconsistency of application across the country and lack of integration with global standards (Park 2007).



16<sup>th</sup> century Joseon fortress, Mungyeongsajae Provincial Park

Sections 4–12 summarise the main places that were visited. Significant observations, potential implications and applications for the EPA are described in Section 13.

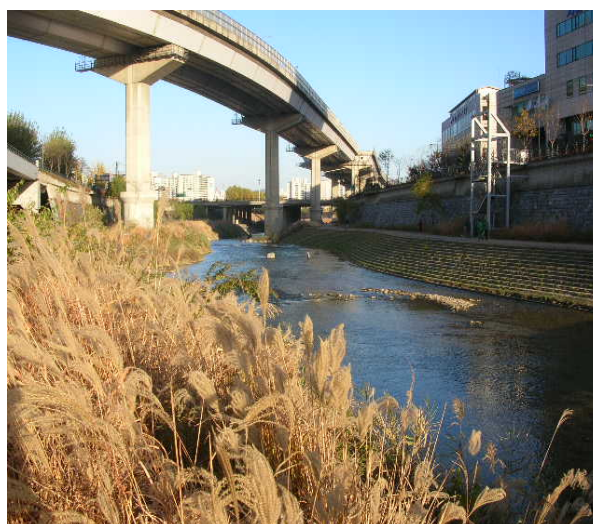
#### 4. CHEONGGYECHEON RESTORATION PROJECT

Cheonggyecheon is a stream running through the centre of Seoul and an important historical and cultural site. It has played an integral role in the life of city people for centuries.

Cheonggyecheon has been the subject of extensive engineering works for over 300 years. In 1760, 200,000 workers widened the stream, built stone embankments and straightened the stream's course. In the early 1900s, the stream was extensively dredged and subject to massive flood events. In the late 1930s, work started to cover the stream with concrete highways and bridges. More extensive works started in 1958 with the four-lane, two-way Cheonggye Elevated Highway. At completion in 1976, a 10km stretch of Cheonggyecheon had been completely concreted over. The stream itself was retained as a sewer and utilities line with over 60km of water and sewage pipes, electrical and telecommunications ducts, and gas lines. The covering of Cheonggyecheon was intended to be a symbol of the post-war success of Korea and an expression of modernisation and economic growth (Seoul Museum of History nd & 2006).

By the early 2000s, problems were emerging. Road maintenance and repair costs were significant and a major financial burden on the city council. Engineering assessments in 2000–01 identified serious structural and safety deficiencies with road support structures heavily corroded and beyond repair. The stream bed was polluted with heavy metals. Upgrading the roadway was estimated at 100 billion KRW (AU\$120 million).

In 2002, the Seoul City Council led by then mayor Lee Myung-bak (elected president in 2007) initiated the Cheonggyecheon Restoration Project. The project was a massive engineering, transport management, construction and environmental feat. The project involved uncovering the Cheonggyecheon Stream, dismantling the elevated highway and bridges, removing sewage and other service infrastructure, finding and relocating cultural artefacts, and rehabilitating the degraded waterway and banks (Seoul Museum of History nd & 2006; Seoul Metropolitan Government 2006).



Cheonggyecheon stream, Seoul CBD

The roadways had long been a fundamental part of traffic movement through the city, with traffic movements of 170,000 vehicles per day. Roads also provided important access to a sprawling commercial district that was home to 200,000 merchants and 60,000 shops, all of which were affected by the changed access arising from the restoration project. As a result, there was massive resistance to the project from business people who saw their livelihoods being negatively affected from changed vehicle access. Extensive consultation, negotiation and conflict mediation was required (Seoul Metropolitan Government 2006).

Starting in 2003, demolition work was carried out for 18 months. Given demolition occurred in the CBD, the most advanced technologies were required to minimise dust, noise and pollutants. A total of 617,000 tonnes of waste were generated. Of this, 100 percent of the scrap iron and steel was recycled, and 580,000 tonnes (or 95 percent) of waste concrete and asphalt reused (Seoul Museum of History 2006).

Cheonggyecheon was restored as an ‘urban stream in nature’, with extensive paths, walkways, footbridges and disabled access. It is a focal point for recreation and contemplation within the sprawling megapolis that is Seoul. Extensive landscaping, lighting and signage are in place. Local fauna such as insects, waterbirds and small fish have returned to the stream.

The new stream was designed to accommodate a 200-year flood and was immediately put to the test during the 2001 floods, just one year after work was completed, and passed! Water flow into the stream is regulated and water quality maintained and improved through treatment.

A major, four-storey museum with floor space of 4200m<sup>2</sup> was constructed to celebrate the past, present and future of Cheonggyecheon (Cheong Gye Cheon Museum 2007). The project had many other benefits including increased capacity of buses and subways and encouraging wider use of the low-emissions public transportation system. It also led to renewal of the surrounding commercial and residential areas. Air pollution in the immediate area has been reduced and green zones along Cheonggyecheon have lowered the urban heat effect in summer (Seoul Museum of History 2006).

Cheonggyecheon is a very impressive urban redevelopment and restoration project. It took over two years to complete and cost 380 billion KRW (AU\$460 million). Cheonggyecheon is being projected as part of the rebirth of Seoul as ‘a city of culture and environment in the 21st century’.

## 5. WORLD CUP PARK AND LANDFILL RECOVERY

*“Seen from a ferryboat,  
Nanjido was embroidered with orchid flowers and a field of reeds,  
Wearing a blue belt of clear rivulets.  
A little rustic, like a pretty country woman.”*

From *Nanjido* by Jeong Yoenhee

Nanjido used to be a beautiful island and wetland teeming with many thousands of waterbirds and other aquatic life. It was a highly productive agricultural area supporting market gardens and seafood production.



View over Hangang River to Seoul from top of former Nanjido landfill

Beginning in 1978, and coinciding with Seoul’s rapid urbanisation, Nanjido became the site of a massive landfill dump covering 2.7 million sq.m. From 1978 to 1993, 92 million cu.m of garbage including household, construction and industrial wastes were dumped (Seoul Metropolitan Government 2002). There was no waste separation. Contaminants from households, construction, industry and sewage were co-mingled. Two massive mountains rising to 100m were created. Today, these remain prominent ‘natural’ features in the Seoul cityscape.

Many poverty-stricken people lived at the dump scavenging and recovering recyclable materials. The landfill created massive environmental and social problems through air and water pollution and land subsidence. Over 15 years, the ignition of 2000 fires further exacerbated air quality problems (Seoul Metropolitan Government 2002).

The Seoul City Council closed the landfill in 1993 and covered the waste with a 1m soil capping to block odours. The Council then formulated a long-term plan to restore the degraded land into an environmentally friendly park.

Site treatment and remediation was exhaustive and costly. Commencing in 1994 and proceeding through to 2001, the landfill site was treated in four major phases:

- leachate treatment
- levelling and soil recovery
- extraction and recycling of landfill gas
- slope stabilisation around the landfill (Seoul Metropolitan Government 2002).

A vertical leachate barrier was installed to a depth of 30m and extending 6km around the entire landfill mass. Leachate is collected at 31 wells placed at 200-m intervals around the perimeter and piped to a leachate treatment plant. Each day, 2.1ML of leachate proceeds through on-site primary treatment, secondary treatment at the nearby Nanji sewage treatment plant, and then is released into the Hangang River (Seoul Metropolitan Government 2002).

Landfill gas (LFG) is collected from over 100 gas extraction wells and piped to a LFG utilisation plant. Methane is generated at a rate of nearly 170cu.m/min and recycled for heating and cooling at the World Cup Stadium and nearby residential complexes.



Restored landfill with wind turbines in rear vista, World Cup Park



World Cup Stadium and suburban Seoul

Land stabilisation started in 1998. Total remediation costs were AU\$275 million and annual maintenance costs AU\$9.4 million/year (Seoul Metropolitan Government 2002). Full project completion is targeted at 2020.

After 15 years buried under a giant municipal landfill waste dump Nanjido, The Isle of Orchids, has been recreated as World Cup Park. At 350ha, it is almost as large as New York's Central Park. It features a diverse array of commercial, recreational and sporting facilities and industrial precincts including:

- the World Cup Stadium, site of the 2002 Seoul World Cup
- a public golf course and club house
- a football field
- gardens, plazas, viewing areas and car parks
- wetlands, lakes, grasslands, gardens and open space parks
- a kiosk and art gallery
- riverside facilities (camping, picnic areas and boat landing)
- wind power generators
- infrastructure associated with site remediation, notably sewage pumping station, leachate treatment site, garbage furnace site (discussed in more detail in Section 6) and a LFG utilisation facility.

Ecological restoration is impressive. Grassland has been replanted and extensive areas revegetated under trees. Monitoring has recorded the return of many native plants and animals. Today, Nanjido is a popular recreational and sporting complex that attracts 10 million visitors per year.

The World Cup Park is an amazing example of engineering overcoming massive environmental problems. It is also an example of previous environmental disasters being transformed into a modern day success story with a new economic bent.

However, in a case of perhaps not learning from past mistakes, Seoul City has established a new landfill by reclaiming an extensive coastal zone near the Incheon International Airport, 50km north west of Seoul. This new landfill is expected to be 10 times bigger than Nanjido!

## **6. MAPO RESOURCE RECOVERY PLANT**

The Mapo Resource Recovery Plant is operated by the Seoul Metropolitan Government. It is a massive, high temperature incineration facility located within the World Cup Park.

Constructed between 2001 and 2005 at a cost of AU\$190 million, the plant has capacity to treat 680 tonnes of waste per day. Incoming waste is collected from surrounding suburbs and trucked to the plant, shredded and then incinerated under high temperature (Seoul Metropolitan Government nd-a).

The plant is promoted as using the best treatment available for removing air pollutants. Waste gases such as dioxin, heavy metals and pollutants are removed via selective catalytic reactor and advanced filtering. The company claims that dioxins are removed to a level that is 10 times lower than the legal, national standard (Seoul Metropolitan Government nd-a).

The plant is designed to collect resources to the greatest extent possible compared with other domestic waste incineration facilities. Wastes are recovered and reused as follows:

- bottom and boiler ash, by-products of the incineration process, are recycled for road base, bricks and pavers. These products are a valuable substitute to extraction of non-renewable sand, rock and gravel from natural environments.
- thermal energy generated during incineration is recycled and used to run the plant and heat nearby production facilities and residential areas
- waste sewage is completely burned and wastewater treated prior to reuse for watering gardens.

The volume of waste entering the plant is reduced through implementation of waste separation policies in households. The Korean Government has mandated that household food waste must be separated at home and is illegal in landfill. Organic food waste is an enormous issue arising from the Korean penchant for large meals and numerous side dishes of kimchi and other condiments. The household separation of organic waste and recyclables is extremely positive yet not without problems. Household food waste was planned for use as fertiliser, however high water and salt levels limit suitability.

The plant is in a very prominent location at the centre of the World Cup Park, less than 1km from a major new residential area of thousands of apartment blocks at Jungsan-Dong. It features a state-of-the-art exhibition museum, small conference pavilion and guided tours, all part of encouraging public access. This accessibility appears to be part of ensuring transparency in operations. It is hard to imagine placement of a facility of this scale and type ever being accepted in a similar location in Australia. In Korea, it seems to be accepted as part and parcel of living in an increasingly crowded country where space is at an absolute premium.

A further four incineration plants of this type are now in place throughout Seoul with a combined capacity of over 2700 tonnes per day. Despite the increased capacity for waste treatment that these plants provide and the improved waste separation recycling that occurs in households, there is still an ongoing demand for landfill for non-combustible waste materials.

## **7. POSCO (POHANG IRON & STEEL COMPANY)**

The largest city on Korea's east coast, Pohang (500,000 people) is a major industrial centre and home of Posco (Pohang Iron & Steel Company). Posco is also well known in Australia where it is the largest single importer of any company with which we trade. Posco imports 18 million tonnes of coal per year and 40 million tonnes of iron ore from Newcastle and Port Hedland.

Posco is the world's second largest steel maker, employing 17,000 people and producing 30 million ton per year of which 85 percent is for domestic use. The plant at Pohang was founded in 1968 and sprawls across 900ha of reclaimed land. It uses 55ML of water per day in production and treatment. Port access is available for bulk freighters with 250,000-tonne capacity.

Another large plant of 1500ha exists 300km west at Gwangyang (not inspected during this trip). Constructed between 1982 and 1992, this plant is also located on reclaimed land behind a 13.6-km seawall. Massive dredging from a nearby river has generated the necessary fill to build up the land to a height of 5.5m above sea level.

Environmental management at the Pohang site is managed by an environmental audit team who are housed in a centralised environmental management tower that overlooks the entire plant. A sophisticated telemonitoring system (TMS) consists of air and water monitoring devices on all stacks and four ocean outfall sites. The principal pollutants being monitored are NO<sub>2</sub>, SO<sub>2</sub> and O<sub>3</sub>. Data is collected and logged every five minutes, and transferred through a front-end processor to the MOE (for independent checking) and company analysts (Posco 2006).

Pollution monitoring is focused on direct plant outputs — noise, air and dust — within and around the steelworks. There seemed to be little monitoring of broader ecosystem or environmental health. For instance, no mention was made in briefings nor data evident in company documents about monitoring water chemistry, biodiversity or ecosystem health in the surrounding marine areas that receive waste water.

Residential areas are within 300m of the plant. This close proximity has caused concerns from residents about coal and ore dust and general air quality.

Consistent with large companies in Australia, Posco has embraced the notions of sustainability and corporate responsibility. Operating under the motto of ‘resources are limited while creativeness is infinite’, Posco appears to have a strong managerial approach that is guided by transparency, innovation, creativity and modern workforce management. The company has created a very strong sense of loyalty among its staff. Construction of a 25,000 seat soccer stadium and running two professional soccer teams has no doubt helped in this regard.

Posco produces an annual public sustainability report that opens up the company to public scrutiny and enquiry. The report is prepared consistent with the *Sustainability Reporting Guidelines* of the Global Reporting Initiative (GRI 2006) and has been independently assured by international consulting firm KPMG (Posco 2006). In recognition of their sustainability efforts, Posco was included on the Dow Jones Sustainability World Index in 2005 and 2006 (Posco 2006).

Consistent with all the other industrial plants we visited, Posco has a first-class museum, spacious auditorium, high-definition screen theatre and large-scale model for briefing VIPs and guests about the company. The Posco Museum is a central part of any on-site visit (Posco nd). By way of scale, architectural innovation, quality and contemporaneity of audio-visual displays, and sheer capital investment, this museum would compete with and probably better public museums in any regional Australian city, if not a few capital cities as well.

Covering floor space of 3600sq.m, the Posco Museum is built around ‘steelmaking patriotism’ and nationalism. Posco was the country’s largest construction project. The museum appeals strongly to feelings of nation-building, defeating adversity on all sides, and pursuit of a dream to build a global steelmaker (Posco nd). At times, there is a religious-like fervour to the displays and film, of workers paying for their efforts in blood, sweat and tears. ‘Steel is national power’ is a Korean axiom that has come true at Posco.

Posco Museum, Pohang



## 8. SIHWA LAKE TIDAL POWER PLANT

Sihwa Lake is located 40km south west of Seoul on Korea's west coast. The 'lake' was originally a large marine embayment surrounded on three sides by large industrial and residential areas.

In 1994, after 10 years of reclamation that resulted in a 11.2-km seawall, the Sihwa lake was completed at a cost of AU\$400 million. The Korean Government's original intention was to exclude seawater to the west of the seawall and undertake extensive land reclamation for industrial, urban and agricultural uses. Of the total 18,000ha, around 7000ha was planned for reclamation (Jang 2003). Impoundment of freshwater for irrigation, industrial and urban use was also a goal. These proposals were subject to enormous public criticism from the media, community and environmental groups.

However, the lake soon suffered serious water pollution largely due to the lack of fresh water, absence of flushing, and the waste discharge from the large number of factories and houses on the lake shore. This was demonstrated by a deterioration of surface water quality from 0.4–2.8mg/L in chemical oxygen demand (COD) in 1980, to 10.4–30.9mg/L in 1997. The lake began to stink and the surface became covered with the floating corpses of birds and fish.

As a result of poor water quality, the prospect of ever using the lake for irrigation was negligible. The project was considered an 'environmental calamity' (Jang 2003). Recognising failure, the seawall sluice gates were opened to allow seawater to flush the lake. This has been extremely beneficial for water quality, with COD returning to 3–5mg/L.

However, the broader impacts of the polluted water haven't received much consideration by authorities. South Korean environmental groups have attacked the opening of the seawall on the grounds that industrial waste will be carried into the sea. They fear that it will affect sea life in the area and argue that the process will not encourage the producers of the industrial waste to reduce their emissions (Anon. 2006).

In 2002, the Korean Government and Korea Water Resources Corporation (K-Water), a corporatised government agency responsible for developing water supply infrastructure, proceeded to develop alternative plans for the area. In 2005, the government announced that it would build a huge industrial and leisure complex on the reclaimed tidelands. Plans for a tidal-powered electric plant that took advantage of the large tidal movements (up to 9.1m) between the sea and the artificial lake were also released.

The power plant is designed to operate in one direction from the sea to the Sihwa Lake, allowing 160 million cu.m of seawater to be circulated each day (50 percent of the total lake capacity). In doing so the plant will generate electric power by using the head between the high tide and the reservoir level (K-Water 2006).

The Sihwa Lake Tidal Power Plant will generate 260MW per day from the flow of water in the bay and be the largest such project in the world. Sihwa's turbines will generate 25 percent of the electricity produced by a typical nuclear power plant, and save South Korea 862,000 barrels of oil and 290,000 tonnes of CO<sub>2</sub> per year.



The tidal plant is currently under construction by K-Water. At the time of our inspection (November 2007) coffering and excavation works had been completed. Work was well underway to install the turbines and gates in the seawall. The plant is expected to be operational in 2009 with an annual production capacity of 550GWh, enough to supply a city of 500,000 people. Total project cost is approximately AU\$400 million.

Coffering and excavation works at Sihwa



The Sihwa Lake Tidal Power Plant is set to open up a new chapter in domestic energy development as Korea plans to significantly increase spending on alternative energy sources in the coming years. The country expects their share of alternative energy to be increased from 1.4 to 5 percent by 2011.

Annual income of AU\$40 million from electricity sales is expected once the plant is fully operational. An additional AU\$8 million per year is forecast from carbon trading and commercial operations (X-game centre, drive-in cinema, cultural centre and marina) within the plant's ecological park.

Many residents have welcomed a tidal power plant as a new tourist attraction to complement the great sunsets and roasted clams that currently attract tourists. To increase the lure, the authorities plan to build a wind farm and solar power plant and turn Sihwa into a 'clean energy park'. Annual visitation of 1 million people is forecast (K-Water 2006).

## 9. MUNGYEONG

Mungyeong Council is located in central Korea approximately 130km south-east of Seoul. It is strategically located at the intersection of two national expressways. The council is rural in character with a population of 150,000 people. Mungyeong City is the main centre with around 76,000 people. The surrounding area is important for agricultural production, particularly rice, fruit and mushrooms, minor industry and tourism. Surrounded by the beautiful Baekdu Mountains, Mungyeong aims to position itself as an important tourism destination (Mungyeong City website).

The AKYLEP delegation met with Dr Hyunkook Shin, Mayor Mungyeong Council and a number of his councillors and senior managers. The purpose of the meeting was to gain an understanding of the environmental issues facing local government and how they are being addressed.

Dr Shin has a PhD in environmental engineering and is a former director in an unspecified environmental agency. He has a vision that Mungyeong will be an 'eco-friendly city'. Cultural and language barriers impeded understanding of what this meant, however the impression gained was that eco-friendly is more about not undertaking reckless development than living sustainably.

A very positive and glowing picture was presented about environmental management in the area. Dr Shin stated that the only environmental issue in the city was waste management from households. There was very low awareness and interest in climate change. The Mayor indicated that he and his council found it very difficult to balance environmental protection and land development due to the low economic status of many people in the area. Economic growth was seen to be the major priority — 'local people don't care about the environment,' he stated.

The Mayor did not favour environmentally-friendly agricultural production such as organic farming due to economic impacts, referring to his experience with rice production where 'normal' practices yielded rice at costs of AU\$2–3/kg, whereas organic production cost the farmer AU\$10/kg. He stated, 'when the farmer chooses environmentally-friendly techniques, his income reduces, so there is no interest'.

Dr Shin discussed a proposal from a political party to construct a canal from the north to south of the country to reduce traffic congestion on roads. He supported the project due to the significant economic benefits the canal would bring to his city. The increase in water availability, enhanced visual amenity, and tourism attraction were other benefits. Environmental impacts did not feature as an issue from the Mayor or council.



Korean traditional village and temples

Mungyeung valley and Baekdu Mountains

After the council meeting, the delegation travelled to the nearby Mungyeung Coal Museum. This provided an interesting historical description of coal mining in the area, including the very difficult conditions in which local miners hauled coal from underground deposits. Consistent with other locations visited, the museum was first rate. Nearby was a reconstructed Korean traditional village and temples, the filmset for a popular Korean historical TV drama called ‘Youngaesomun’.

We also visited Mungyeong Ecological Park, developed by the council and government at a cost of 200 billion KRW (AU\$240 million). The park features artificial wetlands and landscaped areas with fenced display enclosures for rabbits. The ecological park was constructed to expand the tourism product in the region.

Immediately adjacent is Mungyeongsajae Provincial Park which itself is contiguous with the extensive Woraksan National Park (29,000ha). The area is home to numerous Buddhist shrines and historical sites and known for its beauty and history. Three great gates built in the 16th century maintained control over the mountain pass during the Joseon period and still stand.



L. 16<sup>th</sup> century Joseon fortress, Mungyeongsajae Provincial Park



R. Wildflowers, Mungyeongsajae Provincial Park

The park is managed by the Mungyeong City. Up to 2000 visitors per day come to the park during busy periods and festivals. An entry fee of AU\$2 applies. Unfortunately, the very short time we had at this park precluded exploring the area or investigating park management.

## 10. DEMILITARISED ZONE (DMZ)

The Demilitarized Zone (DMZ) was created when the armistice was signed between North and South Korea ending the Korean War in 1953. Encompassing approximately 907sq.km, the DMZ extends west–east for 248km and north–south for 4km in the middle of the Korean Peninsula (Figure 2). Adjacent is the Civilian Control Zone a 5–20 km-wide buffer around the southern DMZ border. Together, this area covers more than 2270sq.km.

Ironically, due to more than 50 years of limited human impact, protection of the DMZ is probably the last chance to save a significant area of natural habitat on the Korean Peninsula. Indeed, many Koreans consider that the only good thing to come out of the war is the DMZ.

The DMZ and its adjacent Civilian Control Zone are unique and contain wetlands, forests, estuaries, mountains, coastal islands, riparian valleys and agricultural fields. The area is an important wildlife refuge and a known wintering ground for several of the world's most endangered species including the white-naped crane, red-crowned crane and black-faced spoonbill. The DMZ is also home to Asiatic black bears, Chinese gorphals and egrets, and some claim the Korean tiger (a subspecies of the Siberian tiger and one of the rarest tigers in the world). Environmental scientists have a unique opportunity in the DMZ to study how nature restored itself after the area was devastated by war (Kim 2007).

**Figure 2. Demilitarized Zone (DMZ), Korean Peninsula**



After the fall of the Berlin Wall in 1989, the DMZ is the last remaining Cold War-style frontier on the planet, bristling with sensors, tank traps and automatic artillery. Up to two million soldiers guard the world's most heavily fortified border. The strip is completely fenced with manned watching posts and unsettled apart from a small village of 200 people who are permitted to maintain their traditional way of life, albeit nervously.

This setting produces a most bizarre and surreal tourist destination. The DMZ is a Mecca for Koreans who want to catch a glimpse of life in the North. The site attracts wall-to-wall buses all operating on a day trip schedule out of Seoul. One minute, the place is flooded with hundreds of excited Koreans, the next it is deserted until the next surfeit of buses arrive.



South Koreans peer north through the fence of the DMZ.

Sculpture depicting reunification of Korea



The South Korean side of the border is Disneyland-like in look and feel — numerous markets, eating stalls, souvenir shops and theme park rides are spread over a large area. An extensive bank of telescopes offer visitors a peep north into the DMZ and beyond. The lookout is heavily guarded by well-armed, officious young soldiers who vigorously monitor and enforce the taking of no photographs beyond a 'magical' yellow line painted on the concrete. Tourist activity is overseen by soldiers in the watching posts who have vantages south over the festival zone and north over razor wire and an extensive natural ecosystem of enormous conservation significance.

Despite the current military fortifications, change for the DMZ is in the wind. Following the historical North and South Korea summit in June 2000, the divided state of the Korean Peninsula has regained interest domestically and internationally. Political exchanges between the two countries are continuing and form part of a gradual move towards north–south exchange and potential reunification. Political analysts consider that reunification of the country is likely within the next five years, perhaps earlier (Assistant Professor Kihong Eom & Mack Williams, pers. comm. 2007).

Ironically, peace and unification is likely to lead to pressure on the natural values of the DMZ. Major development projects including railways and highways are underway, directly impacting the DMZ. With the passing of the *Bordering Regions Support Act 2000*, it is expected that policy and financial support from the South Korean Government will increase for various development projects in the region. This has led to concerns that reckless development could severely degrade the environmental quality of this extraordinary region (MOE nd).

A number of conservation NGOs along with the MOE are looking at ways of protecting biodiversity in the DMZ in the likely event of reunification. MOE has been pursuing the designation of the DMZ as a UNESCO Transboundary Biosphere Reserve. Such a designation would not only mean the conservation and management of a region of major ecological importance, but also contribute to lasting peace on the Korean Peninsula. Under Biosphere Reserve designation, areas with outstanding ecosystems would be managed for conservation and other areas used in a sustainable manner (MOE nd).

The successful official designation as a Biosphere Reserve largely depends on co-operation between North and South Korea. Other major issues arising from possible reunification, such as facilitating family reunions and promoting economic exchange have so far received higher priority than environmental co-operation (MOE nd).



L. Tourists swarm to the DMZ lookout to look into the North, M. Public telescopes provide glimpses over the DMZ into North Korea, R. Stalls and markets on the southern side of the DMZ.

## 11. NON-GOVERNMENT ORGANISATIONS

Briefings were undertaken with the Local Sustainability Alliance of Korea and Citizens Movement for Environmental Justice, both important NGOs in Korea. Observations are summarised below.

### 11.1 Local Sustainability Alliance of Korea

Local Agenda 21 (LA 21) is co-ordinated by the Local Sustainability Alliance of Korea (also known as Sustainable Development Korea). The Alliance is effectively a ‘bridge’ organisation between NGOs and local government. It liaises between and establishes networks among local authorities, NGOs and citizens, and undertakes public education and awareness campaigns.

LA21 was introduced in Ansan City in 1994 and quickly followed by other major cities. As of July 2007, 248 local governments (92 percent of those in Korea) have adopted or are preparing to introduce LA21. This is the highest rate of participation in Asia. Factors contributing to this high uptake are reported as being the release of *Guidelines for preparation of Local Agenda 21* (MOE 1997) and establishment of the Presidential Commission on Sustainable Development in 2000 (discussed under Section 3.2) (Local Sustainability Alliance of Korea nd).

The Alliance has primarily worked on restoration of lakes and parks in heavily disturbed and developed areas, especially residential areas. There appears to have been little attempt to achieve major biodiversity protection outcomes with emphasis more on promoting quality of life through provision of green space and maintaining aesthetics in urban areas. The Alliance is attempting to energise local citizens and initiate change, but awareness and interest is very low.

Best practices under LA21 are described by the Korean Council for Local Agenda 21 (2005).

## **11.2 Citizens Movement for Environmental Justice**

The Citizens Movement for Environmental Justice (CMEJ) is the third largest environmental NGO in Korea (the Korean Federation for Environmental Movement has 85,000 members), yet has only 3500 members in a population of 49 million. This is perhaps indicative of the very low interest in environmental issues across the Korean public.

Like other Korean NGOs, CMEJ originates from the militant organisations of the 1980s set up to deal with human rights and labour abuses. Today, it focuses on environmental health, pollution, rampant development, land use policy and public health including an active anti-fast food campaign.

CMEJ is clearly a low budget operation. Their headquarters are in a very cramped office with inadequate storage space. Funds appear to be extremely tight, to the extent that the heating was not turned on during our visit yet temperatures outside were hovering at 2–3 C!

CMEJ has a range of programs and campaigns underway including:

- development of company-level environmental indicators and scrutiny of corporate sustainability reports, particularly those of big steel, cement and shipbuilding industries. CMEJ consider that Posco (refer Section 7) are doing 'pretty well' in meeting their environmental responsibilities
- a 'one house, one household' campaign aimed at stopping residential property speculation. In Australia, such a policy would be taken by some sectors of the community as limiting personal freedom and wealth, and perhaps a touch 'pinko'
- action for climate justice.

The CMEJ people we spoke to had interesting observations about the MOE. They consider that MOE policy is strongly, if not solely, focused on 'end-of-pipe' issues and that MOE are generally on the back foot and rarely proactive.

The CMEJ was particularly scathing about the ineffectiveness of EIA policies and legislation. Despite the requirement for an EIA on the vast majority of big developments, they consider that these approaches have no impact or influence. The CMEJ claim that development approval is often not sought. Indeed, representatives commented that inadequate separation often existed between developments and city council approval processes whereby a developer might sit on the development approval committee of council! They further claimed that the Government is looking to introduce new laws where a developer can construct an entire city without any restrictions.

My personal observation was that there did not seem to be a strong discipline of city development planning with most development control occurring at the permit stage. This was supported through discussions with the CMEJ and observations around Seoul where industrial, commercial and residential zones were often tightly interspersed, suggesting a lack of planning.

CMEJ seemed to be fighting an uphill battle in the face of relatively low community awareness and interest in environmental issues. Additionally, and perhaps compounding the matter, the CMEJ seems to focus on projects once they are imminent or underway, rather than seeking to influence, inform or guide policy and strategic planning.

The CMEJ meeting was a very valuable insight and reality check into what we had been shown and told throughout the week.

## 12. OTHER SOCIAL AND CULTURAL ACTIVITIES

Formal visits and briefings were complemented by visits to cultural sites and an extensive social program. These activities were extremely valuable in building a richer understanding of and insights into Korean culture, business and way of life, and to build professional networks with other delegates and our Korean counterparts. Visits and interactions are summarised below.



Korean BBQ, Mungyeong

### National Museum

First established in 1945, the National Museum of Korea is the flagship museum of history and art in Korea. In October 2005, the museum opened in a new building in Yongsan Family Park in Seoul. Over 150,000 pieces are included in the collection with 11,000 on display at one time. It is the largest museum in Asia and the sixth-largest museum in the world in terms of floor space, covering 3ha (National Museum of Korea websites).

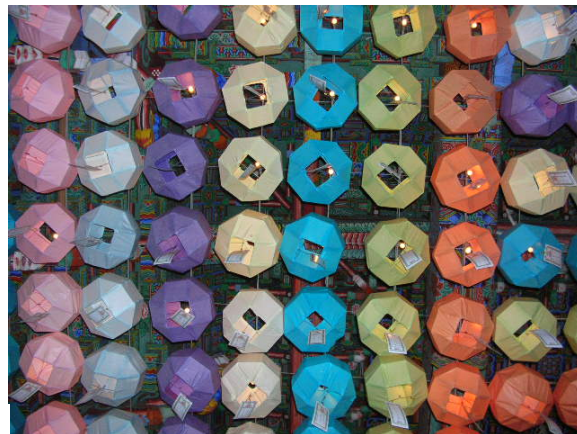
The museum focuses on culture, history and art. Amazingly, given the reported close relationship between Koreans and the natural world, no exhibits or displays feature the natural history or environment of Korea.

### Daesung Buddhist Temple

The delegation had a unique opportunity, rarely available to Westerners, to visit a Buddhist monastery and have a personal meeting and tea-making ceremony with the Daesung master monk. The Daesung monastery of 30 monks is located in a mountainous area of central Korea. The natural environment and serenity are an important part of training for monks as is access to native herbs and vegetables to sustain their vegetarian diet.



Master Monk, Daesung



Paper lanterns, ceiling of Daesung Buddhist Temple

The highly disciplined lifestyle of Buddhist monks is something to behold. They eat 1–2 meals/day and have only 1–3 hours sleep each night. The remainder of each day is spent in meditation. Part of the master monk's training involved 21 days with no sleep!

### **Gyeongbokgung Palace**

Gyeongbokgung served as the main royal palace of the Joseon Dynasty. Constructed in 1395, it was almost completely destroyed during the Japanese invasion of 1592 and then reconstructed in 1868. Today, this sprawling, labyrinthine complex of some 330 buildings dominates central Seoul and covers 40ha. Since 1990, through considerable cost and effort by the Cultural Heritage Administration, Gyeongbokgung Palace has been fully restored to its former glory (Gyeongbokgung Palace website).



Gyeongbokgung Palace, Seoul

### **The Ubiquitous Pavilion**

The Pavilion is a futuristic IT house including state-of-the-art gizmos, robots and the like, some of which are already commercially available. These types of technologies are destined to feature in Korean homes in the near future and no doubt elsewhere (see <http://www.u-dream.or.kr/eng/main.asp>).

### **Nanta**

Nanta (or 'Cookin' in English) is a nonverbal, live stage performance integrating Korean traditional 'samulnori' rhythm with comic and drama all in a kitchen setting. This is a must-see performance and tours internationally. Nanta attracts 300,000 tourists every year and was voted one of the 10 most famous tourist attractions in Seoul by the Korean Tourist Service (see <http://nanta.i-pmc.co.kr/en/index.asp>).



Nanta performers

### **Omija Experience Village**

Omija is a new cultural tourism operation featuring samulnori, traditional Korean drumming, dance, food and accommodation.

### **Sanchon**

Located in Insadong an inner suburb of Seoul, Sanchon is a renowned venue for traditional Korean food and performance.

## **13. OBSERVATIONS AND REFLECTIONS**

Observations, themes and personal reflections that emerged from the exchange are discussed and suggested improvements to the program identified.

### **13.1 Observations and themes**

#### **Environmental challenges**

The scale of environmental challenges being faced in Korea is mind-boggling, problems that make ours pale into insignificance. A massive population of well-educated, relatively well-off people with aspirations for ongoing economic growth, residing in a tiny country, the majority of which is not suited to high density settlement, poses incredible challenges. The familiar issues of energy production and use, disposal of household, industrial and nuclear waste, greenhouse gas emissions, declining air and water quality, and threats to biodiversity conservation are all massively compounded in Korea.

The scale differences between Australia and Korea are telling and bring into sharp focus the issues that we face in our country. Australia is a vast country with extensive areas that are in natural state. Indeed, Koreans looked at us incredulously when we tried to explain that we too face problems with disposal of nuclear waste! In contrast, Korea is a tiny populous country with vastly modified landscapes. Those few natural areas that remain, like the DMZ (Section 10), are under increasing pressure ironically from the prospect of peace initiatives between North and South Korea and a burgeoning development sector.

Koreans seemed to be far more tolerant of big industry being located in close proximity to residential areas than what we would ever accommodate in Australia. Whether this was just an artefact of the recency of democracy in this country or something else is unclear. One did come away with the sense, however, that this tolerance might be changing, with an increasing community push for better quality of life and greater separation of industry and residential zones. The trend of NIMBY that is alive and well in Australia, and growing in Korea, is likely to further complicate environmental management in a country that is fast running out of useable space, yet remains relentless in its desire to be an economic powerhouse.

Somewhat similar to Australia, Korea faces problems with the disparate environmental performance of major companies as compared to small and medium sized enterprises (SMEs). Strong, large industrial enterprises like Korean-owned Posco and multi-nationals like Macquarie Bank appeared to be well managed and were sustainability leaders. Certainly, these large companies operate within a global marketplace that expects solid environmental performance, not to mention the scrutiny that they are placed under by Big International NGOs (BINGOs) such as Worldwide Fund for Nature (WWF) and the like. In contrast, Korean SMEs are operating in the domestic sphere where the marketplace is perhaps not so discerning about environmental performance.

### **Community and political interest**

The pre-trip perception was that Koreans were in tune with their natural environment, that a harmonious relationship existed between nature, culture and society. This perhaps naïve expectation was not borne out by the exchange. Travel throughout the country and interaction with local government politicians, political analysts, expatriate Australian business leaders, people on the street, and then reinforced by industry inspections revealed a country where the environment was not of any great political and public interest. While innovation and success in management of environmental issues was actively promoted, there was no overt pride or recognition of protected areas or nature.

The economy featured strongly in social debate as did education, child care and infrastructure, yet the reality in Korea seems to be one of low community interest in the environment. The pragmatic attitude of Dr Hyunkook Shin, Mayor of Mungyeong Council (see Section 9) accords with that of John Walker, Korea Chairman, Macquarie Group of Companies and Professor Eom, Kyungpook National University, who all considered that environmental management was of very low importance for most Koreans and therefore low political priority.

### **Turning disasters into solutions**

The Korean capacity to innovate and salvage solutions and economic prosperity from earlier environmental disasters and calamities is amazing and something that Australia could learn from. Cheonggyecheon, World Cup Park and Sihwa (sections 4, 5 and 8) were all monumental mistakes, yet have been transformed into engineering and environmental remediation success stories. Interestingly, the Koreans are not afraid to promote these transformations and are open about the mistakes of the past.

Cheonggyecheon restoration was particularly impressive. Although a project of this scale is unlikely in Queensland, there is much to be learnt from the planning, community consultation, conflict resolution, and demolition and restoration techniques that were pioneered here. Cheonggyecheon is a rich source of inspiration, learning and application. Elements of Cheonggyecheon could have application for the proposed Multiplex North Bank development in Brisbane.



## **National pride**

The Korean people are very proud of their status as an economic power and of their successes in industrial development, environmental restoration and IT innovation. This is nowhere better articulated than through the major visitor centres at the sites visited. The Cheonggyecheon, Mungyeong, Posco and World Cup Park centres would be the envy of industry and government anywhere in Australia.

Discussion with our Korean hosts about the purpose and drivers for such elaborate and high cost facilities was instructive. It appears that such centres seek to demonstrate to the Korean people and the global community that Korea is a progressive, resourceful and economically successful country. Presenting a positive public image is also part of the culture of nationalism and patriotism.

## **The importance of language**

The exchange highlighted differences in the meaning of environmental terms and phraseology. The Korean Government and industry commonly use words like ‘nature’, ‘eco-friendly’, ‘sustainability’ and ‘eco-parks’. The use of such words was originally thought to be loose and part of a ‘green-wash’ agenda. However, upon reflection such language was perhaps more about a difference in context and perspective. Koreans refer to eco-friendly and sustainable developments as ones that don’t pollute the air and water, that is, developments that establish parklands for recreation. In the Australian context, we would have different expectations of a development that purported to be ‘eco-friendly’ or ‘environmentally sustainable’. Certainly, it would extend well beyond air and water quality indicators — we would also be looking at elements like building design, emissions, on-site biodiversity conservation, ecological footprint, energy and water use, and healthy living spaces.

So, in this regard, what Australians see in the environment is not necessarily what many Koreans might see. What Koreans view as ‘green’ we see as ‘brown’ issues like clean air, water and greenfield parklands. This is understandable given the highly urbanised character of Korea in contrast to the largely agrarian and unsettled nature of Australia.

Notwithstanding, examples of industry and government ‘green washing’ were very evident. For instance, the mantra of the Seoul Metropolitan Government of ‘Seoul City: People and nature living together in harmony’ seemed strong on rhetoric and low in practice.

## **13.2 Personal reflections and outcomes**

The Australia-Korea Young Leaders Exchange Program was an extremely valuable and rich opportunity for learning, personal development and networking. Through interactions with other delegates and the exchange itinerary itself, I learnt more about climate change, sustainability, industrial ecology and the workings of large industrial plants in ten days than any intensive training could ever provide.

Overseas exchanges inevitably provoke, challenge, excite and stimulate delegates to look at the world and oneself in a different way, through fresh eyes. And so it was with the Korean exchange. It provided a vastly different context and perspective, a different frame of reference. The program forced me to view afresh the environmental issues that we face in Australia and how we go about solving problems.

The program was a huge eye opener. Prior to the trip, my awareness of Korea as a country was limited and dominated by its long history of war and conflict. Having travelled widely throughout South-east Asia, my expectations of Korea were of a populous, poverty stricken, rice- and agriculture-dominated country similar to Indonesia and Vietnam. This ignorant mindset was shattered as soon as we landed at Incheon Airport where the sheer scale and efficiency of air and road transport infrastructure quickly demonstrated that this was no developing country, rather an innovative and bustling modern nation.



Exchange delegates, Mungyeong

Korea is a fascinating country. As a recent democracy and developed country, it is an enthralling story of economic and social development throughout the last half of the 20th century. Its history of war and conflict still permeates the country and is acutely evident and on show through the military build-up and relations with the North. All of these factors strongly influence how Korea has dealt with the environment up to now and where it heads in future.

The exchange did not generate a greatly improved understanding of conservation and natural resource management in Korea as this was only briefly covered throughout the program. We were not exposed at all to fisheries and marine conservation issues, however one can readily postulate the pressures faced here. This limited coverage in itself was insightful and indicative of the Korean psyche which is geared around development and ameliorating associated environmental impacts (noise, pollution, waste etc.). Far less consideration appears to be given to nature conservation and sustainable living.

The program created new relationships and friendships with the other delegates and our Korean hosts. Ten days living together, travelling on buses and planes, and interacting socially built up personal friendships that extend beyond the trip. This is already being demonstrated through post-trip contacts and sharing of information, along with establishment of an AKYLEP blog and FaceBook site.

### **13.3 Areas for improvement**

Future programs could be improved by ensuring greater access to government officials in environment, agriculture and fisheries sectors — that was the missing element of the program. Whilst there was excellent access and interaction with NGOs, industry leaders, researchers and academics, dialogue with government officials and executives was inadequate.

The program had a very strong emphasis on environmental management. Greater attention needs to be paid to conservation, natural resource management, agriculture and fisheries to ensure a more rounded exchange program.

Site visits had heavy emphasis on inspection of company museums and visitor centres. Whilst this was useful, less time could have been spent on this and more directed to on-site inspections and discussions with environmental managers.

Finally, the exchange provided limited opportunities for delegates to share their experiences and ideas with Koreans. Information flow was predominantly one-way and such that delegates were largely unable to give advice, provide feedback and make suggestions to our Korean guests about our experiences in environmental management.

Despite these shortcomings, the exchange program was extremely valuable. The opportunity for other EPA staff to be involved in such exchanges is strongly encouraged.

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## **Appendix 1. Program participants**

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Keith Twyford	Director, Central Region, Queensland Parks and Wildlife Service, Rockhampton
Michelle Walker	Water Conservation Officer, Department of Natural Resources, Environment and the Arts, Alice Springs

## Appendix 2. Itinerary

Friday, 16 November	Pre-departure briefing and dinner, The University of Sydney
Saturday, 17 November	Departure from Sydney Arrival at Incheon International Airport, Seoul Check-in accommodation, Seoul
Sunday, 18 November	Trip orientation & Seoul inspections <ul style="list-style-type: none"> <li>• Korea National Museum</li> <li>• Cheonggyecheon Restoration Project</li> <li>• Meeting with academics, Graduate School of Environment, Korea University</li> <li>• Dinner at <i>Sanchon</i>, traditional Korean restaurant and performance</li> </ul>
Monday, 19 November	<ul style="list-style-type: none"> <li>• Seminar on Korea's environmental issues and policies, Korea Environment Institute</li> <li>• Visit Ubiquitous Pavilion (futuristic IT house)</li> <li>• Welcome dinner hosted by National Strategy Institute, Korea Foundation, Australia–Korea Foundation and Australian Ambassador</li> </ul>
Tuesday, 20 November	Seoul field inspections and meetings <ul style="list-style-type: none"> <li>• Korea Council for Local Agenda 21</li> <li>• Seoul World Cup Park and landfill recovery</li> <li>• Mapo Resource Recovery Plant</li> <li>• Seminar on Australia's environmental issues and policies</li> <li>• Dinner with Korea University staff and students</li> </ul>
Wednesday, 21 November	Fly Seoul-Pohang Pohang City field inspections and meetings <ul style="list-style-type: none"> <li>• Pohang Iron &amp; Steel Company (Posco)</li> <li>• Lunch with Posco executives</li> </ul> Travel to Daegu City Dinner meeting, Kyungpook National University
Thursday, 22 November	Travel Daegu-Mungyeong City <ul style="list-style-type: none"> <li>• Meeting with Mayor, Mungyeong City</li> <li>• Mungyeong Coal Museum</li> <li>• Mungyeong Ecological Park and Mungyeongsajae Provincial Park</li> <li>• Buddhist Temple</li> <li>• Omija Experience Village</li> </ul>
Friday, 23 November	Travel to Ansan City <ul style="list-style-type: none"> <li>• Sihwaha Tidal Power Plant</li> </ul> Travel Ansan City-Seoul <ul style="list-style-type: none"> <li>• Meet Citizens Movement for Environmental Justice</li> <li>• 'Nanta' performance</li> </ul>
Saturday, 24 November	<ul style="list-style-type: none"> <li>• Visit Demilitarised Zone (DMZ)</li> <li>• Farewell dinner hosted by National Strategy Institute</li> </ul>
Sunday, 25 November	<ul style="list-style-type: none"> <li>• Visit Gyeongbokgung Palace</li> <li>• Check-out of hotel</li> <li>• Return flight to Sydney</li> </ul>
Monday, 26 November	<ul style="list-style-type: none"> <li>• Arrive Sydney</li> <li>• Pre-departure briefing and lunch, The University of Sydney</li> </ul>

### **Appendix 3. Major contacts**

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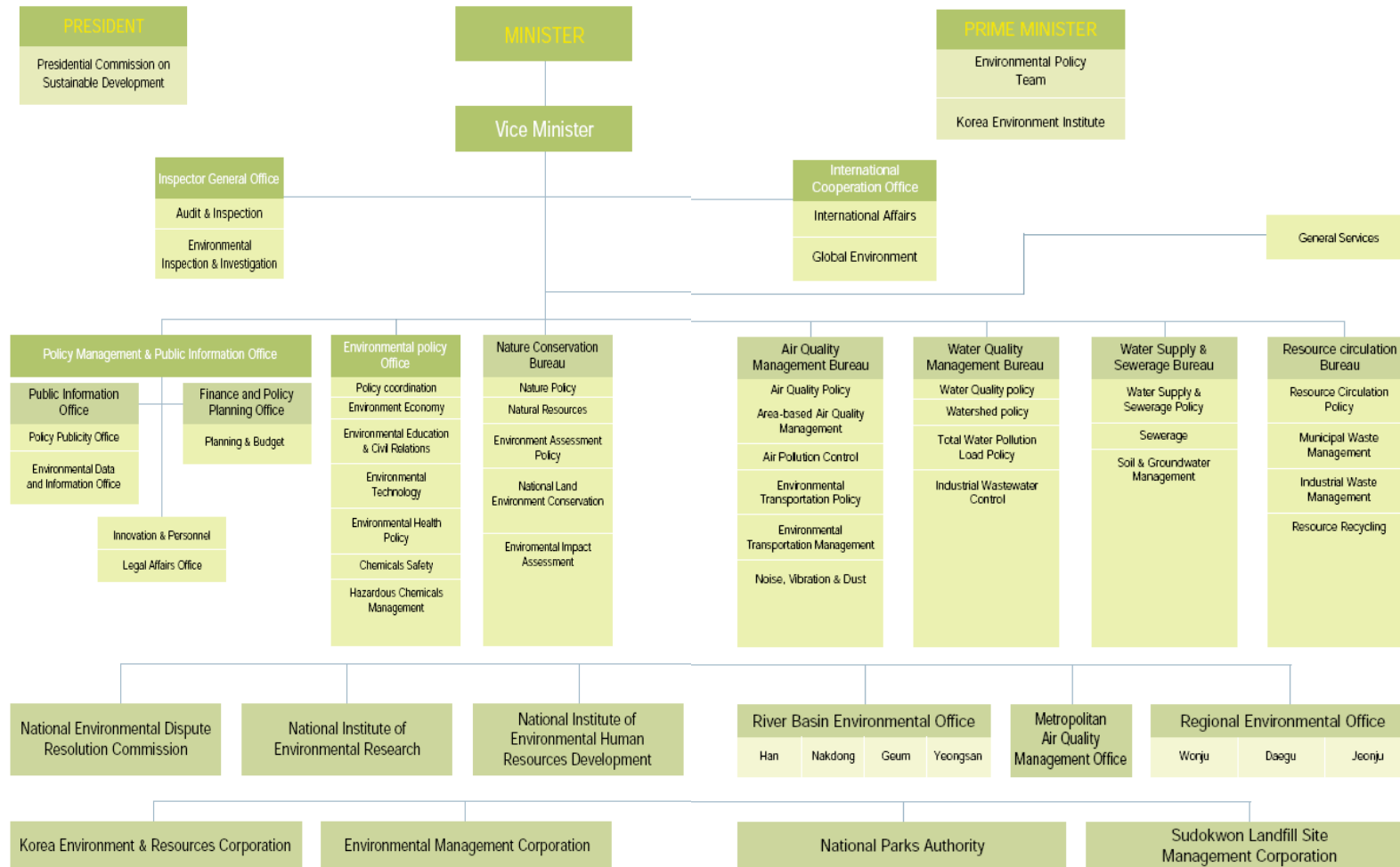
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MOE Organization Chart



## MOE Personnel (1,596)

(Oct 2006)

MOE	Subsidiary Organization (1,124)											
	VEDRC	NIER	WERC	River Basin Environmental Office (413)				Metropolitan A-District Management Office	Regional Environmental Office (182)			
				Han	Nakdong	Geum	Yeongsan		Wonju	Daegu	Jeonju	
472	21	274	27	142	146	114	124	53	72	96	55	

## 2006 MOE Budget

(KRW million, %)

Area	Budget	Projects
Total	2,999,150(100)	
Waterworks and sewerage / Water Quality Management	1,789,511(59.7)	<ul style="list-style-type: none"> <li>Local waterworks development</li> <li>Municipal water development for rural and fishing area</li> <li>Drinking water development for islands</li> <li>Sewage water treatment plant</li> <li>Sewage pipeline repair</li> <li>Industrial wastewater treatment plant</li> <li>Water quality improvement of four rivers, etc</li> </ul>
Waste management	275,915 (9.2)	<ul style="list-style-type: none"> <li>Landfill site</li> <li>Public food waste treatment facility</li> <li>Incinerator</li> <li>Recycling facility</li> <li>Loan for fostering recycling industry, etc</li> </ul>
Air quality improvement	324,905 (10.8)	<ul style="list-style-type: none"> <li>Metropolitan air quality improvement</li> <li>Natural gas vehicles</li> <li>Tele-monitoring system</li> <li>Monitoring equipment</li> <li>Comprehensive measures for municipal noise, etc</li> </ul>
Nature	157,566 (5.3)	<ul style="list-style-type: none"> <li>National biological resources center</li> <li>Conservation of Donggang watershed ecology</li> <li>Conservation of ecology-protected areas</li> <li>National parks projects</li> <li>Natural environment conservation facility, etc</li> </ul>
Others	451,253 (15.0)	<ul style="list-style-type: none"> <li>Core environmental technology for next-generation</li> <li>Environmental improvement funds</li> <li>Preventive system on environmental disease</li> <li>International cooperation for climate change</li> <li>Salary and others</li> </ul>

Source: Ministry of Environment (2006)