Flood Early Warning and Disaster Mitigation in Korea

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WATER RELATED DISASTERS IN KOREA

Snow in Winter

Storms in Summer

Droughts in Spring
FLOODS IN A RECENT DECADE

Collapse of Yeoncheon Dam

Flooded Paju City
FLOODS IN A RECENT DECADE

Broken Railway Bridge by Typhoon Rusa

Flooded Village by Typhoon Maemi
FLOOD DAMAGES IN RURAL AREAS

Inundation of farmlands due to levee failures
FLOOD DAMAGES IN URBAN AREAS

Inundation of roads and underground facilities due to insufficient drain capacities.
DAMAGES IN A RECENT DECADE DUE TO FLOOD

The graph shows the damages in a recent decade due to flood, with a focus on property and life loss. The x-axis represents the years from 1993 to 2002. The y-axis on the right side represents life loss in millions of US dollars, while the y-axis on the left side represents property loss in millions of US dollars.

From the graph, it can be observed that property loss peaked in 1998 and 2002, while life loss was highest in 2001. The years 1993, 1994, and 1997 show low property loss, with life loss being negligible in most years except 1999 and 2001.

Overall, the graph indicates a significant increase in property loss in the years 2001 and 2002, which might be due to more severe flood events during these years.
## Flood Disaster Mitigation

### Preparatory Action against Flood

#### Flood Forecasting and Early Warning
- **FCO under the MOCT**
  - Disseminate warning for certain control points by water level
  - Approval of dam operation

#### Response against Flood Damage
- **Flood Control by Dam Operation**
- **Evacuation**

- **WROC under the KOWACO**
- **Local Communities**
  - Disaster Management System based on Flood Hazard Maps

### Recovery action for Flood Damage
- **FCO**: Flood Control Office
- **MOCT**: Ministry of Construction and Transportation
- **WROC**: Water Resources Operation Center
- **KOWACO**: Korea Water Resources Corporation
PROCESS OF FLOOD FORECASTING AND CONTROL

1. Meteorological Data → Rainfall Forecasting
2. Stage & Rainfall Observation → Runoff Analysis
3. Runoff Analysis → Inflow Forecasting
4. Inflow Forecasting → Reservoir Simulation
5. Reservoir Simulation → Channel Routing
6. Channel Routing → Decision Making (Release time & amount)
7. Decision Making → Flood Control Office
8. Flood Control Office → Gate Open & Release
9. Gate Open & Release → Post Analysis
10. Post Analysis → Model Calibration
11. Model Calibration → Reservoir Operation Method
12. Reservoir Operation Method → Downstream Condition
13. Downstream Condition → Approval
14. Approval → Informing
15. Informing → Public
16. Public → Warning dissemination

Forecasting evaluation

Notice to the Related Organizations
FLOOD FORECASTING FACILITIES
Gathering and Analyzing all the available weather information
Data from KMA, JMA, JWTC, etc.
Gathering information: satellite, radar, AWS, etc.

In-house rainfall forecasting for dam-basins
FLOOD FORECASTING

Flood Analysis Models

Rainfall-Runoff Model
  Storage function model (including SCS-CN method)

Channel Routing
  Hydrologic and hydraulic models

Reservoir Routing
  Scheduled release ROM
  Rigid rate and rigid quantity ROM
  Technical ROM, etc.
FLOOD FORECASTING

Reservoir Routing
FLOOD FORECASTING

Down-stream Channel Routing
FLOOD CONTROL

Flood Control Effect by Multipurpose Dams in the Han River Watershed (Seoul station)
(2002. 8. 4 ~ 8. 16)

- Predicted max level of Indikyo: 11.60m (37,910 CMS)
- Hazard Level: 10.5m
- Flood Control effect of 2 Dam: 2.43m (12,190 CMS)
- Warning Level: 8.5m
- Max Level of Indikyo: 8.17m (25,720 CMS)

Inundated time: 19 hours
FLOOD RISK MAP

100 yr and Levee Breach at PT. 1
FLOOD HAZARD MAP

Sample map with evacuation information
DISASTER MANAGEMENT SYSTEM FOR LOCAL COMMUNITY

- Receiving flood warning from FCO
- Inundation
- Operation of stream gates & pumping facilities
**summary**

- Flood Forecasting and Early Warning Systems have been established for major river basins, and are being extended to smaller basins.
  - More accurate rainfall forecasting with a proper leading time is prerequisite for the reliability of early warning system

- Flood mapping has been conducted for major rivers, and are still under going.
  - Flood map should be opened to the local communities and public to help them what to do in the real emergency situation

- Local community based flood disaster management systems are being developed for effective preparedness against the flood risk.
Thank you for your attention