Redesigning the Urban Environment:
Seoul’s transformation into a clean, green and global city.

A special report for the
United Nations World Tourism Organization
Foreword

Welcome to the new, green Seoul.

As Seoul has become a top business center in Asia it has also transformed itself through massive urban redevelopment projects in an eco-friendly way, making the city a greener, cleaner and more beautiful place to visit and live.

We’ve made important progress to improve the environment. Airborne dust particles have dropped to a record low since 1995, and we’ve added another 246,000 square meters of green spaces to our neighborhoods.

Seoul has also become a recognized leader in building in greener and more eco-friendly ways, and I believe these efforts help highlight the city’s natural charm and design-conscious development.

I am very proud of Seoul’s initiative, enthusiastically supported by its citizens, to become a sustainable example to other cities in Asia and around the world. I hope you will come visit Seoul to witness our transformation into a truly green and fun place.

Samuel Koo
CEO
Seoul Tourism Organization

About the Seoul Tourism Organization (STO)

The Seoul Tourism Organization (STO) is a public-private joint venture company primarily funded by the Seoul Metropolitan Government. Established on February 4, 2008, the STO is charged with promoting the city’s tourism and convention industries to attract international visitors.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>1</td>
</tr>
<tr>
<td>About the Seoul Tourism Organization (STO)</td>
<td>1</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>2</td>
</tr>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td><strong>The Case Studies:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CS1</strong> Clean Water: Restoring Seoul’s Water and Waterways</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>The Cheonggyecheon</td>
<td>5</td>
</tr>
<tr>
<td>The Han River Renaissance</td>
<td>7</td>
</tr>
<tr>
<td>Arisu</td>
<td>9</td>
</tr>
<tr>
<td>Section Notes</td>
<td>10</td>
</tr>
<tr>
<td><strong>CS2</strong> Clean Air: Promoting Green Transportation Options</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>11</td>
</tr>
<tr>
<td>Private Transportation</td>
<td>12</td>
</tr>
<tr>
<td>Public Mass Transit</td>
<td>13</td>
</tr>
<tr>
<td>Section Notes</td>
<td>17</td>
</tr>
<tr>
<td><strong>CS3</strong> Green Spaces: Reclaiming Seoul’s Natural Axis</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>16</td>
</tr>
<tr>
<td>Improving City Parks</td>
<td>19</td>
</tr>
<tr>
<td>Creating New Parks</td>
<td>19</td>
</tr>
<tr>
<td>Citizen Participation</td>
<td>21</td>
</tr>
<tr>
<td>Section Notes</td>
<td>21</td>
</tr>
<tr>
<td><strong>CS4</strong> Green Development and the Future of Design</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>22</td>
</tr>
<tr>
<td>Green Development</td>
<td>23</td>
</tr>
<tr>
<td>Green Construction</td>
<td>23</td>
</tr>
<tr>
<td>Green Design</td>
<td>24</td>
</tr>
<tr>
<td>Section Notes</td>
<td>25</td>
</tr>
<tr>
<td>Conclusion</td>
<td>26</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>26</td>
</tr>
</tbody>
</table>
Introduction

Seoul has transformed remarkably from a war-torn Asian backwater to one of the world’s most sophisticated hubs of culture, leisure and commerce. The city’s remarkable industrialization is often called the “Miracle on the Han River,” and is a source of pride for many Koreans.

The city’s rapid development has put considerable stress on the environment. In the 21st century, municipalities around the world are looking for innovative ways to develop green, sustainable strategies for growth.

This report highlights some of the many initiatives undertaken by Seoul city over recent years to improve the environment. By bringing together stakeholders – residents, business and government, alike – Seoul is documenting impressive environmental progress. From pioneering the use of green technology to restoring a major river ecosystem, Seoul is creating a blueprint for sustainable tourism.

We hope these “lessons learned” can provide valuable insight for other cities as they develop sustainable tourism policies and work to redesign the urban environment.

Michael P. Spavor
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Clean Water: Restoring Seoul’s Water and Waterways

Introduction

In 1394, the area around present-day Seoul was chosen for a new dynasty’s capital. Situated between mountains and a river, the founding king of the Joseon Dynasty [1394-1910], Yi Seong-gye, saw the location as favorable.

Six hundred years later, Seoul city’s primary landmark remains the Hangang, or Han River. For 40 kilometers, the wide river gently moves through the city on its westward course to the Yellow Sea.

In recent years, Seoul’s rapid growth to become the world’s second-largest urban area put huge stress on the natural environment. As water quality deteriorated, citizens complained about pollution and grew wary of drinking tap water.

Seoul invested approximately USD $5.2 billion on water cleanup measures from 1998 through 2005. These initiatives included the restoration of an ancient streambed and a re-birth for the Han River ecosystem. Most of these projects are ongoing, and the coordinated efforts of city officials, citizens and the private sector are already showing promising results.
The Cheonggyecheon

Perhaps nothing reflects Seoul’s history better than the Cheonggyecheon, or Cheonggye Stream. The 5.8-km waterway flows west-to-east through the heart of Seoul to the Jungnangcheon Stream. The name means, “clear canyon stream,” and in ancient times, it was noted for its purity.

Early in the 20th century, Japanese occupation ended the Joseon Dynasty. Over the ensuing decades of colonization and war, shantytowns rose up around the area and raw sewage and garbage were released into the stream.

In 1948, a concrete road covered the Cheonggyecheon. As South Korea rapidly industrialized, the area became Seoul’s central business district. In 1968, an elevated expressway was constructed and by 2002, the former stream had become the nation’s largest commercial area, a bustling neighborhood of over 100,000 shops. But the unsightly Cheonggye Expressway became a barrier against further redevelopment of the area. As air and noise pollution continued to rise, businesses began emigrating to Seoul’s southern districts.

Challenges & Opportunities

On July 1, 2003, Seoul mayor Lee Myung-bak followed through on a campaign pledge to restore Seoul’s ancient stream. His vision was to improve citizens’ quality of life through a more pedestrian-friendly downtown that could revitalize the economy while respecting the city’s historic and cultural heritage. The plan met considerable resistance from citizens and small business owners. While residents were concerned about the traffic implications of removing the expressway, which accommodated 170,000 vehicles daily, many merchants feared the impact of construction on their businesses.

The Cheonggyecheon Restoration Citizen’s Committee was created to explore ideas and manage conflict with local groups, merchants and research centers. Their deliberations brought tax relief, low-interest loans and improved area parking. To reduce traffic congestion, city officials decreased in-bound traffic by 10% through one-way streets, bus-only lanes and shuttle buses.

A Stream Reborn

On October 1, 2005, the Cheonggyecheon was reintroduced to the public. The Seoul Metropolitan Government funded the entire $281 million expense, which was approximately 11 percent over budget.

Today, the Cheonggyecheon is one of Seoul’s most popular attractions. Over 50,000 people enjoy the stream’s fountains, waterfalls, performance and exhibition spaces daily, with visitor numbers more than doubling on weekends and holidays. The stream has also brought attention to Seoul’s cultural richness.

Docents lead three history and culture tours daily, and popular festivals like the Lotus Lantern Festival have returned to the area. Furthermore, 17 access points (including seven that are wheelchair accessible) have increased foot traffic.
in adjacent neighborhoods, which support the economic sustainability of local businesses. Although the removal of a major thoroughfare decreased average speeds from 15.5 km/h to 13.6 km/h, data show that in-bound traffic was reduced by 2.3% while public bus and subway ridership increased by 1.4% and 4.3%, respectively (by 430,000 trips daily). Despite early concerns, initial public response was positive. One month after its opening, a public survey found that over 75% saw improvement in air and water quality, and reduced noise pollution and odor.

Several environmental benefits have also been linked to the project. For example, the Cheonggyecheon acts as a natural coolant, reducing area temperatures by an average of 3.6 degrees Celsius. Furthermore, 96% of the 872,400 tons of concrete and asphalt collected during the expressway’s demolition was recycled. The removal of heavy metals such as lead, manganese and chromium during the restoration process has reduced small-particle air pollution from 74 to 48 micrograms/m$^3$.

Measuring Environmental Impact

Four years after the opening, the Cheonggyecheon has reintroduced several plant and animal species to downtown Seoul. Every day, about 142,000 tons of water are pumped from the Han River and underground sources into the stream. The Cheonggyecheon’s water quality has improved to Class II, which enables safe public use for recreational purposes.

To maintain quality, the city has installed a Ubiquitous Sensor Network (USN) to track water temperature and sanitation levels in real time, thereby minimizing damage caused by seasonal monsoons. This information, as well as underwater “nature videos,” are streamed to the public online.

A Global Model

The successful reintroduction of the Cheonggyecheon has brought international attention to Seoul’s efforts to improve its natural environment in socially, culturally and environmentally sustainable ways. Municipalities around the world are looking to Seoul for valuable insight into how to restore natural habitat in urban environments. International media has also taken note. In 2006, TIME magazine named Lee Myung-bak one of its 2006 Heroes of the Environment.

For its part, Seoul city has budgeted over $250 million to recover and restore 17 additional intercity streams by the end of 2010, and a total of 35 streams by 2020.

The Han River Renaissance

Twelve parks covering approximately 40 square kilometers form an impressive greenbelt on both sides of the Han River. Until recently, however, significant pollution compromised the riverfront’s quality.

In the late 1990s Seoul city officials began to stress improving “livability” as a major goal. Specifically, a three-phase, 25-year plan was announced to transform the Han River into a world-class attraction for citizens and tourists. Called the “Han River Renaissance Project,” the plan is to rehabilitate the river ecosystem and encourage its public use through improved accessibility. By the end of 2010, 33 Phase 1 projects will be completed at a cost of approximately $548.5 million.

Creative Restoration

South Korea’s rapid industrialization in the latter 20\textsuperscript{th} century spawned excessive development. Along the Han River, the over zealous build-up removed wetlands and caused frequent flooding. To mitigate floods, Seoul city officials moved to restore wetlands and natural riverbanks.

Before the project began in 2007, about 86% of Seoul’s riverbanks were lined with concrete. These drab barriers destroyed critical habitat and compromised biodiversity. Natural habitat will replace artificial barriers on about 87% of the riverbanks, and by the end of Phase 1 (2010), three eco-parks (Gangseo, Amsa and Yeouido-Saetgang) will also provide critical wetland habitat for rare birds and other wildlife within the city limits.

One of the Han River Renaissance’s most creative solutions has taken place on a small island in western Seoul. During the Joseon Dynasty, Seonyudo Island hosted wandering Confucian scholars, called seonbi, who visited the picturesque place to paint and compose poetry. But in a dramatic change of fate, in 1978 the island was turned into a sewage treatment plant. Two decades later, the plant was shuttered and the island was transformed into an eco-consciousness park. Re-opened in 2003 and described as a “post-modern space,” the award-winning park integrates the old treatment plant’s structures into a series of gardens. In a nod to its past, water is the principle theme. For example, old settling basins for treatment chemicals are home to small fish and species of aquatic plants that naturally purify water.
Creating Accessible Destinations

Another consequence of Seoul’s rapid development was the construction of major expressways along each side of the Han River. In addition to blocking natural views and polluting the river, these roads blocked pedestrian access to the river.

A major objective of the Renaissance Project is to improve accessibility. For example, direct links between neighborhoods and parks are being made via public transportation routes and by constructing attractive access corridors. Furthermore, several of the Han River’s 22 bridges are being remodeled into destinations themselves.

Inspired by a citizen’s suggestion, the Gwangjindaegyo Bridge has been transformed into 2,000 m² of landscaped parkway with an additional 2.5 meters dedicated to bicycle lanes. Located on Seoul’s eastern edge, two lanes of the four-lane bridge were converted with sustainable landscaping, stylish benches, public restrooms and illumination systems. Opened in July 2009, the bridge also features the Riverview 8 Cafe, which enables city residents to enjoy panoramic riverside views.

A River of Lights

Another bridge project added bicycle and pedestrian paths along the Jamsudaegyo Bridge. City buses now stop mid-span to shuttle visitors to the Han River Banpo Park, where they can watch the Moonlight Rainbow Fountain. Introduced to the public on April 27, 2009, 380 nozzles affixed to both sides of the bridge spray water set to 200 colorful lights and music. During the summer, a popular series of Hangang Rainbow Festivals were held at the park.

The Moonlight Rainbow Fountain is part of a larger illumination project. Since 2006, Seoul city has worked with lighting designers to create bridge illumination systems. The results are colorful pieces of light art that span the Han River. To conserve energy, only half of the bridges are illuminated at any one time, and low-wattage, energy-efficient bulbs and cold cathode lamps were installed. City officials estimate that it costs only $29 per bridge, per day.

As of February 2010, nearly one-third of the Han River Renaissance Project was completed. Already, the network of Han River parks is attracting a growing number of visitors. Today, almost 60 million people visit the Han River parks annually, enjoying their natural beauty and convenient amenities.

**Arisu**

“Arisu” was an ancient name for the Han River. More recently, it is the formal name for Seoul’s “tap” water. The Arisu Project is a Seoul city initiative to bring the city’s water quality up to international standards and to improve citizen perception of tap water as a healthy and viable alternative to expensive and wasteful commercial bottled water.

Every day, an average of 3.5 million tons of water is taken from six intake plants along the Han River. To improve water quality, the city replaced 96% of its pipes by 2005, and will install new rust-resistant piping on all 14,146 km by 2011. Furthermore, an extensive network of water purification facilities were constructed or improved. As a result, all 145 water quality criteria recommended for monitoring by the World Health Organization (WHO) are now strictly observed, including 90 items that Seoul Metropolitan Government voluntarily monitors.

In 2009, the internationally-credited product safety certification organizations Underwriters Laboratories (UL) and the National Sanitation Foundation (NSF) confirmed that Seoul’s water supply met the drinking water standards of the U.S. Environmental Protection Agency (EPA) and that the bottled water product, Arisu, met U.S. Food and Drug Administration (USFDA) guidelines. The NSF is the WHO’s only collaborating center for food and water safety. For example, the cloudiness of purified Arisu stood at 0.1 NTU (Nephelometric Turbidity Unit), which was far lower than the allowable standard of 0.3 NTU.

In addition to ensuring its quality, city officials are also working to reduce water waste. Based on a five-year plan issued by the city, Seoul hopes to lower its non-revenue water ratio – the amount of water lost to leakage or other un-billed usage – from 9.3 percent in 2007 to 5.0 percent in 2012. If successful, it would represent the world’s lowest ratio of wasted water.

The city’s Office of Waterworks is committed to providing its technology to support local governments’ efforts to offer safe water to their citizens. Through the Arisu Quality Verification System, it is also improving public perception. Via real-time updates made online, citizens can monitor water quality. The new system has boosted public trust, increased consumption by 20%, and won a United Nations Public Service Award in 2009.

Section Notes

4 Kie-Wook Kwon, (Undated).
6 Kie-Wook Kwon, (Undated).
7 Ibid.
9 Kie-Wook Kwon, (Undated).
10 Ibid.
14 Ibid., 12.
17 Ibid.
19 Ibid.
Clean Air: Promoting Green Transportation Options

Introduction

A standard measure of air quality is PM, or atmospheric particular matter. Specifically, PM$_{10}$ refers to particles of 10 micrometers or less in diameter. The WHO recommends a daily PM$_{10}$ concentration of under 20 µg/m$^3$. According to the Research Institute of Public Health and Environment, Seoul’s 2009 PM$_{10}$ levels were 13% lower than 2006, and were the lowest since recording began in 1995.

Despite the improvement, Seoul city has set aggressive new air quality goals and will spend about $108 million to reduce PM$_{10}$ levels. The city also aims to reduce CO$_2$ emissions by 35% by 2020. Specifically, will control traffic flow, adopt low-polluting vehicles and encourage public transit use.
Private Transportation

Green Cars

In 1965, there were just 40,000 automobiles on South Korea’s roads. By 2008, the number had skyrocketed to almost 17 million. Auto emissions are the largest emitter of air pollutants in Seoul. According to the Ministry of Environment, vehicle traffic is responsible for 63.2% of Seoul’s large air pollutant emissions.

To mitigate this major source of air pollution, the city has implemented several programs to encourage use of eco-friendly, “green” vehicles that are more fuel-efficient and less polluting than internal combustion engine vehicles. By 2015, city officials have set a target of 10% for green cars (i.e. hydrogen fuel cell, electric or hybrid). Subsequent targets are 20% by 2020 and 50% by 2030.

In 2009, Neighborhood Electric Vehicles (NEV) were introduced to the city’s police, fire and maintenance departments. NEV can reduce vehicle emissions and traffic congestion and are ideal for traveling short distances. With a top speed of 60 km/hour and the ability to travel 70 km. on one charge, city officials believe they are ideal for short errands, such as shopping and shuttling children to and from school. To encourage private ownership, electric charging points will be available in parking lots, on city streets and at stand-alone stations. Seoul city and the Korea Advanced Institute of Science and Technology are also working together to develop an electric car that can be recharged while operating.

Seoul’s Eco-Mileage Program

As part of a carbon point system developed in July 2009, the Ministry of Environment has created incentives to encourage citizens to save energy. These incentives include monetary rewards of up to 50,000 won for households or companies that reduce CO₂ emissions by an average of at least 10% over a six-month period. City officials estimate that a four-person family could earn about $106, in addition to reducing their electricity, gas and water bills.

The city’s Eco-Mileage Program also pledges to launch new energy conservation educational facilities, and to reinforce energy conservation messages in primary schools to transform citizens and online netizens into future “ecotizens.”

Seoul’s “No Driving Day” Campaign

While the city promotes using green vehicles, officials are also discouraging car use altogether. In 2003, Seoul introduced a voluntary “No Driving Days” program to reduce daily commuting by public and private sector employees. In exchange for a five percent automobile tax reduction, a 50% discount on congestion charges...
and up to 20% in parking discounts, public employees select one weekday to take public transit in lieu of their personal vehicle. Private sector employees also receive perks, such as a one-to-six cent per liter discount on gasoline and free or discounted car washes.

In 2010, city officials estimate that the car-free days program will remove over two million vehicles from the road, thereby decreasing traffic volume by 3.7% and CO₂ emissions by 9.3% (over 2 million tons). The program is also delivering annual savings of $50 million in fuel costs. In June 2006, the program spread to all public institutions in Korea and was identified as a “Best Practices” model by the Clinton Climate Initiative’s C40 Cities Climate Leadership Group in 2009.


International Car-Free Day

A similar project called “Car Free Day” is an annual event where citizens are encouraged to leave their vehicles at home. Created in France in 1997, some 40 countries and cities have adopted the program, including Seoul, in 2006. In 2009, the program restricted vehicle use from 4:00 am to 6:00 pm for 5.3 kilometers on two of the city’s most heavily used thoroughfares – Jongno Street and Teheran-no Street.

To encourage public transportation use, bus and subway fares were waived until 9:00 am while parking options were limited. To accommodate more passengers, 141 additional buses and 16 train cars were added to city routes. As a result of the program, the core downtown areas saw a 23% decrease in traffic volume and a 7% average increase in traffic speeds.

Bicycles

Bicycles are an obvious environmentally friendly mode of private transportation. Although just 1.2% of Seoul commuters travel via bicycle, city officials hope that improved infrastructure, bicycle priority traffic signals and a public bicycle rental system employing cutting-edge technology (such as the T-money smart card system), will boost the rate to 4.4% in 2012 and 10% by 2020.

Specifically, 40 kilometers of new bicycle priority lanes will be constructed between 2010 and 2012 to create a citywide network of 207 km. The city predicts the health benefits associated with increased physical activity would reduce medical expenses by about $448 million. Furthermore, bicycle elevators and secure, “close type” public bicycle storage is being constructed near public transportation. Bicycle-friendly subway cars have been installed in Seoul Metro subway cars, and 20 subway stations will provide shower facilities and parking for between 300 to 500 bicycles. Finally, the city is creating bicycle-
Public Mass Transit

Seoul already has an ultra-modern, low-cost public transportation system. It’s estimated that 60% of the public regularly use the city’s extensive network of buses and subways. Promoting public transportation has been an important strategy to reduce traffic congestion and vehicle emissions. The Ministry of Environment estimates that standard automobiles generate 13 times the carbon emissions of buses and over 100 times that of subways.5

CNG and Electric Buses

Following several years of decreasing ridership, Seoul’s public bus system was completely overhauled in July 2004. Improvements were made to better coordinate bus and subway services, integrated distance-based fare system and provide timesaving routes. Every day, about 9,000 buses transport 5.8 million people on 612 routes. It’s estimated that buses account for fully 30% of Seoul’s traffic.

By 2008, the city converted 19,078 buses, 429 garbage trucks and even door-to-door delivery vehicles to Compressed Natural Gas (CNG).6

Thanks in part to an increase in CNG recharging stations over the past few years and a full conversion is expected by the end of 2010.7

While the CNG buses have reduced harmful exhaust fumes by up to 18% and CO₂ emissions by 11 tons per year, per vehicle, Seoul city officials are also looking to new forms of technology for their bus fleets.

As part of a plan to replace all buses and taxis with hybrid or electric vehicles by 2020, in October 2009 a trial service of electric buses was started on three circular routes on central Seoul’s Mt. Namsan.8

In March 2010, the world’s first commercial wireless electric vehicle was introduced at the Seoul Grand Park. Developed by the Korea Advanced Institute of Science and Technology (KAIST), the Online Electric Vehicles (OLEV) are powered wirelessly through magnetic strips buried about one foot below the surface. This “recharging road” technology doesn’t require overhead power wires, and the battery is only one-fifth the size of conventional electric vehicle batteries. KAIST plans to begin trial operations as early as 2011, with commercial use by 2013.9

When the G-20 Summit comes to Seoul in November 2010, KAIST says that fifteen of the new electric buses will shuttle summit participants between venues.
Bus Priority System

In addition to making city buses run cleaner, the city is improving fuel efficiency. One successful program is the construction of median bus lanes. Diverting bus traffic to center lanes has reduced traffic congestion, transportation and idling times, thereby reducing energy use and CO₂ and CHG emissions. The bus priority lanes have increased average bus speeds in every area where they have been installed, sometimes by 100%. At the end of 2010, the city will have integrated at least 13 median bus lanes covering 130.6 km.

Subway

Seoul’s subway network includes 12 under- and aboveground train lines. Over 2.27 billion trips were made on Seoul’s subway system in 2008, making it among the world’s longest and most heavily used. A single journey of 10 kilometers or less costs 1,000 won ($0.88) and transportation card users receive a ten percent discount. By 2017, the city plans to introduce eight Light Rail Transit (LRT) lines to the city, adding an additional 73.3 kilometers to the 314-km system.

Smart Cards

One problem with the Seoul’s popular rail system was printing 450 million paper single-use tickets every year. In May 2009, the city’s subway network started using the world’s first radio frequency identification (RFID) chip-based scheme for single-journey, mass transportation ticketing. Although the new system required a $60 million investment to install, the partnership between Korea Smart Card Co., Ltd. and STMicroelectronics is expected to save the city an estimated $2.4 million annually.

The new RFID technology enhances the smart card transit system installed in 2003. The T-Money transit card enables users to transfer free of charge between subways and buses. The rechargeable T-Money system can also be used to pay for taxis, parking, tunnel fees and to make purchases in lieu of cash. This convenient system, which records over 30 million transactions daily, has helped increase public transit ridership.

Green Taxis & Motorcycles

Seoul’s taxi fleet is also going green. Over 72,000 taxis were converted to Liquefied Petroleum Gas (LPG), but the city has also introduced a hybrid taxi pilot program. Launched on December 3, 2009, 10 taxis are running on a Liquefied Petroleum Injection (LPI) engine and electric power. Each hybrid taxi is expected to reduce more than six tons of greenhouse gas emissions annually, and cut air pollutant emissions, such as nitrogen oxides, in half. Seoul city plans to introduce 70 hybrid taxis in 2010 and to start an electric taxi service in 2011. By 2020,
at least 36,000 LPG taxis will be replaced with electric LPI hybrids.22

And finally, the city is also working to reduce air and noise pollution by introducing eco-friendly electric motorcycles. Ideal for delivery services, the program began in 2008 with the Domino’s Pizza delivery chain. To encourage wider use, companies that switch to these vehicles are offered special subsidies and tax cuts. *
Section Notes


3. Ibid. Note: Refers to emissions of CO, NOx, SOx, PM10 (fine particles) and VOC.


9. Ibid., 21.


15. Ibid., 21.


19. Note: The figure is derived from ridership of Seoul Metro, Seoul Metropolitan Transit Corporation, Korail metropolitan railroad system and AREX passengers in 2008.


23. Ibid.
Green Spaces: Reclaiming Seoul’s Natural Axis

Introduction

Although rapid development policies cleared city forests and drained wetlands, Seoul still has 1,953 city parks that cover 164.22 km² or about 27% of the city’s land area. Per-capita parkland in Seoul amounts to 15.95 m², which is comparable to other major cities. However, two-thirds of the city’s parklands are located in the mountainous outskirts of the city. When calculating easily accessible parklands, the ratio falls to just 5.19 m² per person, which is considerably lower than other major cities, like New York (10.27 m²) and London (24.15 m²).

Seoul officials are increasing public green spaces by expanding existing parks and creating new ones. Ultimately, planners plan to create a greenbelt that runs from Mt. Bukhansan in the north, southwards through the Han River, Mt. Namsan and Mt. Gwanaksan.
Improving City Parks

Seoul’s goal is to make one-third of the city’s total area parks. By 2020, Seoul city will add 74 new parks covering over 100 hectares. The city is creating parks in neighborhoods, including medium-sized and larger parks in greenbelts near residential areas. Green space is being cultivated in various ways, such as creating a park-like atmosphere in schools by removing barrier walls, transforming 104,000 square meters of rooftops into gardens and by converting fragmented plots into small parks. Plans are also underway to expand green areas by 330 hectares in the neighborhoods to ensure that parks will be accessible from any location within a five-minute walking perimeter.

Renovations

In just the past few years, two aging amusement parks have been remodeled to be more eco-friendly. Children’s Grand Park (59.3 hectares) was recently remodeled with more natural green spaces. Dreamland was re-opened in 2009 as Dream Forest, a 90-hectare park in a densely populated residential area.

Perhaps the largest park project is the development of Seoul Grand Park into Gaia: The Living World, a 560-hectare park in southern Seoul that combines a zoo, botanical garden and theme park. Designed by the Californian company Thinkwell, guests can enjoy more than 50 rides and attractions designed to offer both entertainment and an educational experience. City government officials hope the renovated park becomes a regional and international tourist destination. The first stage of construction should be completed by 2015.

Creating New Parks

In a city as densely populated as Seoul, there are few large plots of unused land available for parks. To create new parks, city officials must think creatively about how to convert existing uses into recreational, eco-friendly sites for residents.

World Cup Park

One of the best examples is World Cup Park. Located on Seoul’s far western end, the site is actually six parks totaling 270 hectares. As the name suggests, the site is best known as Seoul’s stadium for the 2002 Korea Japan World Cup football tournament. But for many years, it was the site of the Nanjido Landfill, a massive disposal
site that grew into a mountain of waste 34 times the size of the Great Pyramid of Giza in Egypt. Until it was closed in 1993, Nanjido was the nation’s largest uncontrolled landfill.

In 1994, city officials released a master plan that designed the parks with conservation and the preservation of biodiversity in mind. Once the landfill was covered in one meter of soil, some 85 different varieties of plants and wildflowers reclaimed the site. Today, five wind-powered generators produce electricity that operates park lamps, while the methane gas produced underground by the landfill is recycled as fuel for the stadium and nearby apartments. This is important since methane production at landfill sites can pose significant health and environmental risks.

So far, World Cup Park’s environmentally-friendly design has enticed ducks, pheasants, cranes, kestrels and several other types of birds back into Seoul. Even the endangered narrow-mouth frog, named as the park’s flagship species, lives there. The park’s highest plateau is famous for its hectares of cogon grass and eulalia, and is the site of a popular festival each October.

Converted Water Treatment Facilities

Much like Seonyudo Island, other water treatment and sewage facilities around Seoul are being transformed into parks. The original facilities, either too small or old to serve their original purpose, are being converted for public recreation. One example is the former Sinwol Water Purification site. Recreated as West Seoul Lake Park, the park is located in a southwestern district that lacks many public parks. The 22.5-hectare park mixes water features with digital art. The outdoor site was opened to the public in October 2009, after 44 years as a water purification plant.

Seoul Forest

Seoul Forest is an urban park covering 116 hectares in the city’s Seongdong District. Situated on the former site of Joseon Dynasty’s royal hunting grounds, the area had been left to deteriorate until the Seoul city government partnered with local citizen groups to begin tree-
planting initiatives in 2003. This collaboration enabled the park to be reopened to the public the following year.

Yongsan Park

Perhaps the most exciting prospect for Seoul’s parkland enthusiasts is Yongsan Park, the tentative name for a massive swath of 270 hectares currently occupied by the U.S. military. Located in central Seoul, the site will be converted into a public recreational area once the U.S. army relocates to Pyeongtaek, Gyeonggi Province. Planning is already underway, with construction anticipated to occur between 2015 and 2030. The ambitious project is envisioned to restore the green corridor from Mt. Namsan to the Han River.

Citizen Participation

The Green Seoul Citizens Committee was founded in 1995 to address environmental issues through cooperation among citizens, NGOs and companies. It consists of 89 members, including NGOs, companies, experts, city council members and government officials. The committee holds 100 meetings each year and initiates various projects, including the assessment and advisory on the sustainability of key administrative programs and plans, offering of bids to participate in city projects and publication of environmental news.

Seoul Action 21 is an action guideline consisting of 34 action goals and 580 action plans in seven areas, developed in cooperation from the public, the business sector and the Seoul government to create a more livable Seoul. For example, the group initiated a citizen campaign to prevent climate change, a hillside protection project to protect wooded neighborhood hillsides degraded by unauthorized hiking trails and gardening, a stream protection project to preserve neighborhood streams, and an air pollution mitigation project.

In July 2003, the Seoul Metropolitan Government launched the “Creating a Clean Seoul” movement. This is a voluntary citizens’ movement to clean up streets and alleys outside shops and homes. As of the end of 2006, about 188,000 citizens were participating in the movement and participation continues to grow.

Section Notes

2 Ibid.
Green Development and the Future of Design

Introduction

Buildings account for 56% of Seoul city’s total energy consumption. About half of these buildings are over 20 years old and require retrofitting in order to provide energy-efficient temperature regulation. Due to the city’s significant temperature fluctuation, between 47-55% of energy is used to heat or cool residential and commercial buildings.

The Seoul city government has acknowledged the need for creative solutions to increase energy efficiency. The city established eco-friendly building standards in August 2007 that are mandatory for public buildings and recommended with incentives for private buildings. These standards include CO\textsubscript{2} reductions of 20% for new buildings and 10% for existing ones. Already, 32 public buildings (including the City Hall Annex) and 30 private buildings were retrofitted with energy efficient heat and air conditioning facilities. Seoul’s demonstrated commitment to reduce greenhouse gases (GHG) was recognized by the Clinton Climate Initiative, which described the city as a world-leader in building retrofits.

What follows are some examples of prominent green development projects.
Green Development

As the global trend towards green development continues, Seoul is emerging as a leader in the new sector. One leading local firm in LEED-certified projects is Samoo Architects and Engineers. Samoo launched a Sustainable Design Team in 2006, and today has 51 LEED-accredited professionals. LEED is an international rating system for green building. In recent years, Samoo has won several international design competitions to create industry-leaders in green development. Two current projects include a redesign of Seoul’s historic Garak Wholesale Market and the development of one of the city’s last undeveloped tracts.

Magok Research & Development City

The Magok Research and Development City (MRC) is another initiative designed to creatively use Seoul’s natural resources. The MRC area, which is one of the last large-scale, undeveloped sites within Seoul city limits, will be converted into a multifaceted R&D hub for the city’s high-tech IT, BT (bio technology) and NT (nano-technology) economic growth engines. Samoo’s “The Living Water” concept, which won first prize in an international design competition, will also transform the 117-hectare plot into an eco-friendly waterfront town with hotels, convention centers and entertainment and leisure venues that capitalize on the MRC’s riverside location.

Garak Market Redevelopment

Established in 1985 as the first public wholesale market in Korea, the Garak Wholesale Market is Seoul’s largest venue for wholesale meat and produce. Although a popular marketplace, it is often criticized for its traffic congestion and unpleasant odor. The winning proposal by Samoo Architects and Engineers transforms the 53.2-hectare site into a giant roof garden, a radical envisioning of the traditional market.

Green Construction

Primarily led by the private sector, measures to save energy, enhance building efficiency and create green standards are well underway. Generally, new buildings must use energy efficient design while existing buildings will be retrofitted to meet new green standards. Beginning in the public sector, the retrofitting project will reduce energy consumption through the replacement of fluorescent lighting with LED (30% reduction), dimming controls (30% reduction), and building enveloping (20-50% reduction). Enveloping recovers the exterior to reduce the number and size of windows to improve insulation. Other projects involve installing rotating doors, energy-efficient heating and cooling systems and automatic building controls to avoid energy waste.
In 2007, the city government established the Seoul Green Architecture Standard, which aims to reduce GHGs from buildings through incentives and financial support. The new standards require eco-friendly energy conservation and maintenance standards for all existing and newly constructed public buildings, and encourage it in private structures. When buildings are up to standard, 5-20% of acquisition and registration taxes will be deducted and the city will partially support the cost of green architecture certification.

The city government is strongly encouraging that the green architecture standards are used from the design stage and measures environmental impacts through meticulous evaluations and standards reviews. Currently, 60 large-scale, private sector buildings under construction are following the new green standards. The city will make these standards mandatory for all private sector buildings with over 100,000 m² by 2020. Twenty-three features including amount of open space, sunlight obstruction, topography, geology and reduction of environmental pollution are evaluated. By 2030, Seoul plans to transform 10,000 large structures into green buildings, as well as require new buildings to acquire green building certificates.

An Energy-Independent City Hall

Seoul will have a new City Hall in 2011. The 13-story structure with five underground levels will cover approximately 90,000 m². Most notably, the building will be 100% energy-independent. A total of 218 geothermal pipes extending over 200 meters will heat and cool the building, accounting for 78% of total energy use. Natural and solar light will be used through in Integrated Photovoltaic System (BIPV), which is a covering that directly converts the sun’s light and energy into useable heat and electricity. In addition, the new City Hall will collect and use rainwater. Overall, the new building is expected to reduce energy consumption by 55%, limit non-renewable energy use to 10.9%, and has already received pre-certified, first grade rating for eco-friendliness.

Green Design

In 2008, Seoul was selected as the World Design Capital 2010 (WDC) by the International Council of Societies of Industrial Design. The designation is to promote design to further social, economic and cultural development. Perhaps the most visible expression of Seoul’s new design aesthetic is the Dongdaemun Design Plaza and Park (DDP). Designed by the British Pritzker Prize-winning architect Zaha Hadid, a stunning “fluvial” effect mixes flowing water, rolling green spaces and curving walkways encourage visitors to enjoy nature, think and interact in a more natural and fluid way. Scheduled for completion in 2011, the DDP will be located in the heart of Seoul’s fashion district. The famous Dongdaemun Fashion Town contains over 25,000 shops and receives over 2 million foreign tourists annually. This October, Seoul will host the Seoul Design Fair, which looks at innovative and sustainable design solutions for the city.
Section Notes

2 Ibid.
3 Ibid.
4 Ibid.
Conclusion

Thanks to the forethought of city officials, Seoul’s residents and visitors, alike are experiencing the benefits of sustainable, green growth policies. Seoul city has made remarkable process in improving its air and water quality, as well as the attractiveness of its green spaces.

With domestic and international tourism quadrupling over the past three decades, tourism represents an important economic sector. As the city works to make Seoul an attractive international tourism destination, officials are employing innovative technology and creative problem solving to create a healthy environment for both nature and commerce. Finding this balance will be an important mission for the 21st century city.

As the projects highlighted in this report mature over the next several years, city officials hope to be able to work with other communities and agencies such as the United Nations World Tourism Organization (UNWTO) to apply successful programs to other communities.

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