

SH-ADB

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Ministry of Environment



## Flood Forecasting System

Man-Shin, HAN  
Han River Flood Control Office

# Contents

- Flood Damage in Korea
- Hydrologic Characteristics in Korea
- Flood Control Office
- Integrated Water Management
- Flood Forecasting and Issuing
- Flood Information Service System
- Methods of Flood Information service



# Flood Damage in Korea

Flooding of Yeongduk county of Kyeongbuk province by typhoon Sarah(1959)



Demolition of bridge and levee by Typhoon Thelma (1984, Chungbuk)



Inundation by heavy rain (1996, Gyunggi Paju)



Damage by Typhoon Maemi (2003)

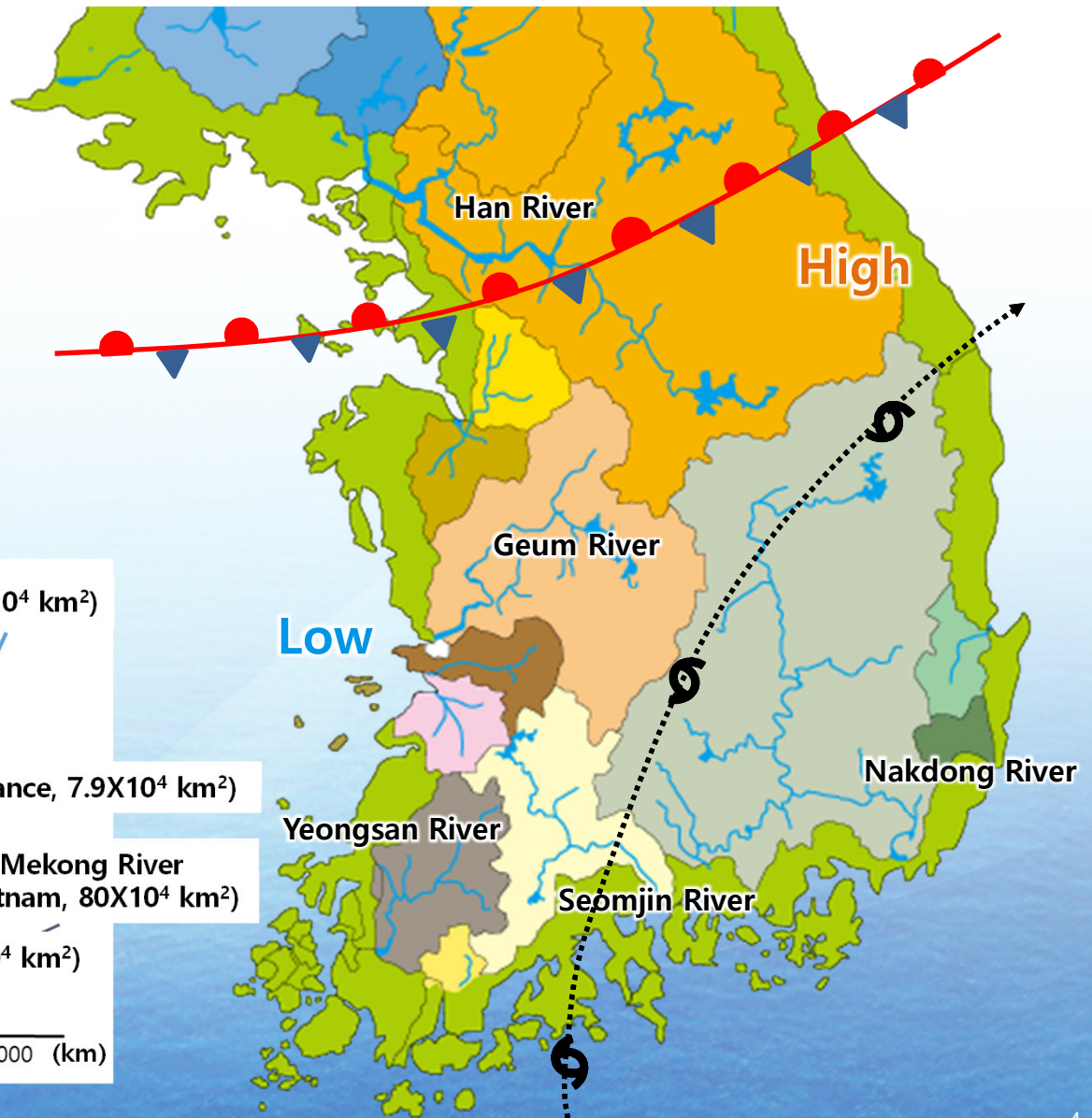
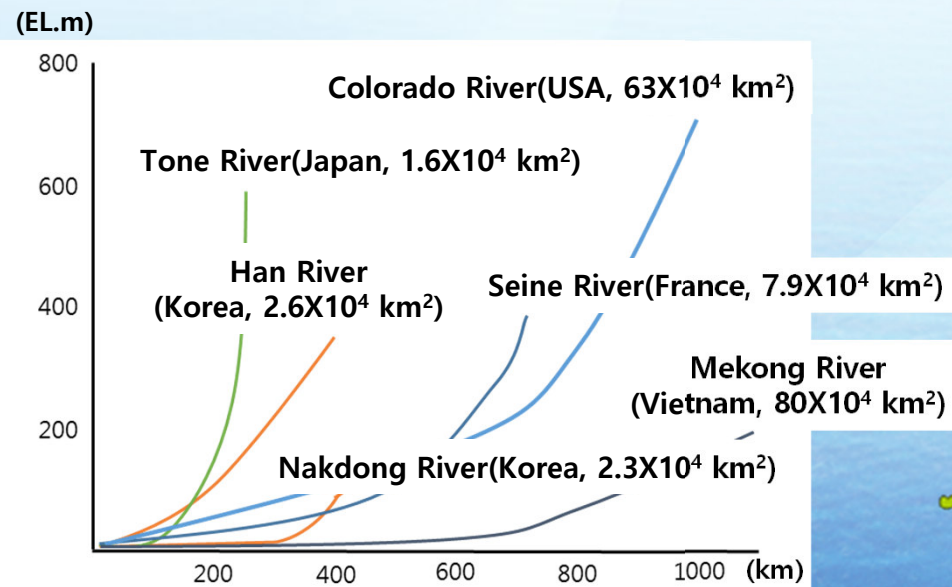
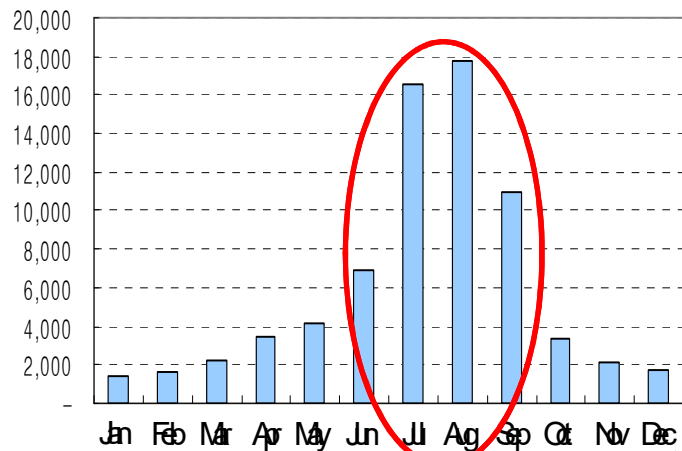


# Flood Damage in Korea





# Hydrologic Characteristics in Korea





# Flood Control Office

Total Basin Area 99,827 km<sup>2</sup>



Han River FCO  
Since 1974



Nakdong River FCO  
Since 1987



Geum River FCO  
Since 1990



Seomjin River FCO  
Since 1990  
(Integrated into  
The Yeongsan River  
FCO in 2005)

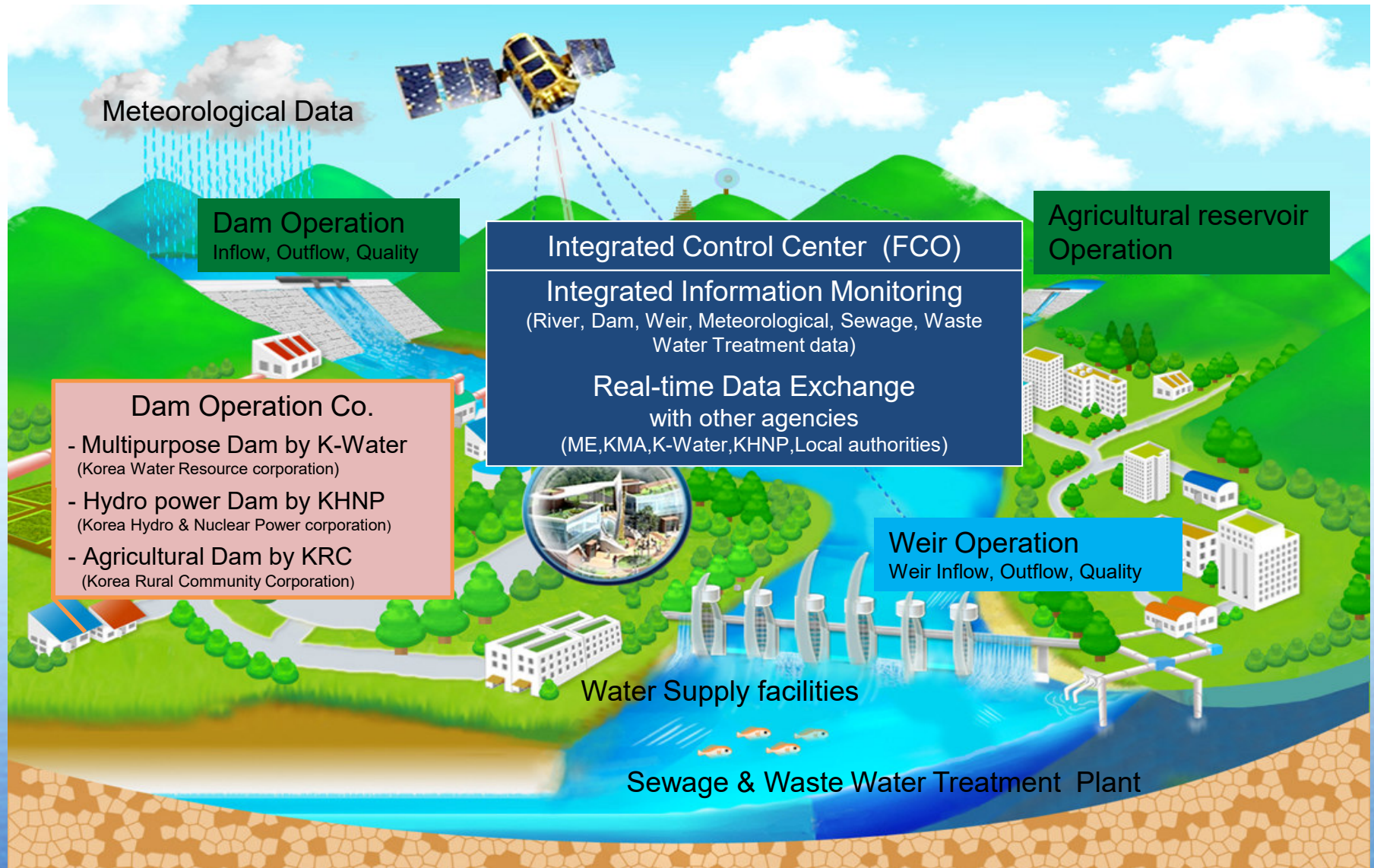


Yeongsan River FCO  
Since 1991



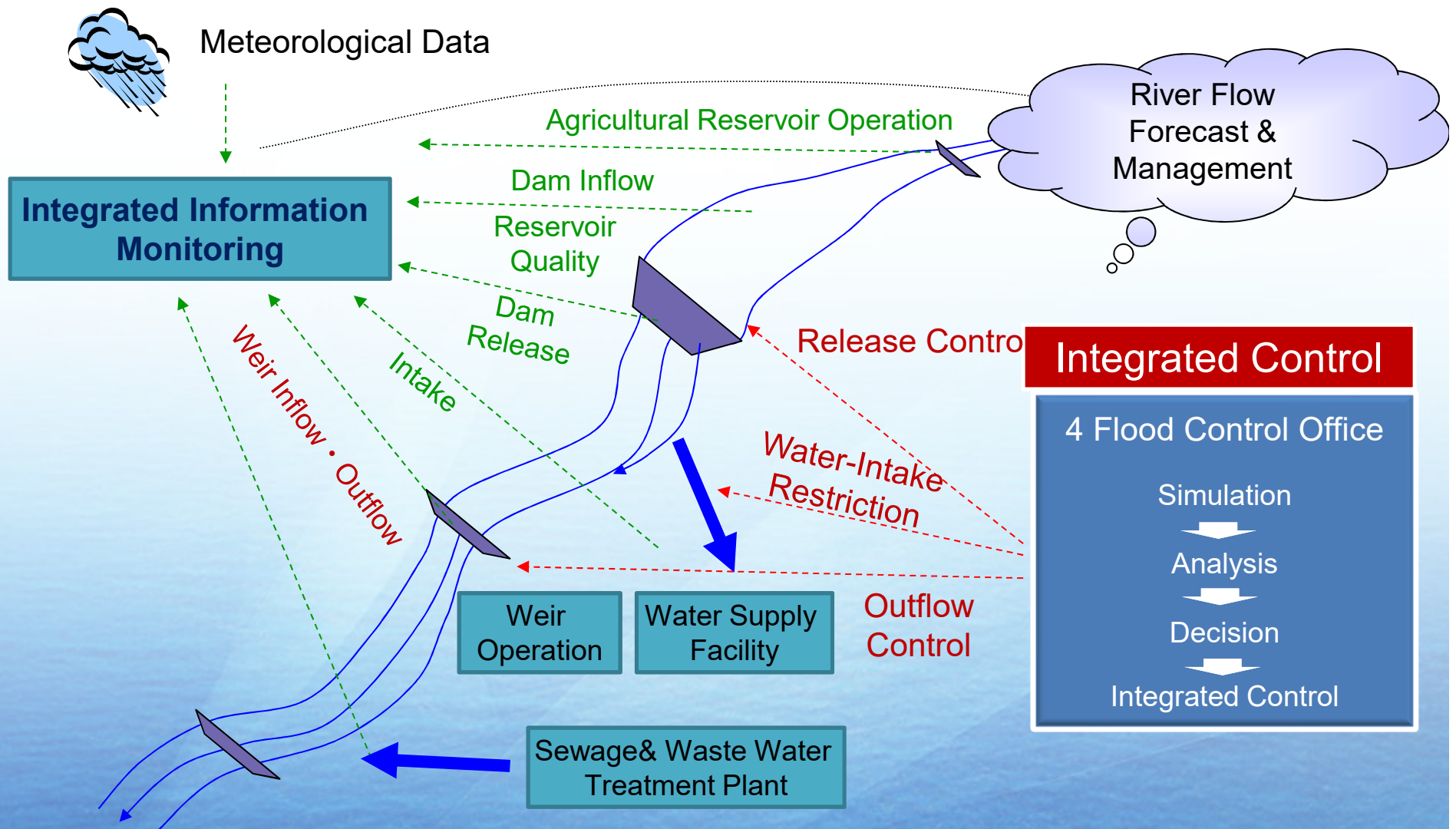


# Integrated Water Management





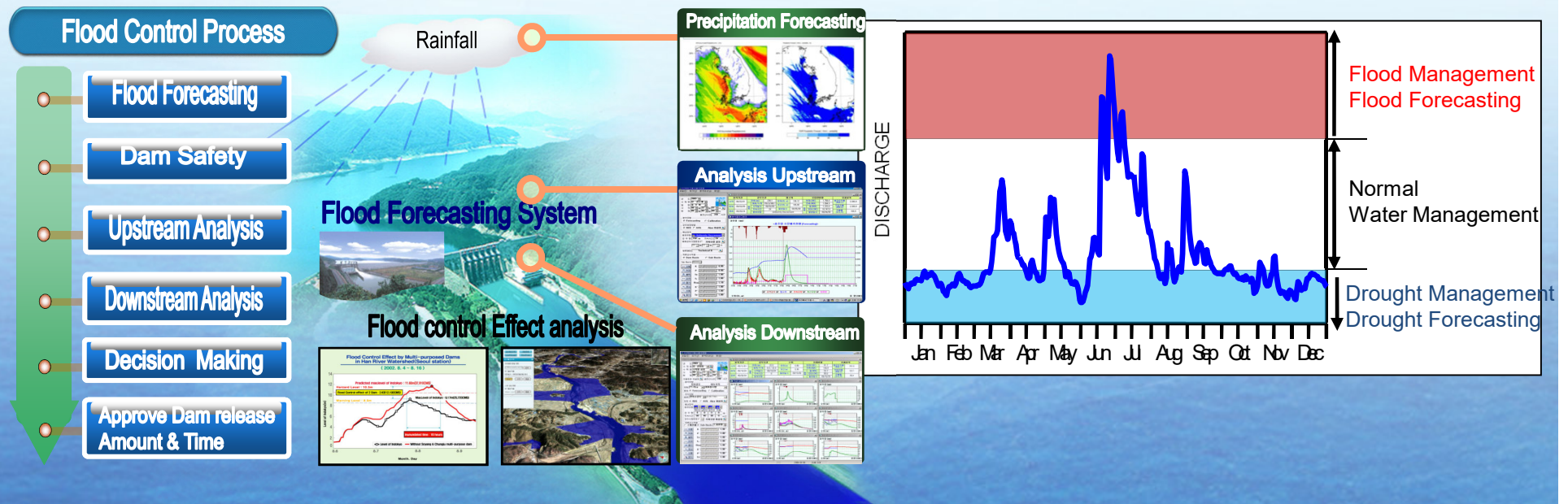
# Integrated Water Management





# Integrated Water Management

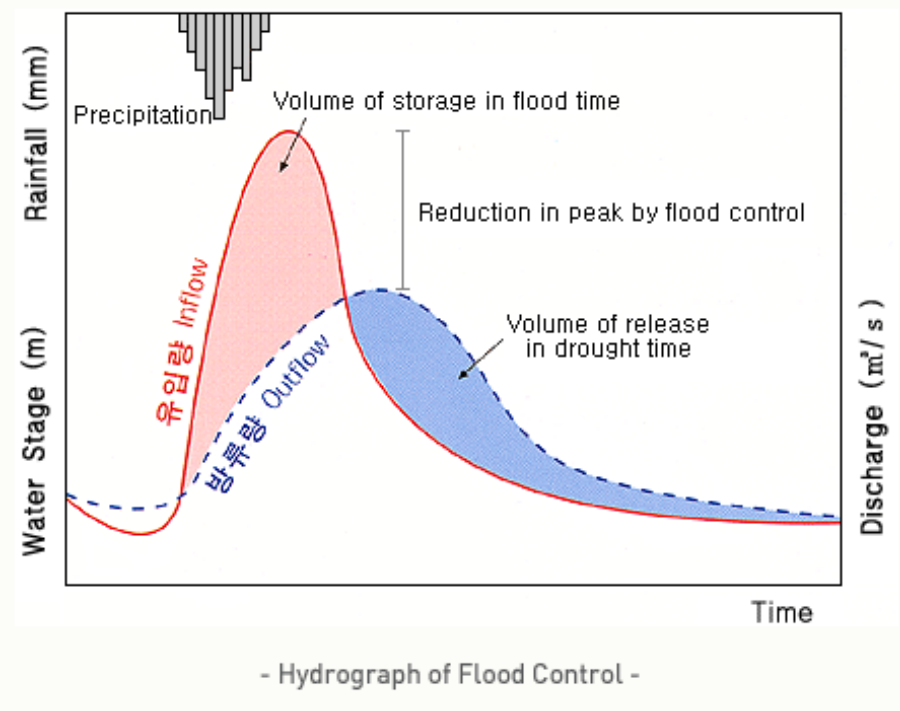
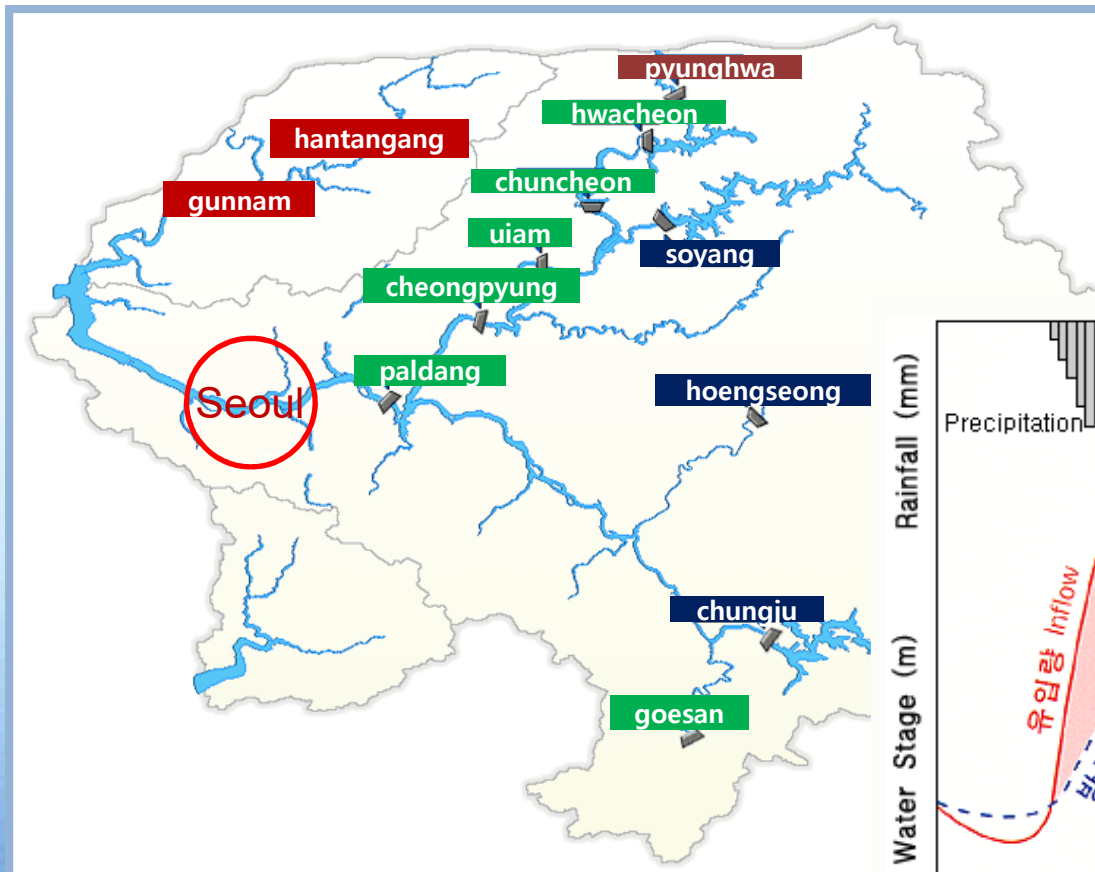
- Real Time River Flow Management(Han River FCO)
  - 14 dams at Han river basin
  - FCO approve the Dam release amount & time
    - Comprehensive analysis
    - Upstream + Downstream + Dam Safety + Historical event, etc





# Integrated Water Management

## Flood control by Dam operating





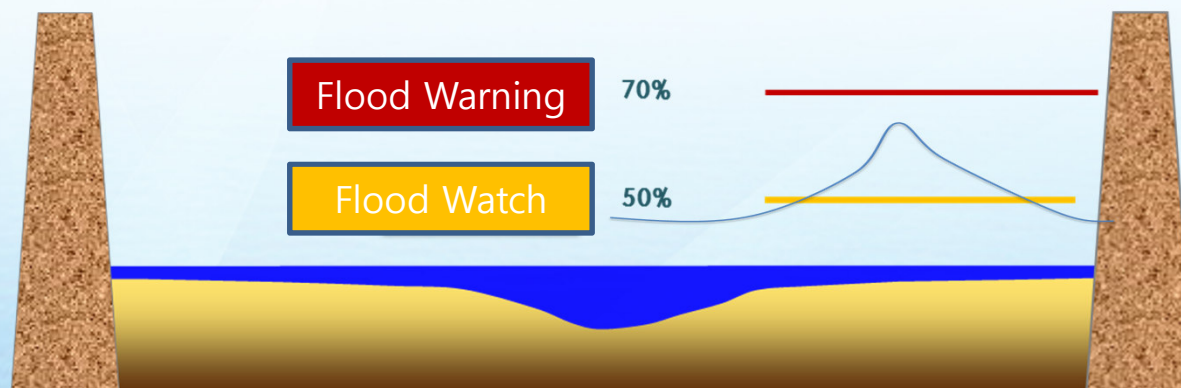
# Flood Forecasting and Issuing

Flood Forecast = Flood Alert(Warning) + Flood Information

## @ Flood Alert(Warning)

Flood Watch : Design Flood Discharge **50%** (Design Flood Level 60%)

Flood Warning : Design Flood Discharge **70%** (Design Flood Level 80%)

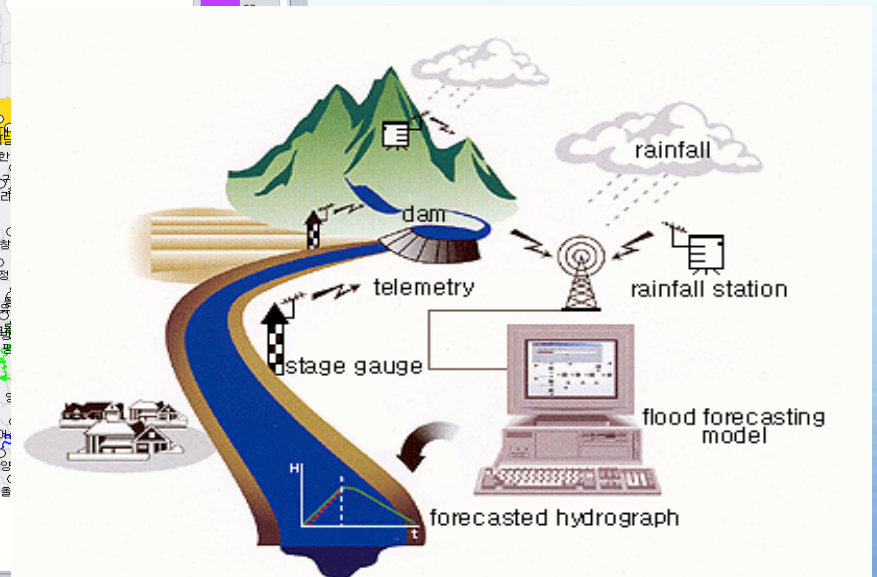
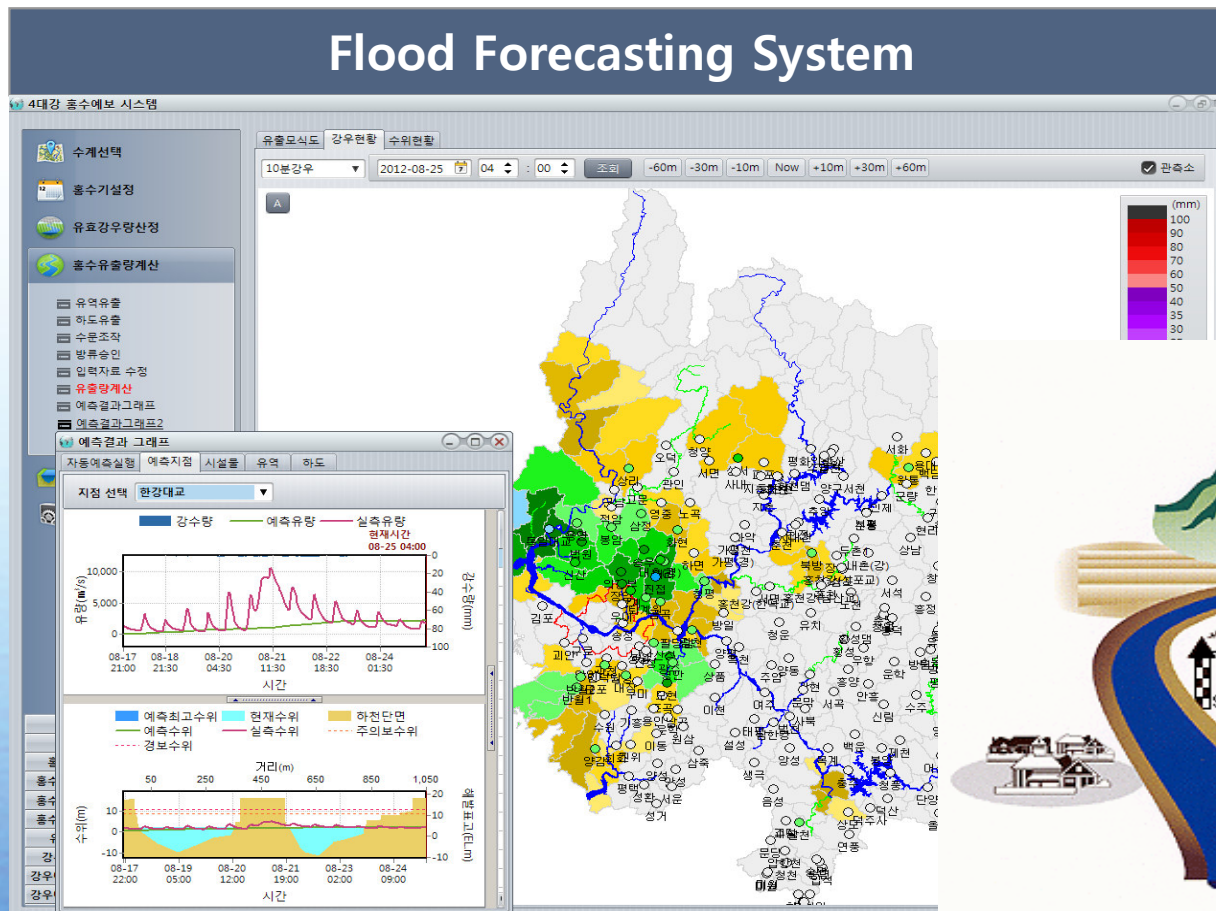


## @ Flood Information

Real-time water level, Quantity, forecasted water level, Dam release, Flood Special Report and so on

# Flood Forecasting and Issuing

## Flood Forecasting System

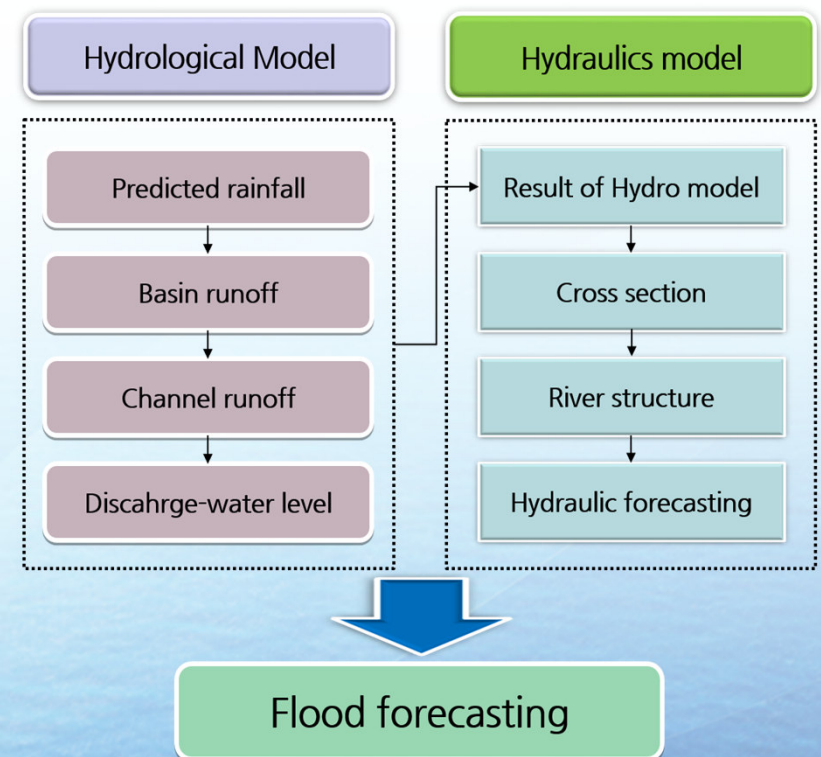
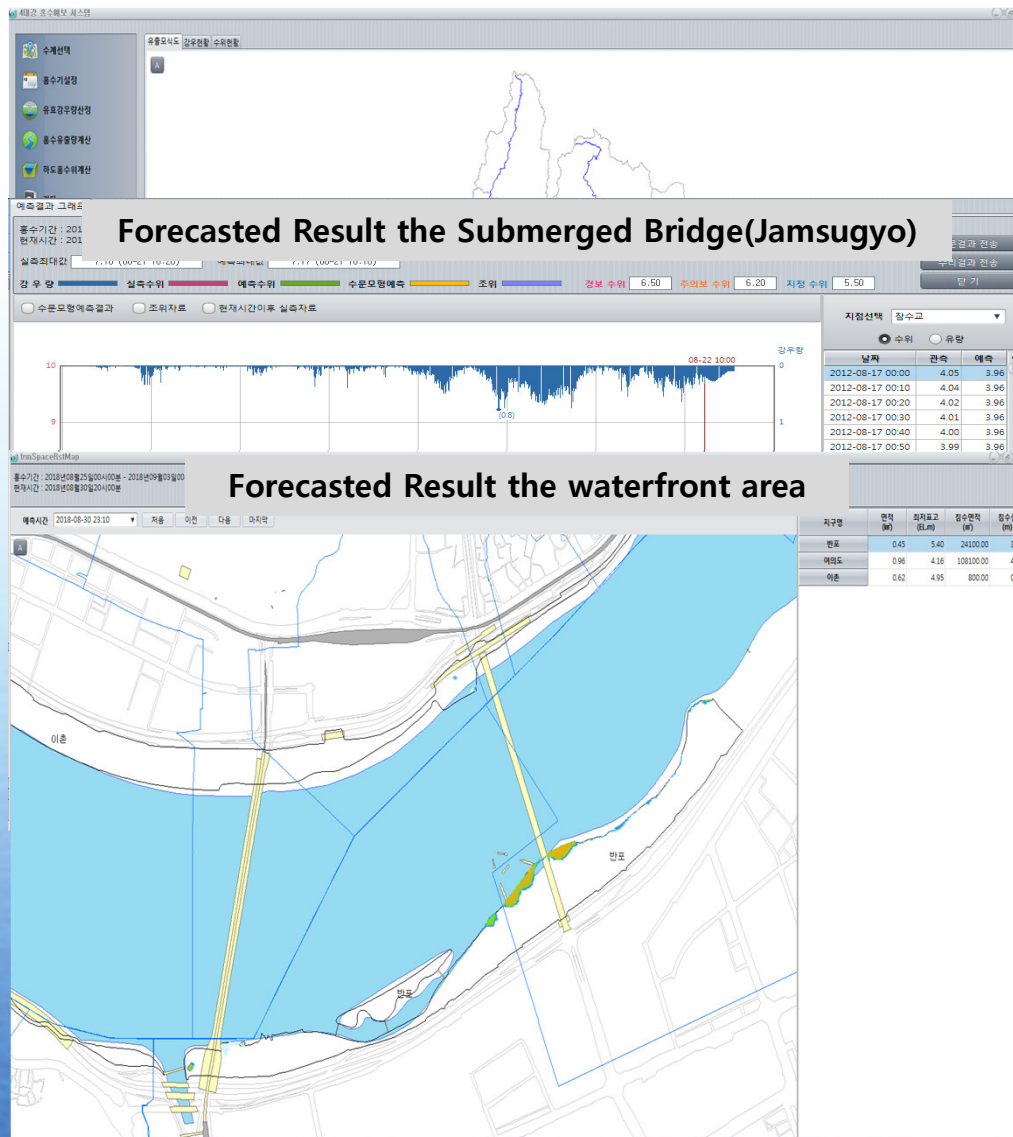


- Concept of Flood Forecast -



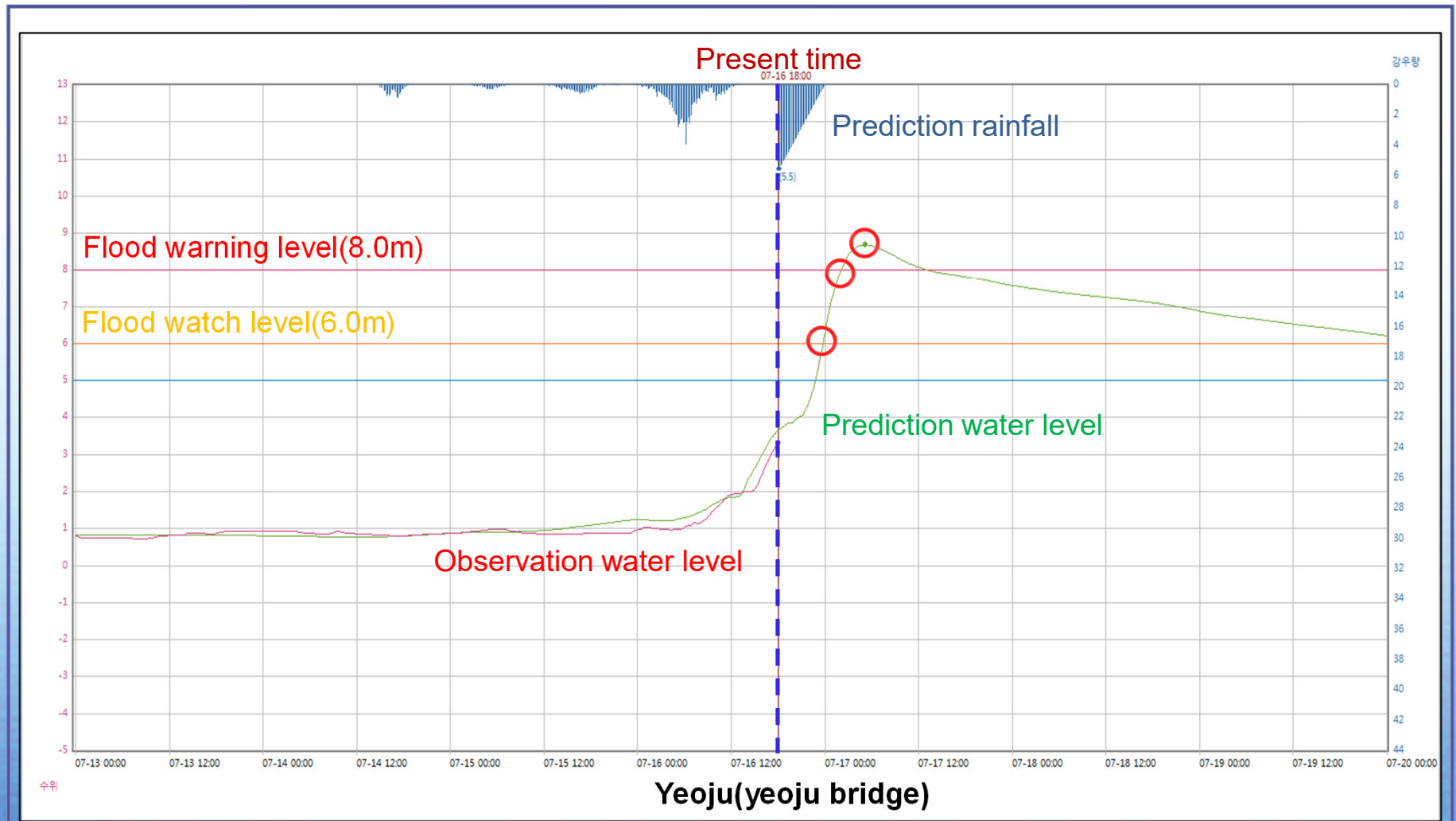
# Flood Forecasting and Issuing

## Flood Forecasting System(forecast, waterfront area)



# Flood Forecasting and Issuing

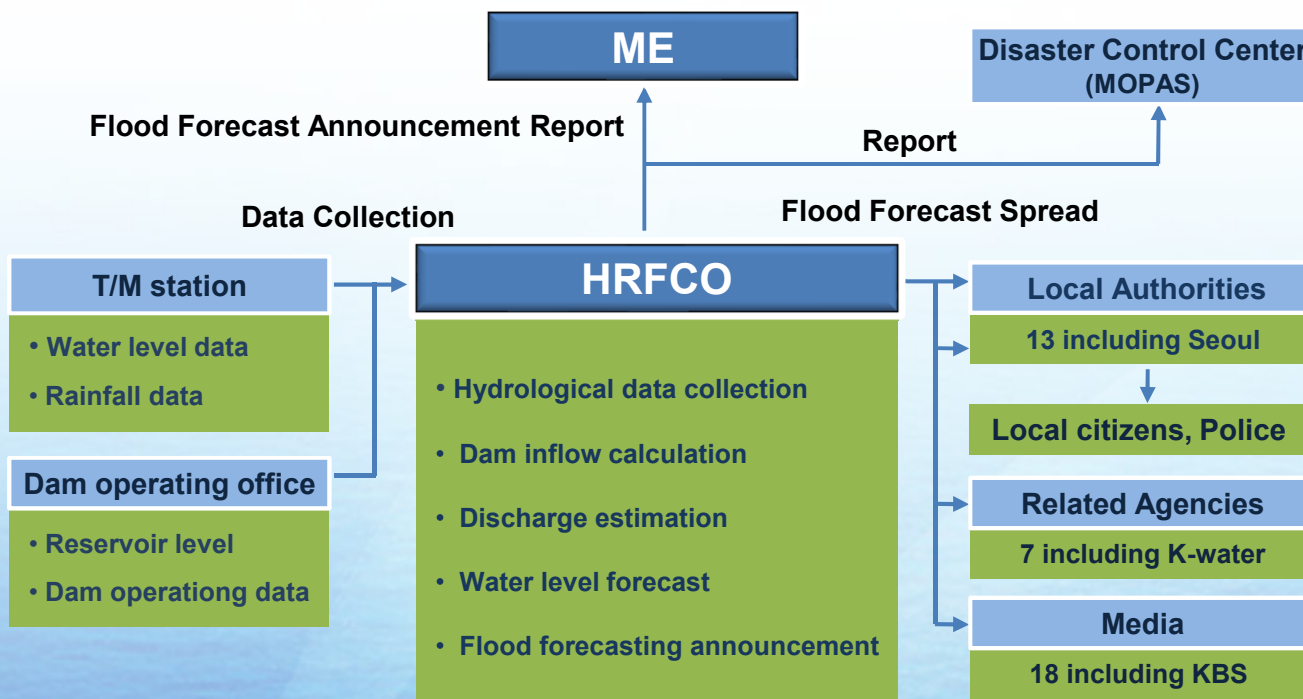
## Flood Forecasting Result





# Flood Forecasting and Issuing

## ● Distribution of forecasted results to related authorities and mass-media



**홍수주의보 발령**

홍수특보 제 2018-2호 발령일시 : 2018년 6월 12일 07시30분

발령자 : 환경홍수관리수령장

한강(분류) 유역에 내린비로 서울시(한강대교)지점의 수위가 계속 상승하여 2018년 6월 12일 10시 30분쯤에는 주의보수위(수위표기준 8.50m, 해발기준 10.57m)를 초과(도달) 할 것이 예상되어 홍수주의보를 발령하니 한강(분류) 인근 하류지역 주민들은 유의하시기 바랍니다.

(단위 : m)

지점	현 재				예 상		
	일 시	수 위		변동상황	일 시	수 위	
		수위표기준	해발기준			일 시	수위표기준
서울시(한강대교)	2018.06.12 07:30	4.84	6.91	상승중	2018.06.12 10:30	8.50 내외	10.57 내외

※ 참고 (서울시(한강대교)) 지점  
 - 제방고(좌안, 우안) : 수위표기준 15.93, 16.43m, 해발기준 18, 18.5m  
 - 경보 수위 : 수위표기준 10.50m, 해발기준 12.57m  
 - 주의보수위 : 수위표기준 8.50m, 해발기준 10.57m  
 - 계획홍수위 : 수위표기준 13.26m, 해발기준 15.33m

※ 같은 하천이라도 지역과 장소에 따라 예상되는 피해가 다릅니다.

\* 홍수특보 발령사항은 홈페이지(<http://www.hrftco.go.kr>)를 통해 확인 가능합니다. (홍수발령 → 홍수특보 발령사항)  
 환경홍수관리수령장 : ☎ 02-590-9990~8, FAX 02-590-9929

### Flood Forecast Announcement

## ● Process of Flood Information





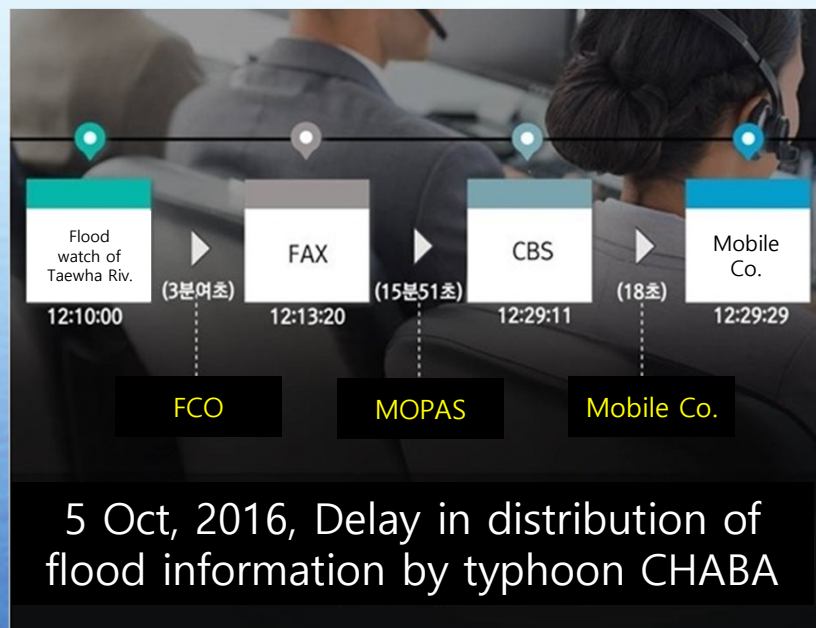
# Methods of Flood Information Service(CBS)

## Emergency disaster message(CBS; Cell Broadcasting Service)

- Emergency message for rapidly evacuation in case of disaster
- Send to mobile phones connected on the base station of mobile company
- Determine the sending status and area in MOPAS



## CBS System Improvement



## Flood Warning CBS Sending Time

### Current(20min)

FCO  
Announcement(FAX)  
해저아저브 사회식  
MOPAS Creation  
Manager Approval  
인  
CBS Sending

### Improvement(3min)

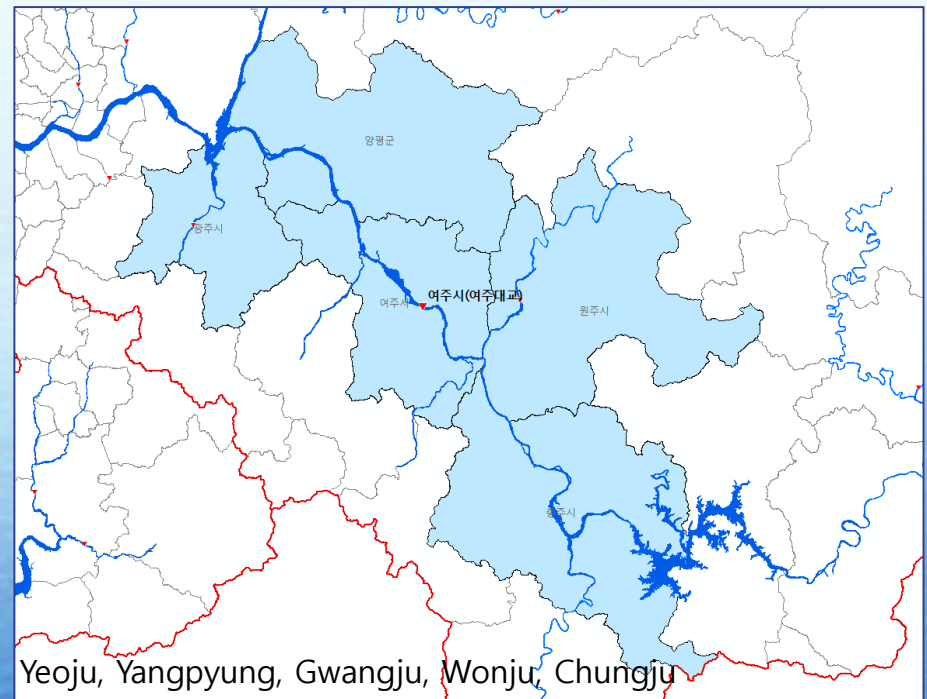
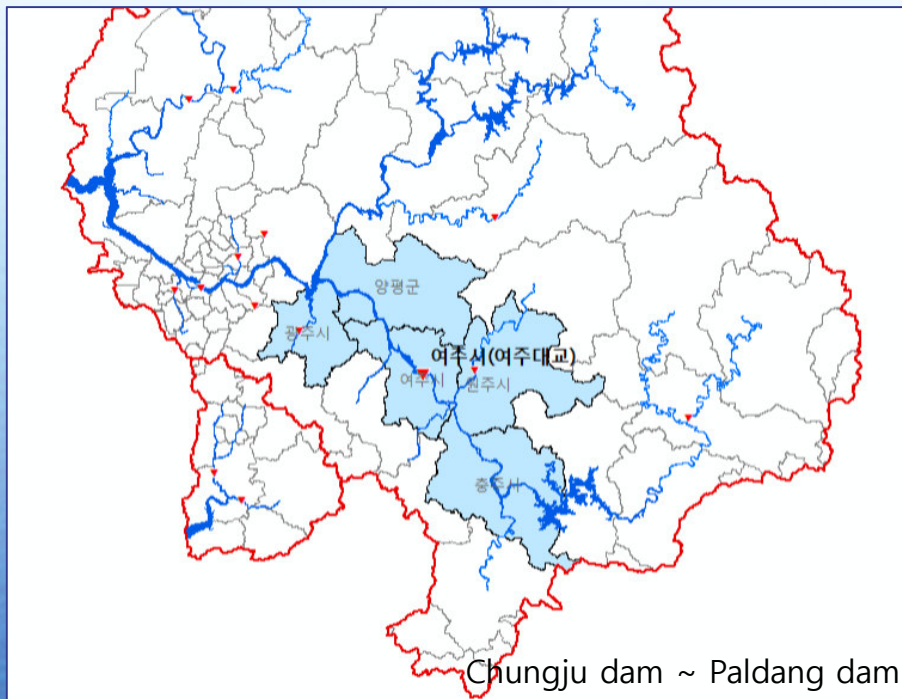
FCO Announcement  
(Auto Creation)  
해저아저브 사회식  
Manager Approval  
승인  
CBS Sending

# Methods of Flood Information Service(CBS)

## ● CBS text

Warning Point	Flood Watch	Flood Warning
<b>Yeoju</b> <b>(yeoju bridge)</b>	[HRFCO] 11.5 10:00 Han river yeoju(yeju bridge) point flood watch issuing. Please be careful of your safety.	[HRFCO] 11.5 10:00 Han river yeoju(yeju bridge) point flood warning issuing. Be prepared for flood damage

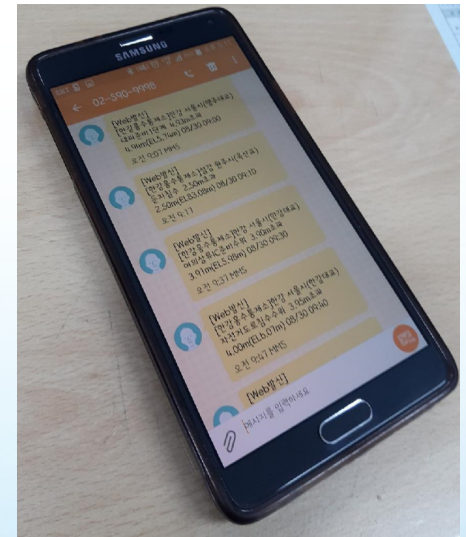
## ● CBS sending area





# Methods of Flood Information Service(SMS)

- Flood warning issuing: 18 points
- Dam & Weir release approval: 12 dams, 3 weirs
- Designated water level excess: 158 points
- Major roads & Rail bridges flood information
  - The blocking traffic of major roads: 5 points
  - Rail bridge weak section: 4 points
  - Submerged bridge(Jamsugyo) inundation & forecasted information
- 129 Agencies, 2,630 peoples received in 2019

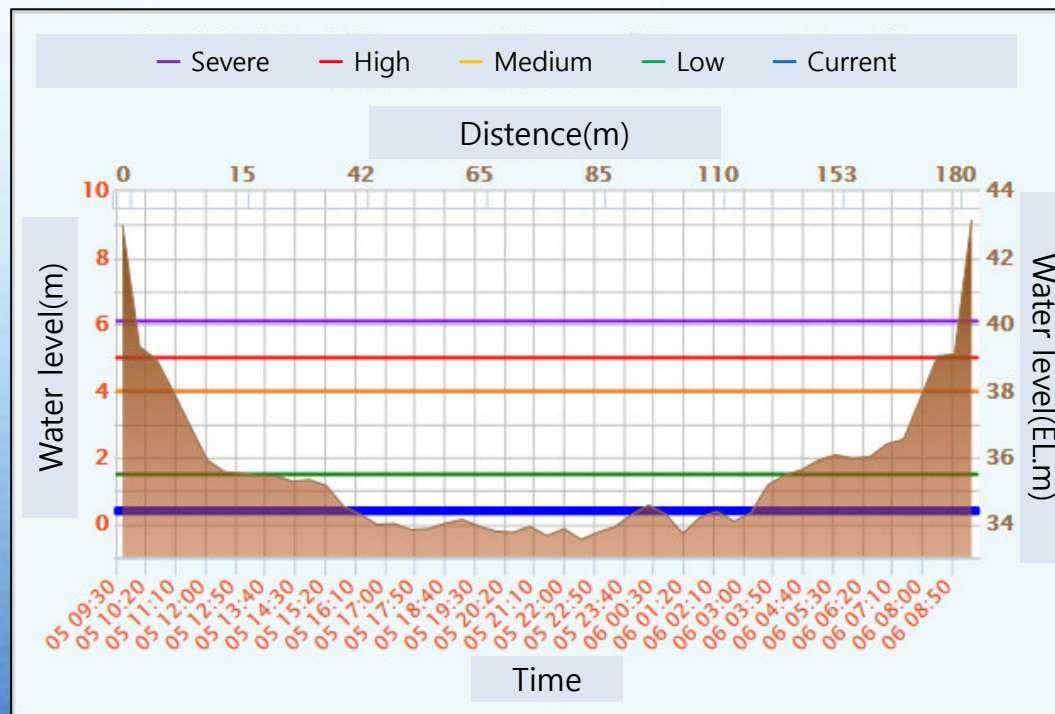


# Methods of Flood Information Service(SMS)

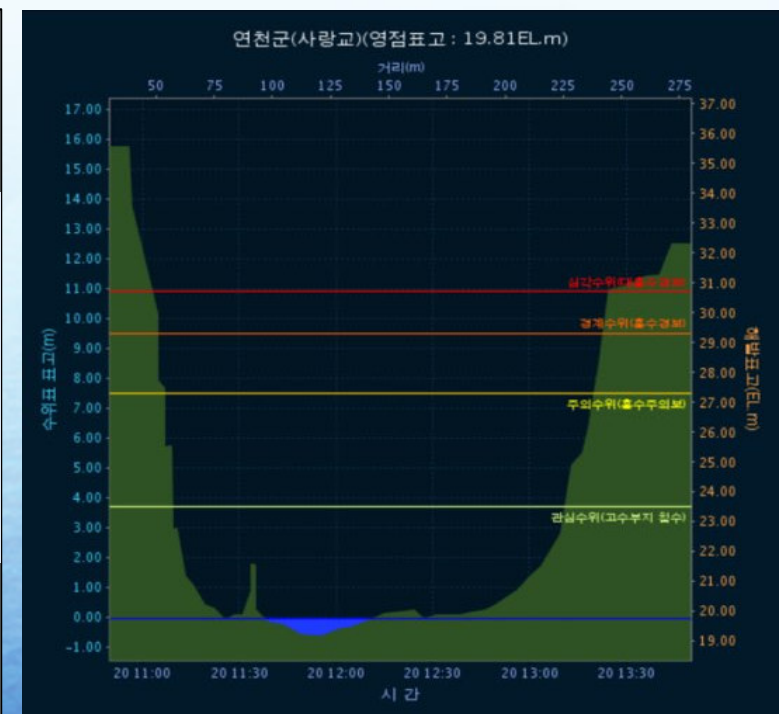
## Flood Information by Emergency Warning Steps(4 Steps)

- Low: Inundation level of facilities at the waterfront or 1m lower than medium level
- Medium: flood watch level(design flood discharge 50% or design flood level 60%)
- High: flood warning level(design flood discharge 70% or design flood level 80%)
- Severe: design flood level of the cross section

\* Reference Material : UK CEH(Centre for Ecology & Hydrology), Real-time forecasts of flood hazard and impact



HRFCO Homepage offering display



Flood Alarm App offering display



# Methods of Flood Information Service(Internet Webpage)

## ● Homepage and so on

- Homepage: [www.hrfco.go.kr](http://www.hrfco.go.kr)
- WAMIS(Water Resources Management Information System): [www.wamis.go.kr](http://www.wamis.go.kr)
- WINS(Water Management Information Networking System): [www.wins.go.kr](http://www.wins.go.kr)

The image displays three screenshots of Korean government websites related to water management and flood control.

- Top Screenshot (HRFco):** The homepage of the Han River Flood Control Office (한강홍수통제소). It features a map of the Han River basin with various monitoring points marked. The header includes navigation links like '정보공개' (Information Disclosure), '수문' (Weir), '홍수' (Flood), '하천' (River), '알림' (Notice), '민원' (Public Inquiry), and '소개' (Introduction).
- Middle Screenshot (WAMIS):** The homepage of the Water Resources Management Information System (WAMIS). It includes a '공간도형 다운로드' (Download Spatial Data) section, a 'USE GUIDE' section, and a 'MOBILE APP' section. The header has links for '수문기상' (Weir Weather), '유역' (Basin), '하천' (River), '댐' (Dam), '지하수' (Groundwater), '이수' (Water Use), '수도' (Water Supply), '환경생태' (Environment & Ecology), '자연재해' (Natural Disaster), and '지형공간' (Topography & Space).
- Bottom Screenshot (WINS):** The homepage of the Water Management Information Networking System (WINS). It features a large 'LOGIN' button and a list of services provided by the system, including '국립수자원관리정보시스템' (National Water Resource Management Information System), '한국하천일람 및 하천시설정보를 조회하는 GIS 기반 시스템' (GIS-based system for querying national river catalogs and facilities), '국립지하수에 관련된 모든정보를 조회하는 시스템' (System for querying all information related to national groundwater), '상하수도관련 통계, 연보자료를 제공하는 포털시스템' (Portal system providing statistics and yearbooks related to water supply and sewerage), '농촌지역에 산재되어 있는 농촌홍수물 계량하는 포털시스템' (Portal system for measuring rural flood water in scattered rural areas), '역전수, 호소수 등 수질에 관련된 자료와 환경생태 자료 제공 시스템' (System providing water quality related data and environmental/ecological data for reverse flow, reservoirs, etc.), '물에 관련된 모든 학문분야의 연구 및 교육기관으로 학회지 및 세미나 주관' (Organizing research and education in all academic fields related to water), '농수림업 고적할 때 토양특성에 맞는 작물을 재배할 수 있도록 토양정보 및 일일온도, 일일강수량을 주전 제공 시스템' (System providing soil information and daily temperature/precipitation to help farmers choose crops suitable for soil characteristics), and '한강유역환경홍수통제소, 국관안전방수방호 CCTV제공 시스템' (CCTV system provided by Han River Basin Environment Flood Control Office, National Safety Flood Protection). The bottom right corner also mentions 'CCTV SYSTEM'.

# Methods of Flood Information Service(Smart Phone)

## Flood Alarm Application

### Main board

현황판  
전국의 홍수 상황을 한눈에 볼 수 있습니다.

강수량  
(레이더, 지상)

하천수위

댐

보

홍수특보

도로철도

관리수위

친수지구

댐방류  
도달시간

수위동영상

관련 앱 서비스

우리강 이용도움  
우리강 이용도움

안전디딤돌  
안전디딤돌

SMART 물정보  
SMART 물정보

사실물재난  
관리시스템

한강  
홍수통제소

메뉴

현황판

내주변홍수정보

설정

### Acting board

2018-06-26 20:50 기준

메뉴

현황판

내주변홍수정보

설정

### Waterfront area

첫화면 / 친수지구 / 여주 친수지구

지도

테이블

침수도표

침수이력

2018. 10. 17.

16시

40분

메뉴

현황판

내주변홍수정보

설정

### Flood Warning

첫화면 / 홍수특보

상황판

목록

하천	예보지점	주의보 [m]	경보 [m]	현재 [m]	발령 상황
한강	영월군 (영월대교)	6.00	8.00	0.98	—
평창강	평창군 (평창교)	3.50	4.50	0.16	—
청미천	여주시 (원부교)	5.50	6.50	0.78	—
한강	여주시 (여주대교)	6.00	8.00	0.87	—
한강	서울시 (한강대교)	8.50	10.50	0.60	—
섬강	원주시 (문막교)	4.50	5.50	0.81	—
왕숙천	남양주시 (진관교)	2.00	3.00	-0.11	—
탄천	서울시 (대곡교)	5.50	7.00	1.72	—
중랑천	서울시 (중랑교)	5.00	6.50	0.53	—
안양천	서울시 (오금교)	7.00	9.00	0.93	—
임진강	파주시 (비룡대교)	9.50	11.50	-0.14	—
한탄강	연천군 (사라교)	7.50	9.50	0.27	—

메뉴

현황판

내주변홍수정보

설정



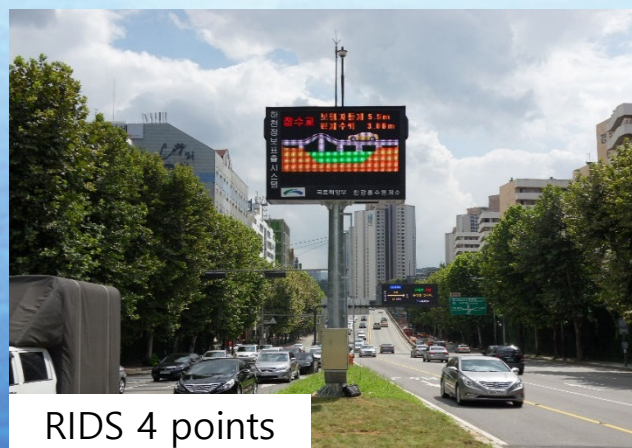
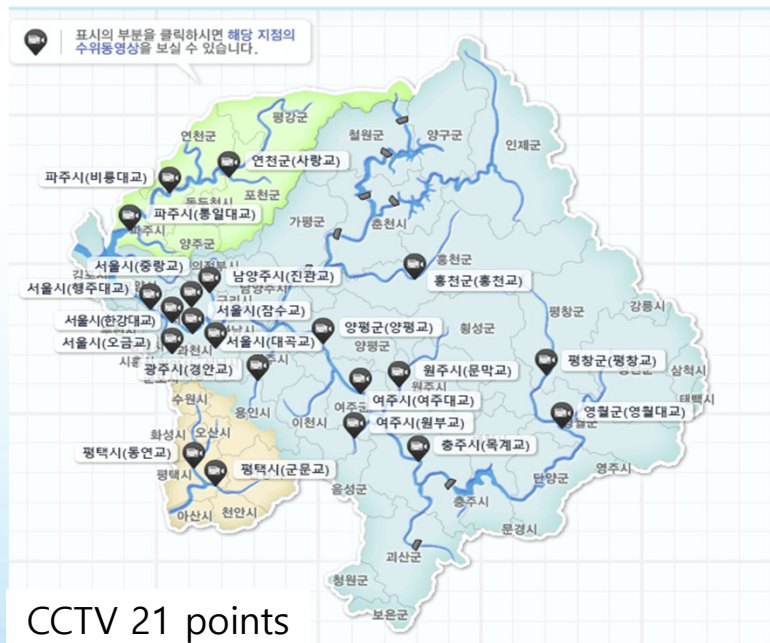
# Methods of Flood Information Service(SNS)

## Facebook, Twitter



# Methods of Flood Information Service(Image Equipment)

## CCTV & River Information Display System





Thank you for your attention

