Stream Restoration Project

Cheonggyecheon

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I. Introduction

- Seoul

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Seoul Map

- Capital city of Korea for over 600 years
- Area: 605 km²
- Population: 10.2 M

Key Map

- Hangang River
- Cheonggyecheon
- Jungrangcheon
- City hall

Introduction
Cheonggyecheon

- Catchment area: 61 km²
- Length: 13.7 km (covered: 6 km)
- Width: 20~85 m

Suseongdong Valley
II. The Restoration Project

- History
- Why restore?
- Outline
- Design of the stream
History

The Restoration Project

● In 1760, Choseon Dynasty
  • Dredging to prevent flood

● In the early 20th Century
  • Great open space for people

● In 1958~1978
  • Cheonggyecheon was covered

● In 1968~1976
  • Elevated highway was built to improve traffic flow
  • A symbol of successful industrialization
Why restore?

- **Revitalization of downtown area**
  - Stimulate urban redevelopment of neighborhood around the stream
  - Balanced regional development

- **Ecological strategy for sustainable city**
  - Reduce urban heat island effect and global warming
  - Improve the quality of life for citizens
Why restore?

**The Restoration Project**

- **Fundamental solution to safety problem**
  - Structures (covering and elevated highway) beyond repair
  - Deterioration accelerating severe pollution of stream

- **Recover the city’s 600 year-history and culture**
  - Rediscover Seoul’s historical roots and original look
  - Restore the cultural space for citizens
Project Outline

- Project started: July 2002.
- Construction started: July 2003.
- Total length: 5.84 km
- Budget: US $386 million
Design of the Stream

- **Design Criteria**
  - Flood control (rainfall capacity for 200 years frequency)
  - Improve sewage systems
  - Easy access to water (install sidewalks along the both sides)
  - 2-lane traffic flow in both sides of the stream
  - Restore the ecosystem, history and culture
Design of the Stream

- **Sewer system**
  - Separated sewer system
  - Capacity: 3 times of estimated wastewater
Landscape Design

- Concepts: Urban stream with nature
  - Change gradually from an urban image to a natural landscape
  - Plant wild plants along the stream
  - Restore a natural environment for insects, birds & fish
  - Use natural resources for an ecological stream (wood, rocks)
Ecological Design

Lower Level Planting

Urban type

Natural type
Ecological Design

Upper Level Planting

Inclined wall

Vertical wall
Ecological Design

Upper Level Planting

- Number of trees
  - River side: 734
  - Street side: 1,527

- Planting every 6 meter

Chinese Fringe tree  Zelkova
Ecological Design

Traces of the past highway

Willow marsh

Stone plate for clothes washing

Resting places
Downtown Development Plan

Guideline for the Cheonggyecheon Neighborhood
III. Challenges

- Transportation
- Merchants
- Historical relics
- Timeline requirement
Challenge 1: Transportation

- Road & highway
  - Urban backbone corridor
  - 170,000 vehicles/day

- Traffic disaster warned
  - Media, interest group
  - Traffic simulation
  - Project delay
  → prevent traffic disaster
Challenge 2: Neighboring merchants

- The most significant commercial area in Korea
  - Vital part of Seoul’s economy
  - Home to more than 200,000 merchants and 60,000 shops

- Worry about business decline caused by construction
  - Inaccessibility, traffic congestion, noise and dust
Challenge 3: Historical relics

- Seoul has over 600-year history
- Need to restore historical relics

Solution

• Preserve all heritage items excavated during the construction
Challenge 4: Timeline requirement

- Complete the restoration work within 2 years
  - Reduce inconvenience for merchants and citizens
- Divide into 3 sections to condense the construction schedule
  - Have 3 construction companies working simultaneously

![Map of sections](image)
IV. Restoration Process

- Highway Demolition
- Road & Bridge Construction
- Restoration of Ecology
- Restoration of History
- Public Arts
- Citizen Engagements
Restoration Process

- Demolition of the highway and covered road: 5.4 km
  - Waste (concrete + asphalt): 872,400 ton (96% recycled)

- Construction
  - New slope walls, sidewalks, 22 bridges
Restoration of Ecology
Restoration of History
Public Arts
Citizen Engagements

- With Citizens
  - Planting 63,000 trees
  - Making “Desired Walls” with 20,000 people
  - Inspections
Open to the Public

Awards

- 2004 Venice Architectural Binnale Award
- 2005 World Technology Award
- 2005 ITDP Sustainable Transport Award
- 2009 UN-Habitat Scroll of Honor Award
- 2009 ASLA Professional Award
- 2010 Veronica Rudge Green Prize
Popular Destination

- **Total visitors**: 231 million (by 2017)
- **Official foreign visitors**: 4 million

**Total Visitors**

- **Official Foreign Visitors (2011~2016)**
  - **China**, 2,418,000, 62%
  - **Thailand**, 469,000, 12%
  - **Japan**, 275,000, 7%
  - **USA**, 200,000, 5%
  - **Taiwan**, 136,000, 4%
  - **Others**, 372,000, 10%

**Visitors**

- 30,000,000
- 25,000,000
- 20,000,000
- 15,000,000
- 10,000,000
- 5,000,000
- 0

Question & Answer
Thank you!

http://www.sisul.or.kr/grobal/cheonggye/eng/WebContent/index.html

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III. Challenges & Solutions
Solutions to transportation

- Encourage citizens not to drive cars in the city center
  - By leaving cars at home one out of every 10 days

- Improve the traffic flow system
  - By designating many streets as one-way streets

- Improve the public transportation system
  - By establishing bus-only lanes
  - By operating downtown shuttle buses
Solutions to merchants

- Collect public opinion
  - Detailed survey on the markets
  - Meeting with Residents & Merchants (More than 4,200 meetings)

- Minimize inconveniences
  - Reduce dust and noise
  - Provide parking lots around the site
  - Operate free shuttle buses

- Stimulate business activities
  - Reduce parking fees
  - Promote CGC stores on TV, news papers, etc.
  - Procure supplies for SMG and local district governments
  - Financial support and subsidies
Solutions to merchants

- Create a special business section on the outskirts
  - Located at the southern part of Seoul
  - 120 acre
  - House wholesales, retail shops, support facilities, etc.

- Special arrangement for street vendors
  - Move to an idle Stadium
V. Impact of the Project

- Impact on traffic
- Environmental improvement
- Flood control
- Ecosystem improvement
- Improve the quality of life
- Popular destination
- Economical regeneration
Impact on Traffic

- Vehicles entering downtown
  - 1.56 million \(\Rightarrow\) 1.27 million (-18.6%)

- People using public transportation
  - Bus: +11%
  - Subway: +13.7%
Environmental Improvement

● Air quality
  ▪ No$_2$: 69.7 $\Rightarrow$ 46.0 ppb (-34%)
  ▪ PM10: 74.0 $\Rightarrow$ 60.0 µg/m$^3$ (-19%)

● Water quality
  ▪ BOD: 100~250 $\Rightarrow$ 1~2 ppm

● Noise level reduced

● Wind corridor created

● Cooling effect
Cooling Effect

Thermal image
27 July 2005

Average 36.3°C
Nearby street

Average 32.7°C
Cheonggyecheon

-3.6°C
Flood Control

- After the heavy rain (Sep. 21. 2010)
  - The heaviest rain during 102 years
  - 259.5mm/day
  - Stream capacity was enough
Ecosystem Improvement

• **Species (2003 ⇔ 2013)**
  - Plants : 62 ⇔ 280
  - Fishes : 4 ⇔ 13
  - Birds : 6 ⇔ 19
  - Aquatic invertebrate : 5 ⇔ 18
  - Insects : 15 ⇔ 83
Improve the Quality of Life

- Cultural Event: 32,177
  - Public events: 1,202
  - Artists events: 30,975
Economical Regeneration

- Improved economic vitality
- Increased real estate values by 30-50%
- Stimulated redevelopment of neighborhood
- Increased number of businesses by 3.5%
VI. Reasons for Success
Reasons for Success

- Conflict resolution
- Strong leadership
- Cooperation from citizens
Reasons for Success

Citizens’ Committee
- Principles
- Collect public opinion
- Public relations

C.R.P. Headquarters
- Planning
- Implementation
- Cooperation with interest groups

Successful Restoration

Research Center
- Site investigation
- Feasibility study
- Monitoring
Design of the Stream

- **Water supply system**
  - Water supply: 142,000 ton/day
  - Water from Hangang river: 120,000, Underground water: 22,000
  - Depth: more than 40 cm
  - Flow velocity: 0.24 m/sec
  - Water-pipe: 17.36km (ø 900~1800mm)

Water supply: 78,700t
14,000t
10,800t
3,500t
13,000t

Hangang river

Pumping station
Intake station