Central–Local government cooperation project for Improving Sewerage System To Prevent Urban Flood in Korea

2013. 3.
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Rainfall pattern and flood risk factors in Korea

- Yearly Ave. Rainfall: 1,650mm (800~1,800mm)
- Ave. Rainfall per Capita: 2,591m³ (13% of World Ave.)
- High Population Density: 489 persons/km² (3rd in World)
- Unequal seasonal rainfall distribution: Summer
  - 70% of rainfall concentrates on June to September

Forecasting constant rainfall increase by 2100 (20% compare to 2010)
1. Rainfall pattern and flood risk factors in Korea

- **73% of flood are caused by drainage constraint**

- **The flooding causes a great economic loss (566 million USD in 1990s, 1,916 million USD in 2000s)**

- **Increased surface run off**

- **Large impermeable area**

**Pie Chart:**
- River flood 27%
- Drainage constraint 73%
- Others 13%
- Low lying area 2%

**Graphs:**
- Economic loss (hundred million KRW)
- Runoff during rainy season (m³/d)
- Immerable area (site) and (road)

**Notes:**
- Increased surface run off due to large impermeable area.
- 2,488,000 m³/d during rainy season.
- Economic loss due to flooding: 566 million USD in 1990s, 1,916 million USD in 2000s.
I. Rainfall pattern and flood risk factors in Korea
II. Amendment Sewerage Act

- Flood response sewerage advance TFT (‘11.10.12)
- Seminar on sewerage improvement (‘11.10.26)
- Briefing session, disaster and safety countermeasure corresponding to climate change (‘11.12.9)
- Amendment of sewerage act (‘12.2.1)

Sewerage Act

1. **Sewerage Act 4-3**
   - Designation of priority management region

2. **Sewerage Act enforcement regulations 1-3**
   - Procedure and Criteria for determining priority management region

3. **Sewerage Act enforcement regulations 1-4**
   - Establishment of countermeasure
III. Designation of priority management region

**Work flow**

- **Designation by MOE**: Ministry of Environment shall designate priority management region if there had been inundated or have risk of inundation.
- **The head of local government**: Ministry of Environment shall designate priority management region at the request of the head of local government.
- **Establishment of countermeasure**: The head of local government establish countermeasure after designation.
- **Financial support**: The Ministry of Environment shall provide financial support for necessary.
- **Termination of designation**: The Ministry of Environment shall terminate designation of priority management region when necessary.
III. Designation of priority management region

Work flow

Designation

- Application for the designation
- Review
- Designation announcement

Ministry of Environment

Establishment of countermeasure

- Establishment
- Review
- Financial support

- Implementation

Local government

Schedule

- September: Application announcement (Ministry of Environment)
- October: Applying for priority management region (Local government)
- November: Review application (Ministry of Environment)
- December: Designation announcement (Ministry of Environment)
III. Designation of priority management region

Procedure and Criteria for determination

Application

Drainage basin(region)

The head of local government shall apply for designation in every October

Proposed region

- Regions which had been inundated or have risk of inundation due to the sewage flooding.
- Regions which have probability of inundation due to the poor condition sewer system
- Regions which have probability of degradation of public water bodies due to the sewage flooding
### Required documents

1. Geographical information (location, area range, etc.)
2. Current state of sewerage system
3. Reasons for applying for priority management region
4. Extent of damage from heavy rain and flood
5. Water quality of public water bodies and drinking water resource
6. Further plans for sewerage management.
7. The necessary budget for establishment of countermeasure
The head of local government should establish countermeasure after announcement of designation (within a year)

Requirements

1. Goal and Commitment period of project, Plans for expansion of sewerage and maintenance.
2. Extent of damage from heavy rain and inundation, Current state of sewerage system and problems being faced
3. Connections to other plans
4. Annual investment and financing plan
5. Announced additional requirements by the ministry of environment
V. Pilot project from 2012

- Public hearing; sewerage improvement plan to prevent urban flood (‘12.1.17)
  - 308 participants from local government and related industry
- Demand survey for pilot project (‘12.1.20)
  - 37 cities applied for pilot project as participants
- Designate 6 pilot project region (‘12.2.24)
- Signed MOU with 6 cities (MOE↔6 local governments, ‘12.3.26)
- Signed consignment contract (KECO↔6 local governments, ‘12.3.30)
- Implement of Feasibility study and basic plan (‘12.5.30 ~ 10.26)
- Design development & Detail design (‘13.1.2 ~ )
### V. Pilot project from 2012

#### Summary of project

- **Project:** Sewerage improvement project to prevent urban flooding
- **Period:** ’12.04 ~ ’15.12 (4 years)
- **Expense:** 223 million USD (Government subsidies: 156 million USD)

#### Project summary & expense

(단위: million USD)

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<th>Project summary</th>
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<td>Area 1</td>
<td>6.5Km sewer construction, one Pump station (1,200㎥/min)</td>
<td>42</td>
<td>29</td>
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</tbody>
</table>
| Area 2           | 5.1Km sewer construction, one Pump station (232㎥/min)  
                  | Sewer tunnel construction (D=3.8m, L=1,300m) | 45    | 32   |
| Area 3           | 33.2Km sewer construction 2,068 drain-appliances repair  
                  | Pump station Expansion (260㎥/min) | 44    | 31   |
| Area 4           | 6.7Km sewer construction  
                  | Two construction of storage tank (V=18,000㎥, 3,000㎥) | 35    | 24   |
| Area 5           | 9.1Km sewer construction  
                  | Two construction of storage tank (V=6,000㎥, 2,000㎥)  
                  | Two pump station (328㎥/min, 64㎥/min) | 11    | 8    |
| Area 6           | 17.3Km sewer construction  
                  | Two pump station (1,200㎥/min, 140㎥/min) | 45    | 32   |
Challenges

1. Local government deficit financing
   - Local government with lower financing independence rate could be unaffordable 30% of share in expenses

2. Limited benefit for priority management zone

3. Uncertainties (Estimation flood probabilities for extreme event)
   - Lack of data (precipitation, land use, sewerage system)
   - Reliance on history as a guide to future level of risk

4. Risk assessment and Decision making
   - Decision making under risk
     (Traditional tool, Incorrect information)
   - Decision focused on reducing risk from single hazard
V. Pilot project from 2012

Expected Effects

1. To reduce and manage the risk that flood pose human health and cultural heritage
2. Improvement of living environment
3. Regional economic vitalization
4. Guideline for coordination between central and local government to reduce flood risk
5. To draw up flood risk map and establish flood management plans focused on prevention
6. Application of practical countermeasure
   - shift from a backward-looking paradigm to one based upon forecasting current and future level of risk
Thank you