Smart Safety City in Seoul
- Flood Disaster Management

2019. 10. 29

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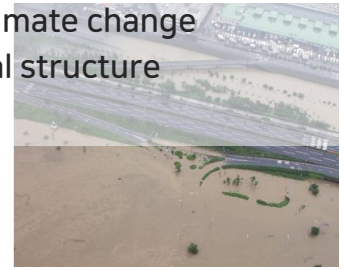
Characteristics Of Recent Urban Disaster Occurrence

The Diversification, Formation, And Complexity Of Disaster Types

- ✓ Large scale natural disaster increase due to abnormal climate and climate change
- ✓ Risk of large-scale disasters due to changes in building and industrial structure
- ✓ Extend the Threat of Terrorism

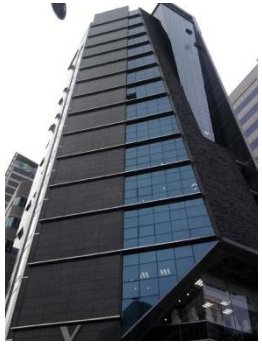


The Emergence Of Cutting-edge Urban Types, Such As Smart-city

- ✓ System-based lack of safety design from urban planning stage
- ✓ Communication paralysis and Personal information infringement

Increase In Living Risk

- ✓ Poor implementation of disaster management system for routine accidents and new risk factors.
- ✓ Combined disaster resulting from crime, fire, and collapse



Smart Safety City

Smart Technologies Are Applied To Safety Areas To Enhance Urban Safety Functions And Provide Safety Services

The Change of Smart Safety City

Improving the Limits of the Existing Safety Management System through Smart Technology

Service

A lack of feeling among citizens
Unilateral provision of information in the direction of the government

- ✓ The Direct Benefits Of Citizens
- ✓ Citizens And Interactive Information Services
- ✓ Reflection Of Citizen's Needs

Business

Dispersed situation management according to disaster
Response-oriented disaster management

- ✓ Integrated Linkage Of Disaster Management
- ✓ Preventive-centered Disaster Management

System

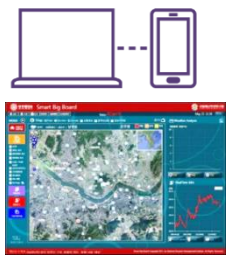
Limited monitoring and forecasting
Restricted data
Disconnected information system

- ✓ Iot-based Monitoring
- ✓ Real-time Information Gathering
- ✓ Prediction With Big Data Analytics
- ✓ Interconnection Of The Information System

Citizen Participation And Preventive Disaster Management

Disaster Management System Utilizing Smart Technology

Build And Analyze Real-time Data With Technologies Based On The Fourth Industrial Revolution → Prevent Disasters And Respond Quickly

Prediction	Prevention	Handling	Response	Restoration
Scattered, Limited Information Difficult To Share	Insufficient Real-time Information Gathering	Senario Based Disaster Training	Difficulty In Decision-making From Lot Of Communication.	Casualty Of Field Personnel
Big Data, Drone/Robot, IoT	Drone/Robot, IoT	Big Data, VR	AI, Drone/Robot	AI, Drone/Robot
				
Icbm-based Gathering And Analyzing Information	Ict-based Real-time Disaster Detection	Demonstrated Disaster Virtual Training	Real-time Decision Making	Structure/Recovery Using Intelligent Robots And Drones

A Case Study on the Application of Smart Safety City in Seoul

Expanding the scope of application of new technologies such as IoT and Beacon from individuals to cities

Bukchon IoT Service (2016)

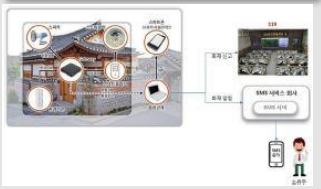
Secure School Notification Service

Smart Disaster Prevention House

Smart Fire Protection Service

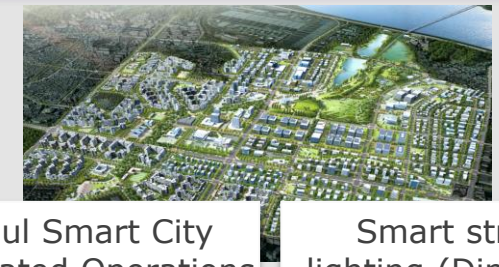
Social safety service of single-body seniority

IoT Fire Monitoring and 119 Automatic Reporting

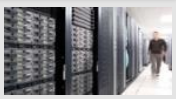


*출처 : 북촌 사물인터넷 브로슈어

Smart City in Magok District (2018)



Seoul Smart City Integrated Operations Center



Smart street lighting (Dimming)

single elderly care service

Underground sinkhole monitoring service

Data-Based Intelligent Urban Management

3D Urban Operations Management Model

Citizen Participation Hub

*출처 : 마곡지구 U-City 구축현황 및 스마트시티 전환방안(2018.05) 발표자료

The Case of the Seoul Metropolitan Area

1. Dobong-gu
- ✓ CCTV Security Emergency Bell

2. Nowon-gu
- ✓ Smart Nowon Apps

3. Eunpyeong-gu
- ✓ Operation Of Connection Between Drone And CCTV Control Center
- ✓ Disaster Prediction And Warning System Using Big Data
- ✓ Children's Location Alarm Using Iot Bluetooth Beacon

4. Mapo-gu, Seocho-gu
- ✓ Smart City Integration Platform

5. Seodaemun-gu
- ✓ Smart Security Light
- ✓ Report Of Emergency Situation In Public Restrooms

6. Seongdong-gu
- ✓ Underground Space Safety Management System Using Sensors And Iot
- ✓ 'Smart Safety Rest Area' For Integrated Management Of Location Information Of Safety Facilities

7. Yangcheon-gu
- ✓ Disaster Prediction Using Iot
- ✓ Accurate Disaster Prediction Through The Installation Of Self-gnss RTK

8. Geumcheon-gu
- ✓ 3D Virtual Reality Simulation Training For Disaster Response
- ✓ Safety Management Using Iot In Market

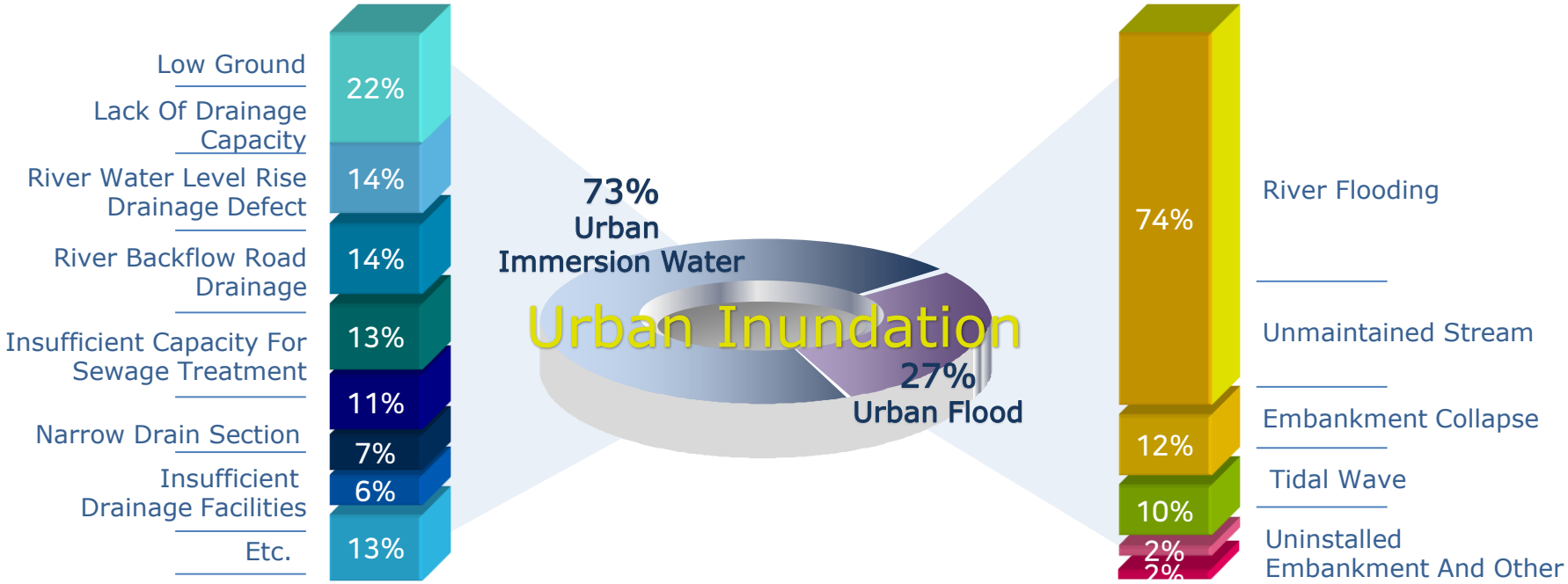
9. Gwanak-gu
- ✓ Security Map Based On CCTV

Providing services suitable for regional characteristics

Efficient connection is required for the establishment of individual systems

Flood Damage in Urban Area

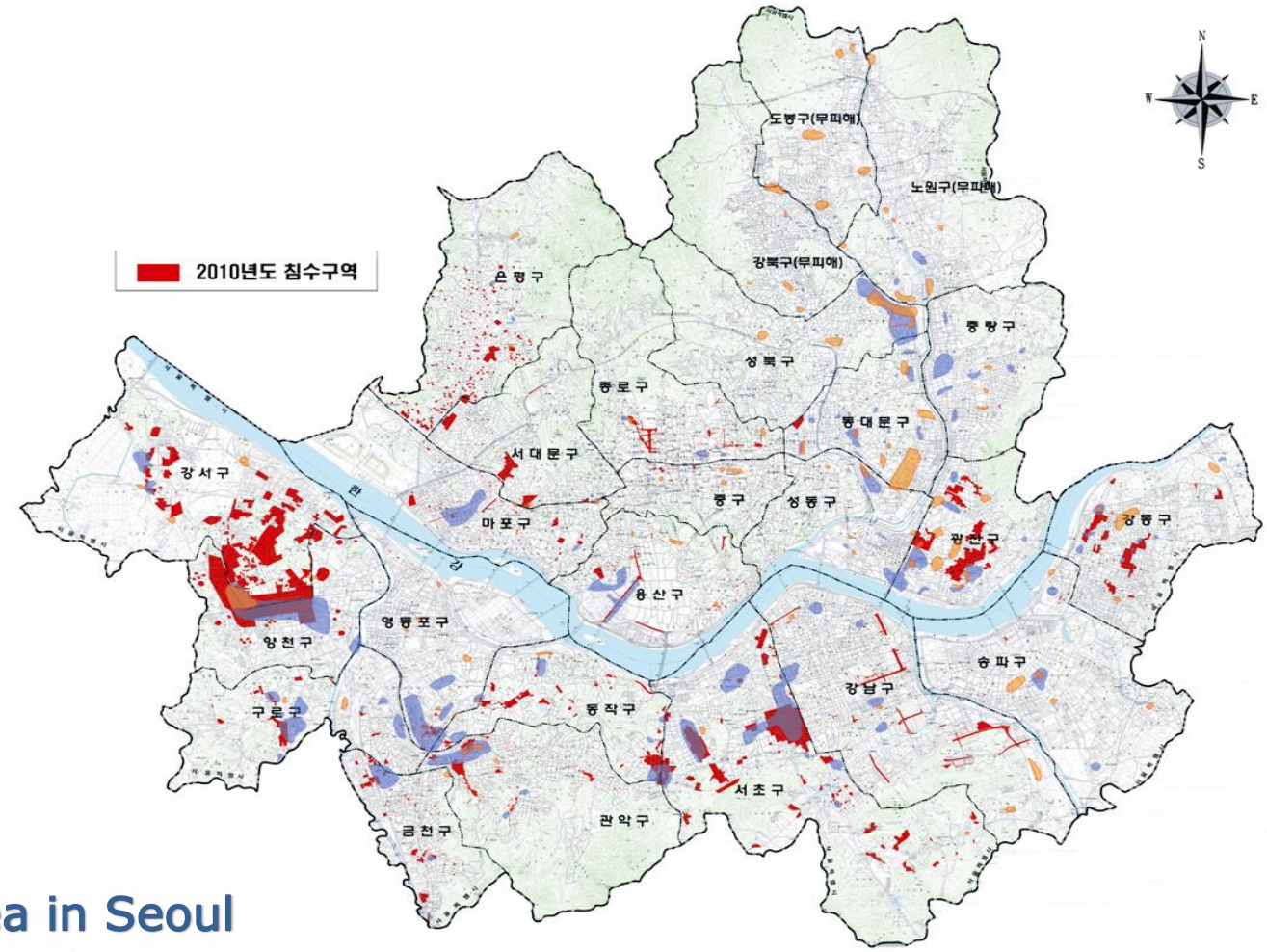
- ✓ **Urban flooding is more damaging to water by urban Immersion water(73%) than by flooding (27%)**
- ✓ **Climate change causes sudden flooding to become more frequent and large, limiting existing measures**
- ✓ **Therefore, it is urgent to establish new measures to deal with Immersion water management in urban areas where population and infrastructure are concentrated**



참고 : 심재현·김영복.2006."전국 상습수해지구 현황과 대책".방재연구 제8권 제1호. 국립방재연구소

Main Flood Area in Seoul

1) Characteristics and Status of Water Damage

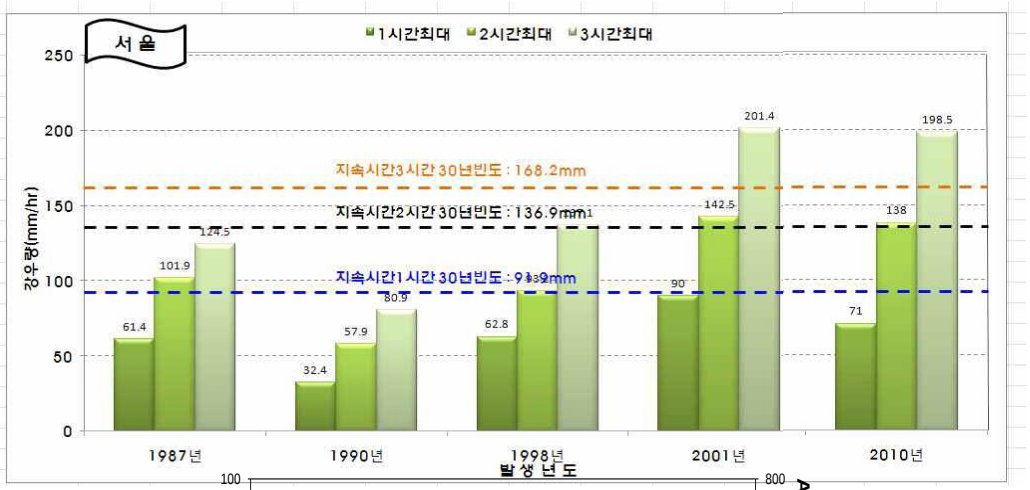


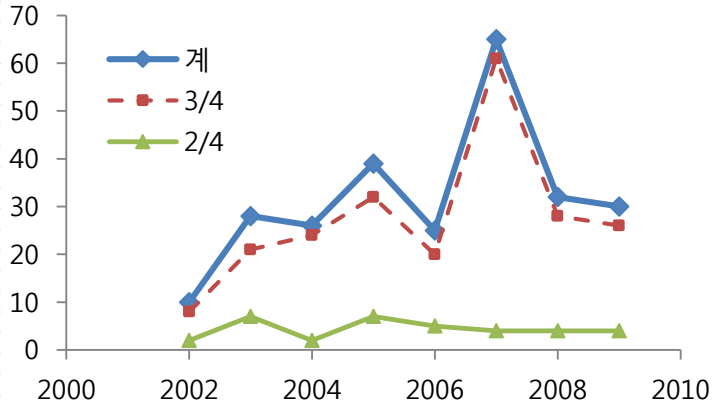
Main flooded area in Seoul

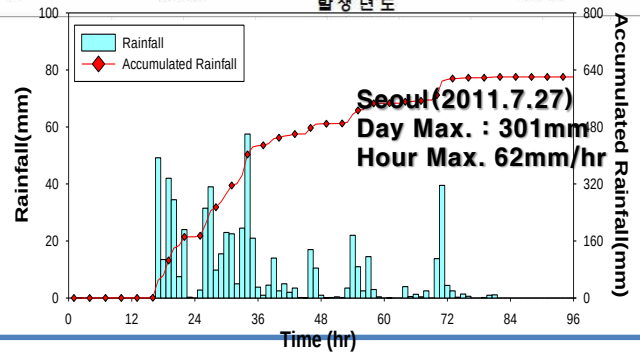
출처) 9.21 기습폭우 침수피해 자체점검 및 수해방지종합대책보고서(2011.2)

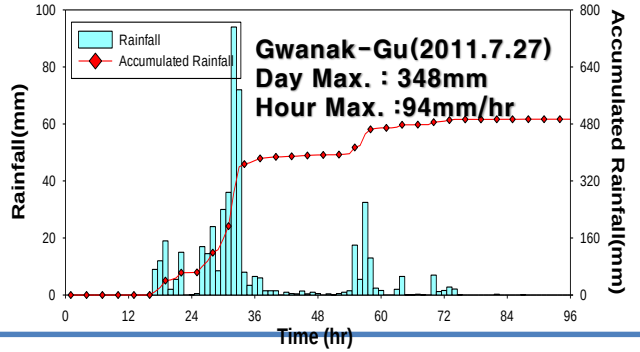
Status of precipitation in Seoul

- Frequent frequency, large scale
  - Increased torrential rain in excess of design capacity
- The maximum 1 hour precipitation in Seoul was 146.9mm on July 3, 1937.
- Major inundation damage recorded 62.8mm in 1998, 90.0mm in 2011 and 75mm in 2010.





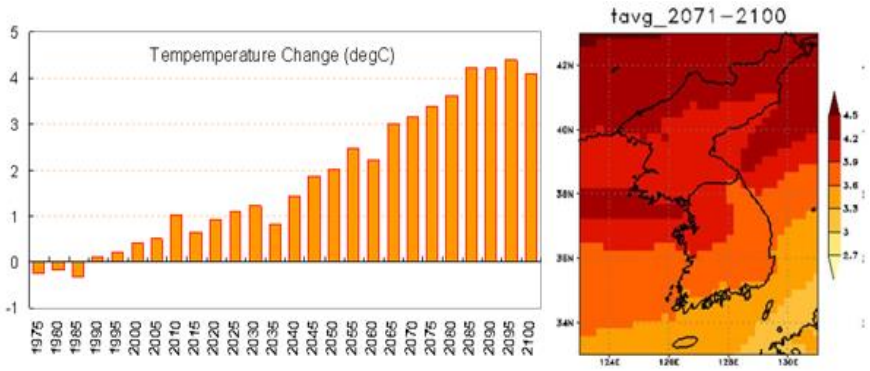


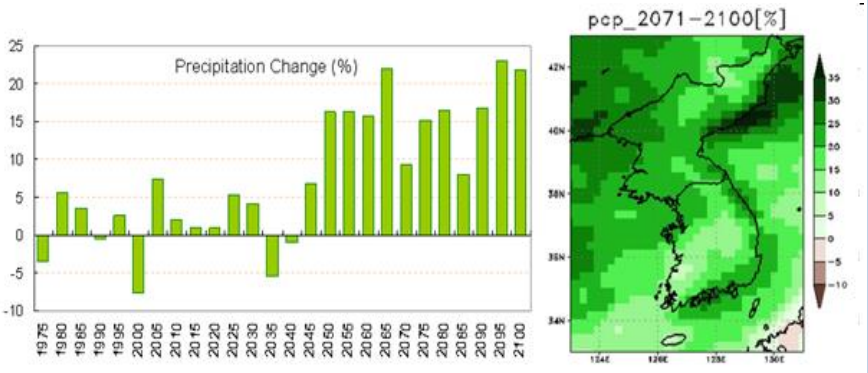


Analysis of Rainfall by Climate Change

The Change of Rainfall Rate in Seoul by Climate Change

- Temperatures on the Korean Peninsula will rise by about 4°C and precipitation will rise by 17% at the end of the 21st century.





❖ Prediction of Future Changes in the Climate Change Scenarios of the Han River Rainfall in Seoul
- Rainfall by current frequency is expected to increase by up to 15% in 2100

Method	A frequency of 80 years				A frequency of 100 years				A frequency of 200 years			
	Probability rainfall observation(mm)	Increase rate(%)			Probability rainfall observation(mm)	Increase rate(%)			Probability rainfall observation(mm)	Increase rate(%)		
		2011-2040	2041-2070	2071-2100		2011-2040	2041-2070	2071-2100		2011-2040	2041-2070	2071-2100
Analysis	**351.0**	**5.4**	**10.5**	**15.0**	**362.7**	**5.5**	**10.6**	**15.0**	**398.7**	**5.9**	**10.8**	**15.3**

Flood Accident Cases in Seoul

	Damage Photograph	Damage Status
Flood Damage	  Seoul (2010. 9. 21)	✓ Housing Immersion: 11,744 , Road Immersion: 36 locations ✓ Subway Control Section: 7 locations in total ✓ Rainfall: 241.3 mm/day ✓ Time maximum rainfall: 98.5 mm/hr (Gangseo-gu)
	    Landslide in Mountain Umyeon Seoul-Gyeonggi (2011.7.26-28)	✓ July 26th to July 28th, 2011. ✓ Accumulated precipitation 546mm in Seoul, ✓ The maximum amount of rain is 99.5 mm (26 p.m. on July 27) in Gwangju, Gyeonggi Province, and 94 mm in Gwanak, Seoul (27 p.m., 08 p.m.) ✓ 53 deaths, power loss 129,872, four housing failures, and 9,957 houses immersion.

❶ The Basic Direction of Seoul

Extensive Disaster Prevention for Adaptation to Climate Change

✓ **Goal**

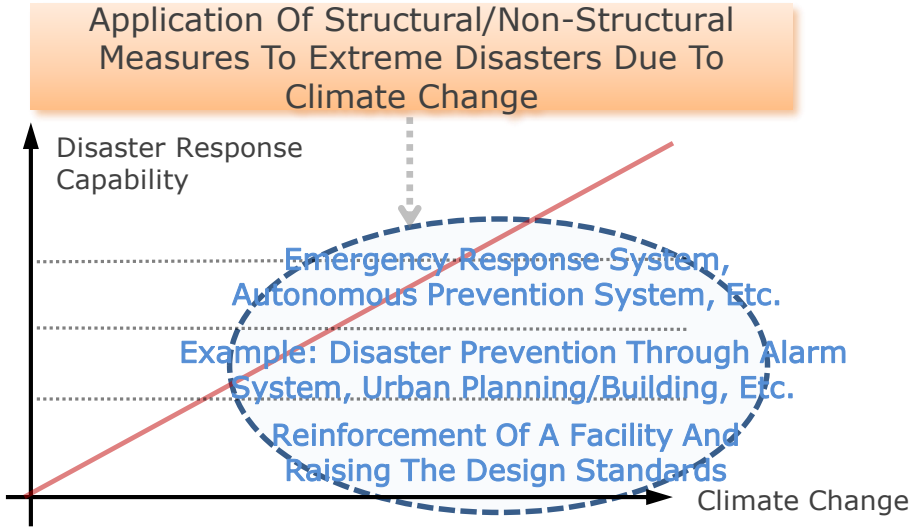
- Establish a multi-tier disaster prevention posture to achieve 'zero' damage

✓ **Approach method**

- Existing facility-centered measures are limited to prevent extreme weather disasters.
- Therefore, structural and non-structural measures are applied comprehensively to prevent and minimize disasters.

→ **Integrated disaster management system is required for integrated application of structural/non-structural measures**

The Present	**Structural Measures** • Sewage, Stream, Pump Station, Low-flow Facilities, Etc.
The Future	**Structural Measures + Non-structural Measures** • Sewage, Stream, Pump Station, Low-flow Facilities, Etc. • Example: Alarm System, Land Use, Building, Disaster Guidance, Flood Insurance, Etc.



❷ Policy Direction and Challenges

Extensive Disaster Prevention for Adaptation to Climate Change

1) Development of Urban Space Based on Risk Assessment

✓ Policy Direction

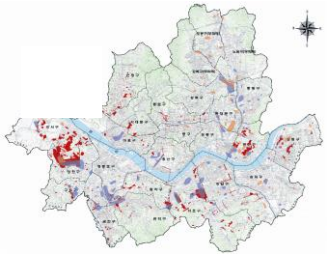
- The hazard area is analyzed/assessed in advance for maintenance/development projects and individual development activities (architecture, change of shape, etc.) and reflected in the plan.

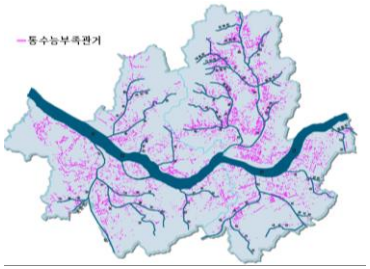
- Reinforce the regular and systematic investigation system on disaster performance, probability of disaster, vulnerability, etc. and deploy the investigated information in the form of a map to disseminate/utilize the information.

✓ Major Policy

- Development of Risk Assessment Method
- DB establishment and mapping, including disaster performance, anticipated risk, and Vulnerabilities, such as inundation and landslide
- Institutionalization of Risk-Based Development Management System

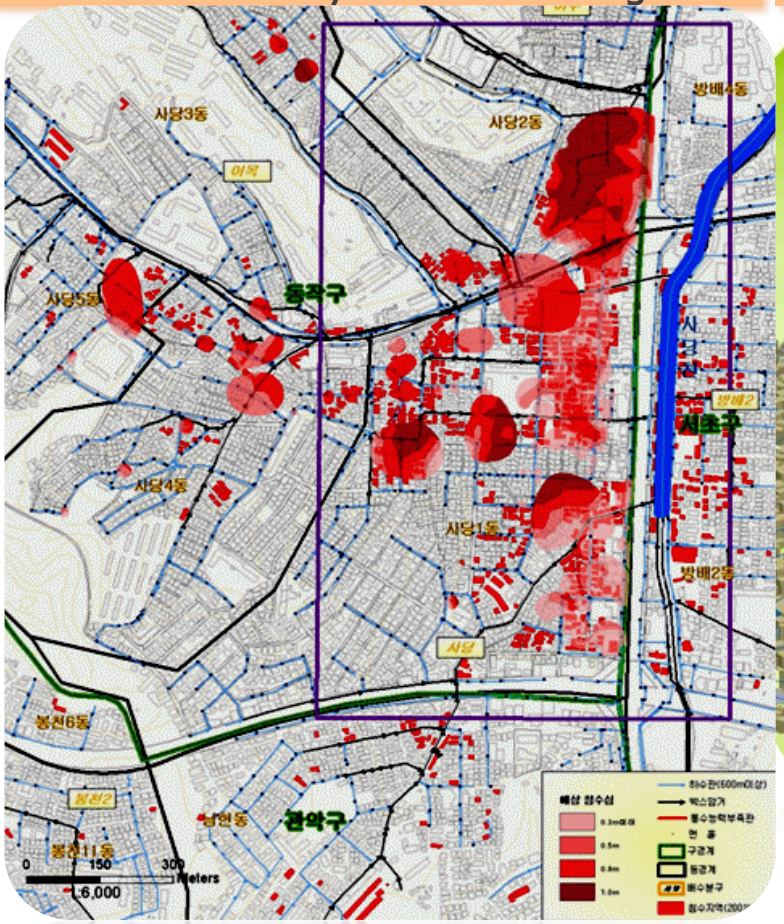
Basic survey → **Disaster Risk Assessment (severity, cause, etc.)** → **Planning and Development of Urban Space (Developed location/land use, buildings, facilities, etc.)**



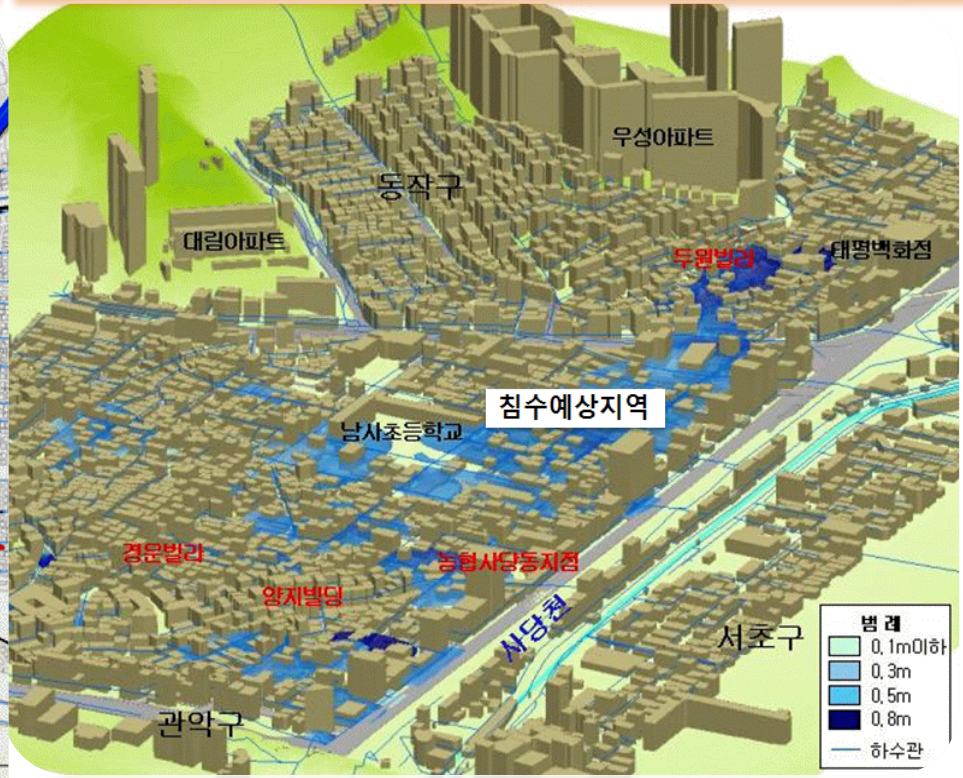


A Basic Plan for Integrated Database for Disaster Management in Seoul

Flood Damage Chart And Actual Rainfall (126mm/Hr, 2001) Prediction by Flood modeling



3-dimensional Water Drainage Prediction Diagram With 145mm/Hr Rainfall



❷ Policy Direction and Challenges

Extensive Disaster Prevention for Adaptation to Climate Change

2) Differentiation and Strengthening of Anti-Disaster Facility Standards

✓ Policy direction

- Stricter than the usual design standards for areas with frequent or anticipated disasters such as habitual flooding and landslides

- Increasing design standards for disaster prevention facilities considering future climate change scenarios

✓ Major policy

- Establishing design standards for application of regional differences in disaster prevention standards based on risk levels

- Establishing upward standards such as anti-disaster facilities based on climate change scenarios

* Upgrading to 30 years frequency for new sewer lines and implementing the National Emergency Management Agency's Disaster Prevention Performance Standards (2010.12)

The Present	✓ Uniform Design Basis ✓ Insufficient Future Climate Change And Climate Change Considerations
The Future	✓ Different Design Standards According To Regional Hazards And Characteristics ✓ Strengthening Design Criteria For Future Climate Change And Climate Change

❷ Policy Direction and Challenges

2. Extensive Disaster Prevention for Adaptation to Climate Change

3) Monitoring and upgrading the forecast alarm system

✓ Policy direction

-Establish a real-time alert system so that citizens and disaster management departments can receive weather and disaster-related information and refer to the action plan.

-Establish a system to accurately monitor, measure and predict weather, rain, water level, ground motion, etc. in real time, to suit the actual conditions of Seoul

-Strengthening the alarm system in disaster-prone areas

✓ Major policy

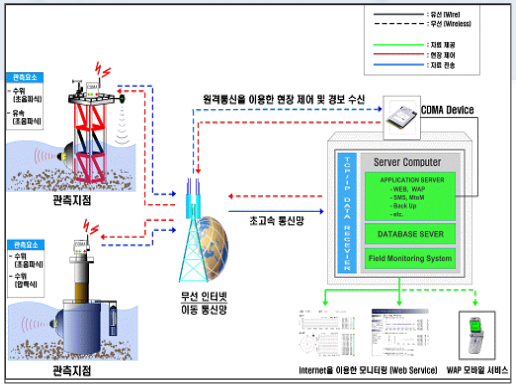
-Establishing a real-time automatic measurement and flood warning system such as small and medium-sized streams and open water streams

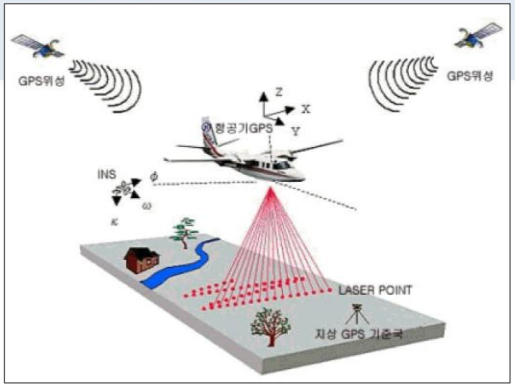
-Establishing a monitoring and warning system for ground movement, landslide risk, etc. in the area of slope weakness

-Establishing a soil forecasting and management system

-Introduction of weather forecasting/forecasting system in Seoul through introduction of rain radar

-Automated waterlogging prediction system





❷ Policy Direction and Challenges

2. Extensive Disaster Prevention for Adaptation to Climate Change

4) Prevention of Accident through Land Use and Buildings

✓ Policy direction

- Create urban spaces that are "no harm in the event of disaster" by assigning them to urban structures, land use, infrastructure, and individual buildings in consideration of their risk and vulnerability.

- In case of habitually flooded areas such as low-lying and semi-underground houses, landslide hazard areas such as steep slopes, the risk areas are gradually mitigated through maintenance and support, and strictly managed against development activities such as building new buildings (e.g. ground elevation, Piloti, separation, reinforcement methods, etc.)

- To improve prevention of disasters by interconnection of urban development/repair projects

✓ Major policy

- Prepare flood control guidelines for underground spaces, etc. and prepare management/support measures for waterlogging.
- Prepare a system for designation of disaster prevention zones and linkage with maintenance projects
- Prepare a disaster response system to cope with extreme weather events, such as extreme rainfall.
- Establishing the Urban Planning Standards for Adaptation to Climate Change
- Introduction of Low Impact Development