Disaster Mitigation & Reconstruction








Presented by : Jack Wu

Title : President

Email : ykw@e-toyou.com

2008 disasters* in numbers (UN/ISDR)

Top 10

Natural disasters by number of deaths[1] - 2008

Cyclone Nargis, May	Myanmar	138 366
Earthquake, May	China, P Rep	87 476
Flood, June-August	India	1 963
Extreme winter conditions, January	Afghanistan	1 317
Typhoon Fengshen (Franck), June	Philippines	644
Hurricane Hanna, September	Haiti	529
Mass movement wet, September	China, P Rep	277
Flood, October	Yemen	180
Flood, June	China, P Rep	176
Flood, September	India	173

(1): Includes the reported missing persons

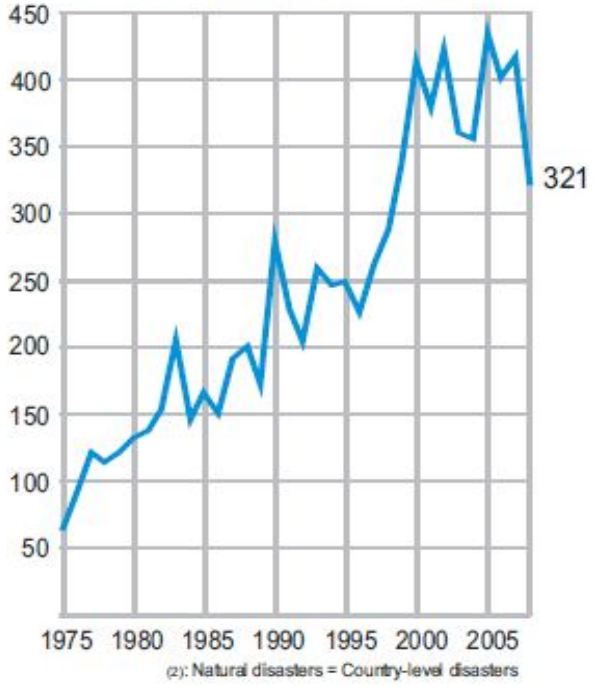
Number of reported natural disasters by country - 2008

China, P Rep	26
Philippines	20
United States	19
Indonesia	16
Viet Nam	10
India	10
Colombia	8
Kenya	8
Taiwan (China, P Rep)	5
Cuba	5
Thailand	5
Iran Islam Rep	5
Brazil	5

Total killed and affected people by natural disasters per 100,000 inhabitants - 2008

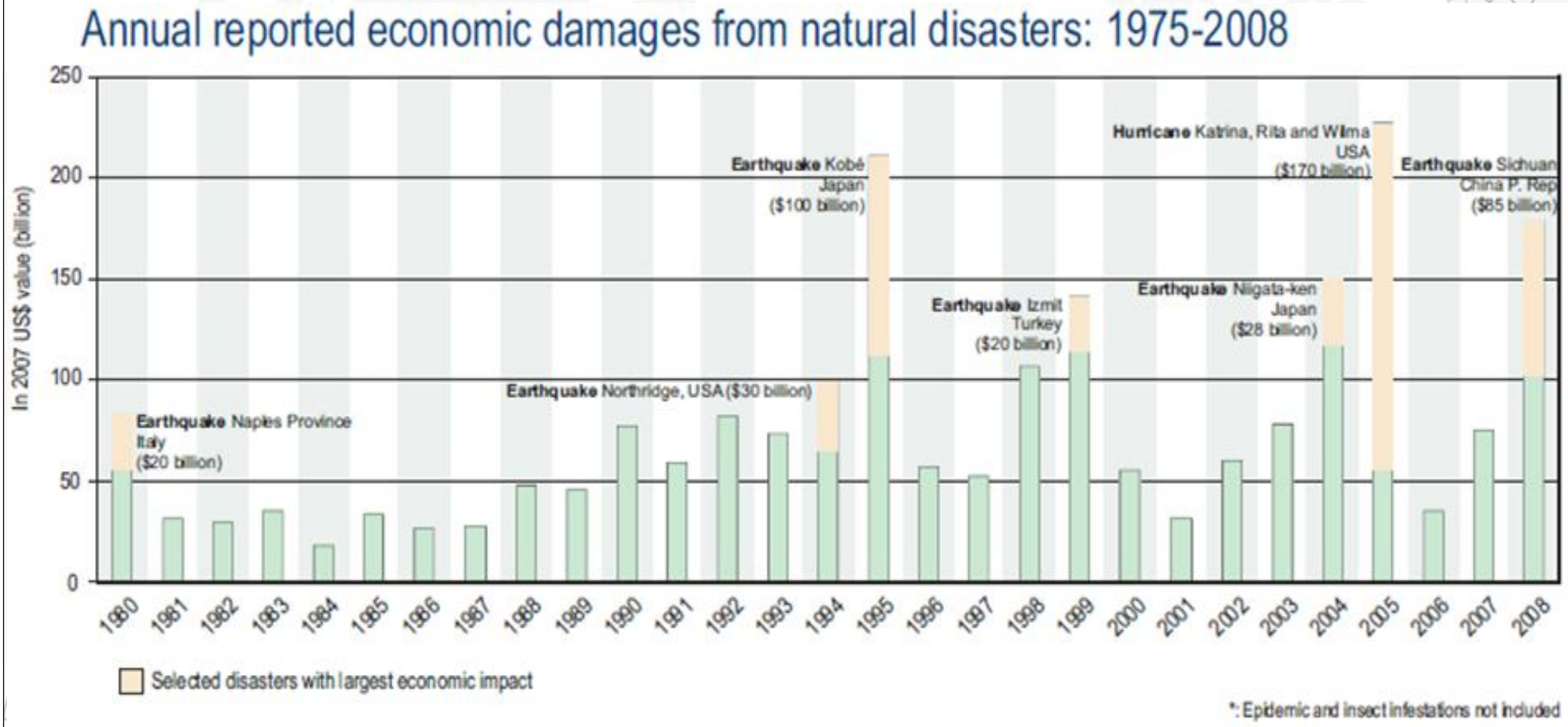
Tajikistan	41543
Djibouti	40817
Somalia	38 547
Eritrea	35 111
Antigua and Barbuda	30420
Thailand	18080
Belize	15792
Guyana	13540
China, P Rep	10077
Philippines	9626

Time trend of reported natural disasters[2], 1975-2008



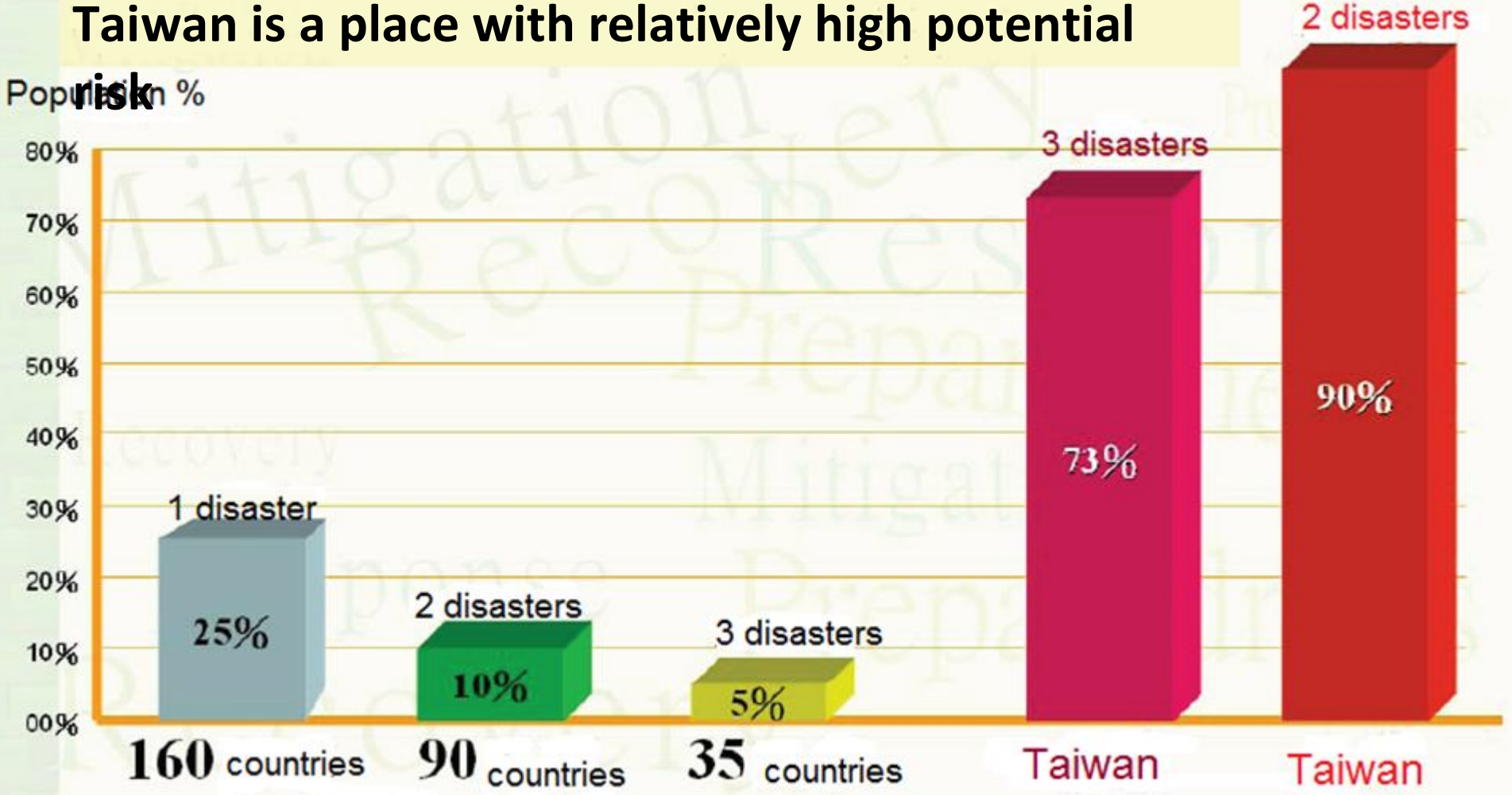
(2): Natural disasters = Country-level disasters

2008 disasters* in numbers



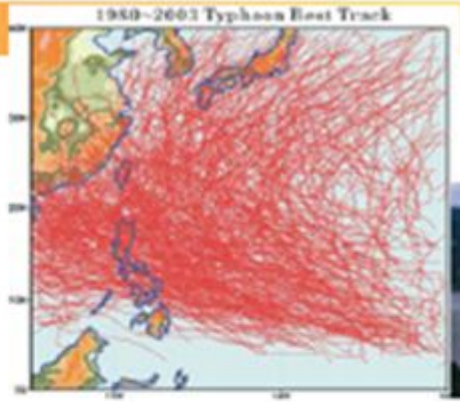
A Global Risk Analysis-world bank (2005)

Taiwan is a place with relatively high potential risk



Natural Disasters in Taiwan

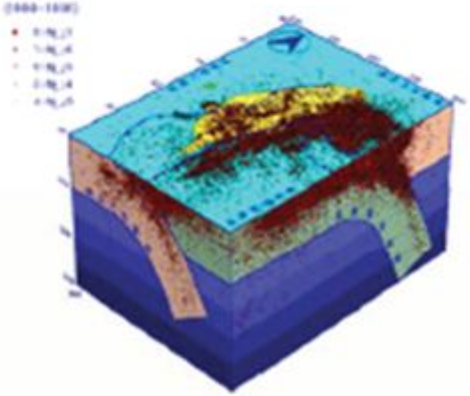
- Typhoon average hit rate is about 3.5 times per year and causes economic loss 20B NTD annually
(400,000,000 €)



- Drought and regional water resource allocation issues are serious year by year

- Frequent earthquake loss brings much impact to society and economy

921 Earthquake in 1999 causes economic loss more than 360B NTD
(7,200,000,000 €)

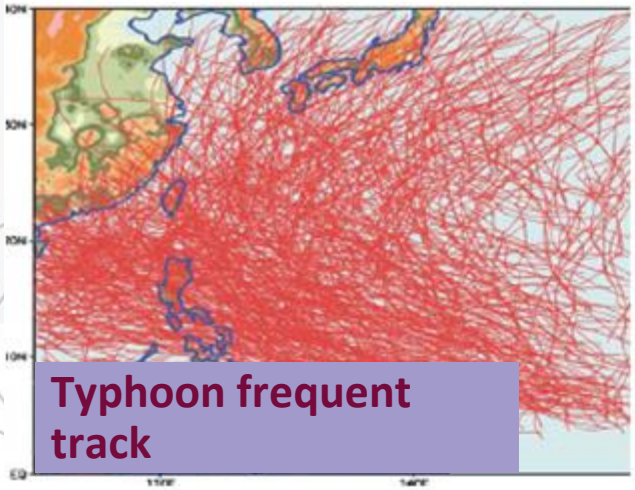


Issues exploring in Taiwan disasters (1)

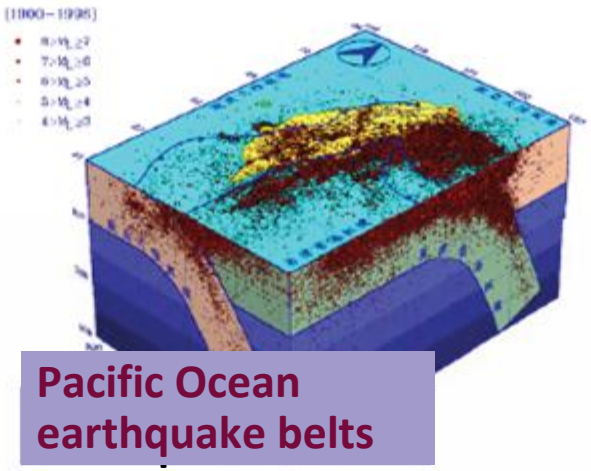
- Existing many factors which are relatively vulnererabe to disaster:
  - Population density ranked 13th in the world
  - Residents are gathered up in urban district
  - Busy economic activities
  - Family structure and social functions changed

Issues exploring in Taiwan disasters (2)

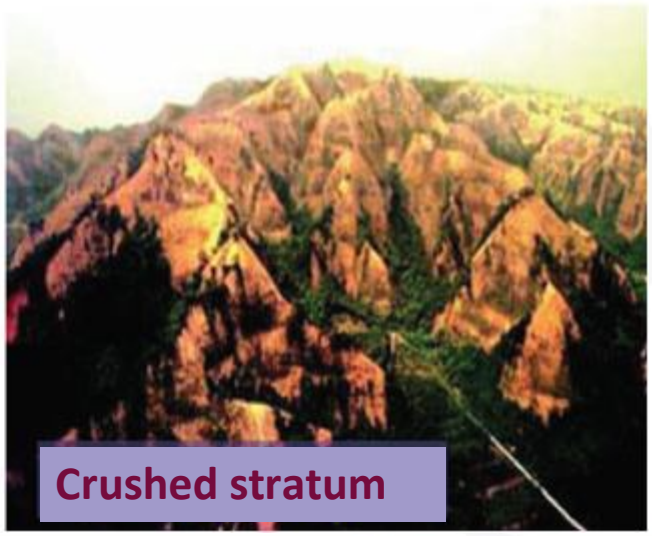
- Natural environmental sensitivity increase!
  - Undergound water is over-extracted to cause stratum undercut
  - Global warming effect, average climate temperature increase 1.1 degree to cause extraordinary climate change occurs often
  - Surface soil outflow, coastline shrink
  - 73% territory is the development and reservation of hilly land



Typhoon frequent track



Pacific Ocean earthquake belts

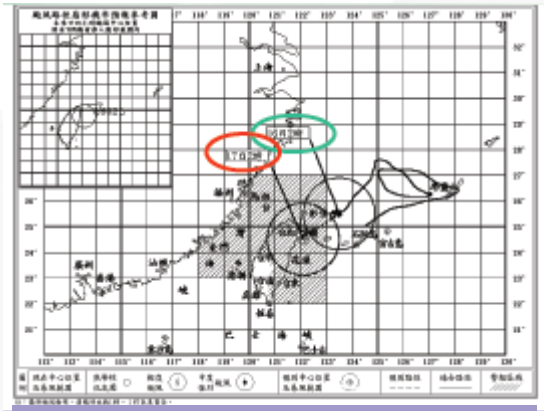


Crushed stratum

Some points for disaster mitigation system

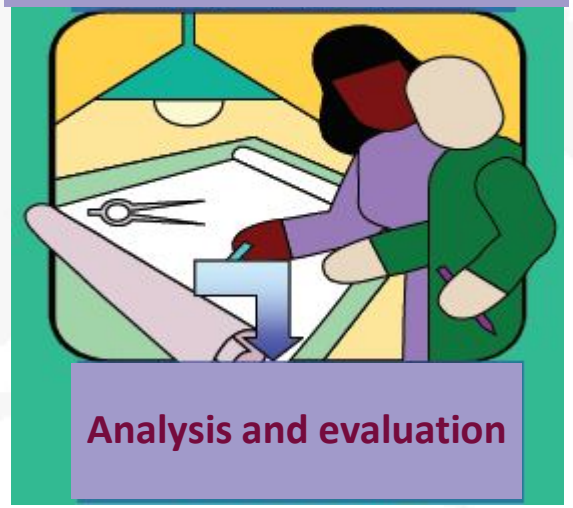
- Integrate web GIS (Geographic Information System)
- Easy UI for easy manipulation
- Integrate ready-made technology, like :
  - GIS technology
  - Disaster domain and Model technology
  - Related database to analyze the disaster trend
  - OA technology
  - ……
- To utilize the wired and wireless communication technology

DP flow for contingent situation in typhoon duration



Typhoon track forecasting

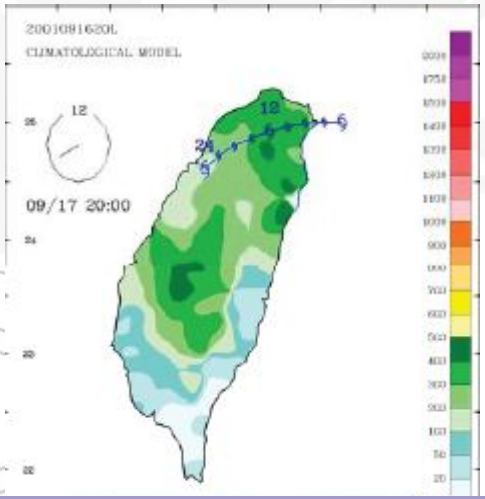
Rapidly estimates the disaster scale and warming scope



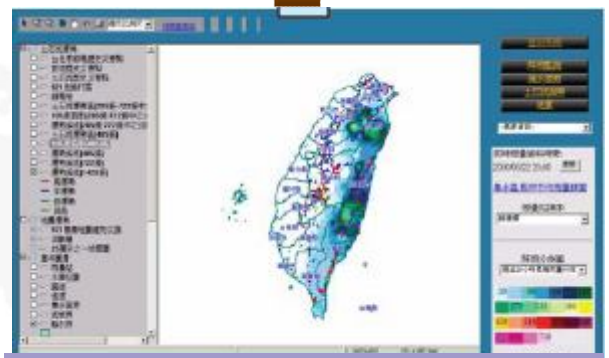
Analysis and evaluation

Warming potential flood area

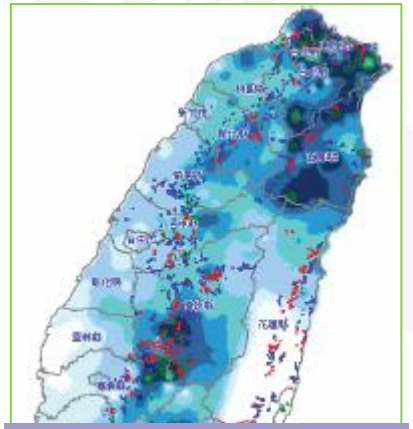
+



Rainfall intensity prediction

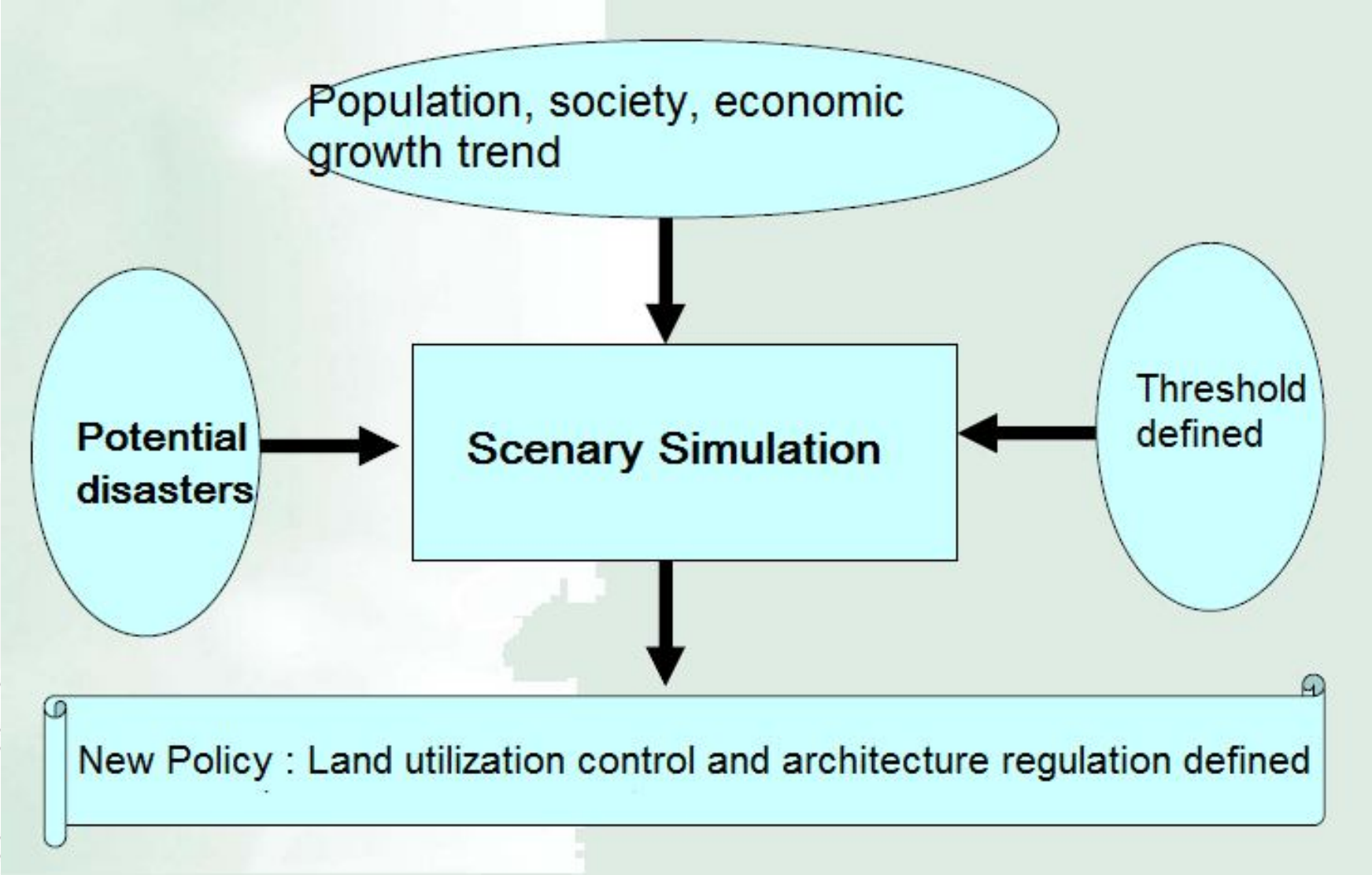


Decision-making support system (potential flood, landslide disaster)

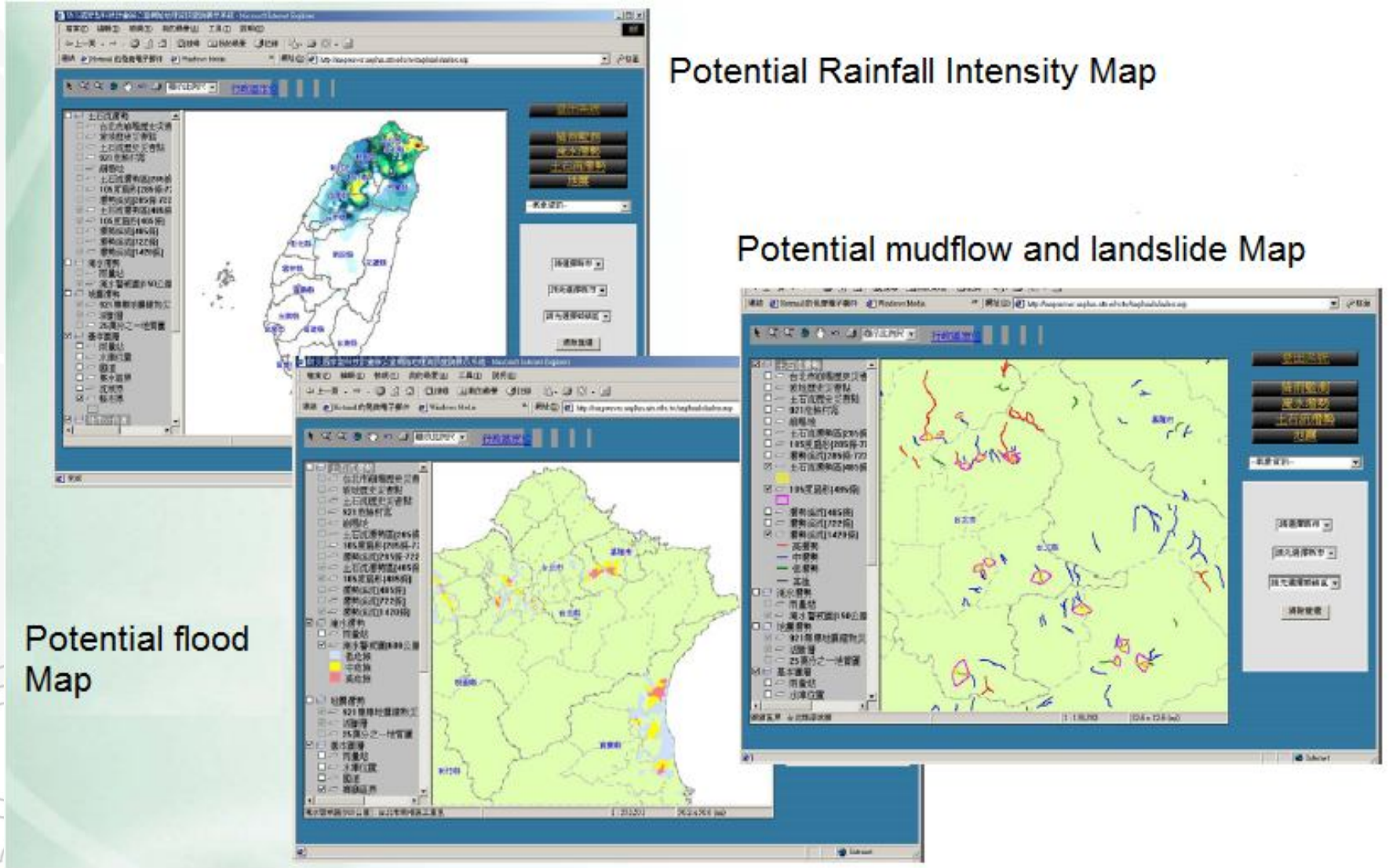


Warming potential landslide area

Land utilization policy simulated and modified



DSS for Disaster Management

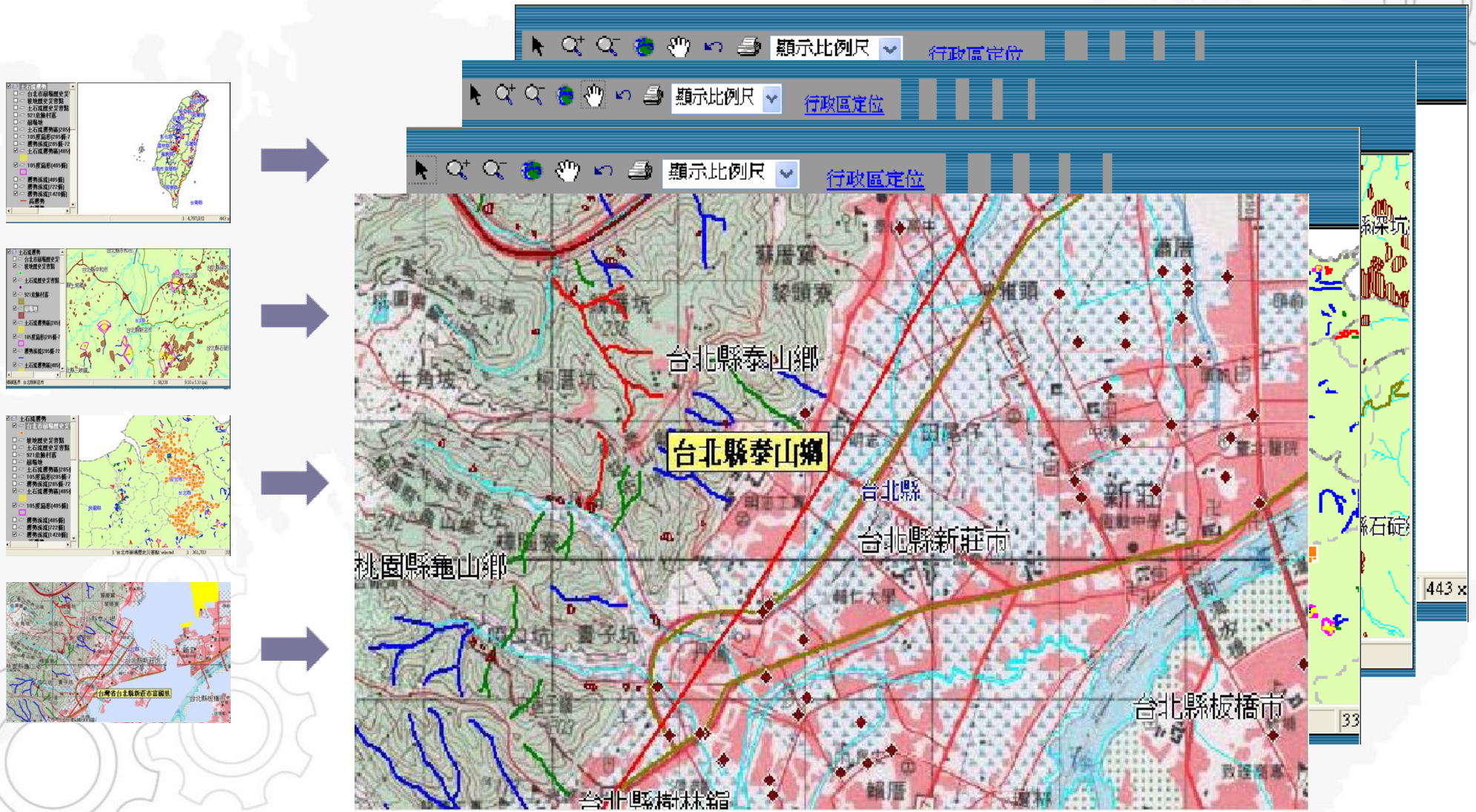


Potential Rainfall Intensity Map

Potential mudflow and landslide Map

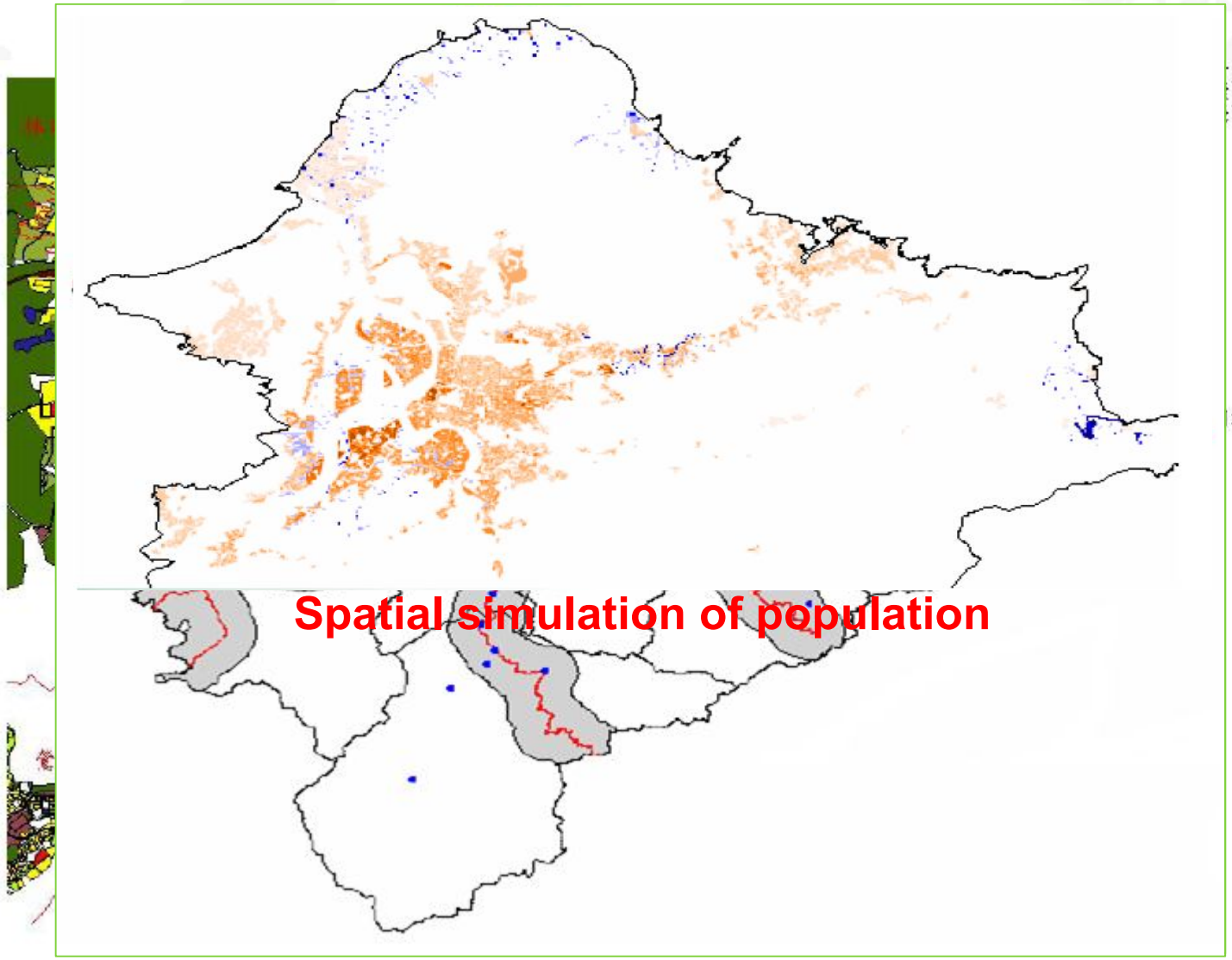
Potential flood Map

Intergrate related applications between GIS layers



Potential flood area

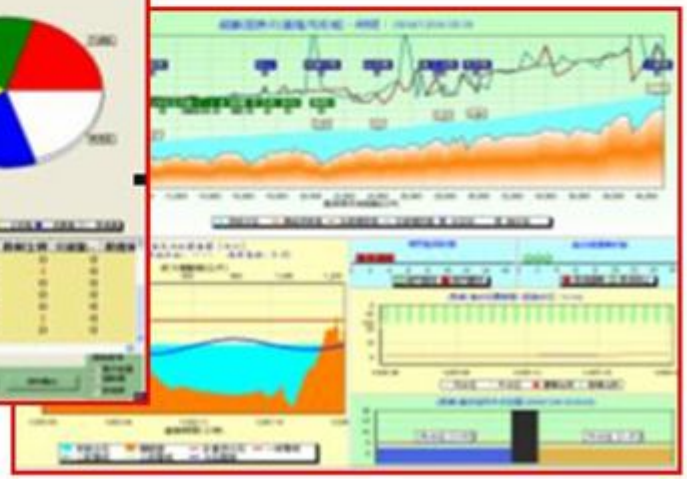
Land Utilization & Distribution Map



Demo 1: Taipei City EOC

- The capital of Taiwan.
- Population 7M residents (almost 1/3 total population)
- Issues in Taipei to cause disasters :
  - Some rivers cross the metropolitan area
  - A Basin terrain and water in lowland uneasy to discharge(Tide effect)
  - Sudden rainfall causes flood due to high density of building
  - Houses constructed in hilly area in early years
  - …..
- EOC (Emergency Operation Center) constructed 7 years ago but critical information system has been developing since 10 years ago.
- A stable SOP (Standard Operation Procedure) to fight against all natural disasters to minimize the loss.

Taipei City EOC Decision Support System



Taipei EOC integrates CCTV(1300 sets)and GIS to analyze , control and give command to all related division to fight against any incoming disaster which will threaten the life or porperty of the residents.

DVD shows the live status of the EOC which applies the modern information technology to reduce the gap between the residents and professionals thru internet , cable TV, radio, PDA....

Hope you enjoy the film!!!

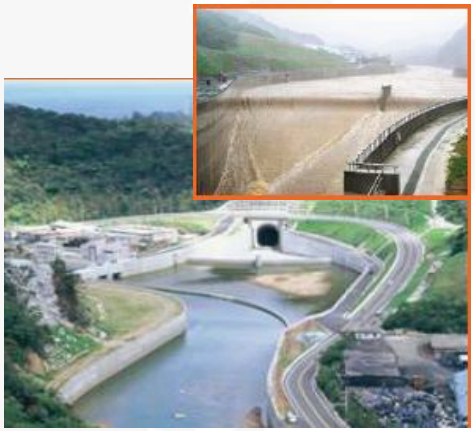
Reconstruction

- More preparation, Less reconstruction vs. Less preparation, more reconstruction
- Include engineering & non-engineering
- Law or regulation modification
- material supply & psychology rebuilding
- Recovery fund raising or mass disaster insurance

Demo 2: Yen_San_Tze Flood Detention-reconstruction

- To divert river water to neighboring seashore thru Yen_San_Tze flood tunnel.
- To decrease the flood possibility along the river thru the engineering method.
- Apply integrated information technology in the project:
  - DSS to invoke the diversion of the river water
  - To simulate the sustainability of the biggest flood level
  - Real Time to evaluate the effect of diversion
- Tunnel diameter 12m. Tunnel Length : 2.48 Km. Budget : 4.5B NTD. (90,000,000 €) Effectively decrease 65% volume water in the upstream to flow into downstream of the metropolitan.

Demo 2: Yen_San_Tze Flood Detention-reconstruction



http:www.wra10.gov.tw

- Rainfall monitoring in upstream
- Monitoring of river water in all sections
- Monitoring the flood detention
- Water gate operation and management
- 3D simulation of water volume

Apply the information technology to :

- **decrease construction cost and increase construction quality**
- **decrease operation and maintenance cost**

18

Conclusion

- Since natural disaster is inevitable in recent years , we should confront it with good preparation.
- Apply modern technology to mitigate the loss is a trend and be proven effectively.
- To combine an experienced group to related study is also a shortcut to get the results.

System Integration - Disaster Mitigation System

Hydrology Disaster

- Tansui -River Flood control Command System
- Emergency Reaction/ Flood Control System for MOEA
- Taiwan Hydrology Information System
- Yuansantze Flood Diversion System

Weather Disaster

- National Weather Forecasting System

Earthquake

- HAZ-Taiwan Technology Transferring Project
- 921 Disaster Emergency Response System

General Disaster

- National Disaster Reaction Center Planning
- Taipei City Disaster Decision Support System

e-ToYou

Emergency Operation Center (EOC)

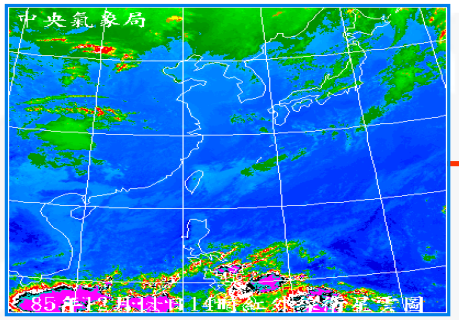
- Central Disaster EOC
- 921Earthquake Disaster EOC
- Taipei City EOC
- Taiwan Hydrology Information Center
- Northern, Central Region Water Resources Office EOC
- Tansui-River Flood Control Center
- Emergency Reaction/Flood Control Center of MOEA
- Weather Forecast Center (CWB)
- Central Epidemics Command Center

…

Epidemic Situation

- Central Epidemics Command Center Decision Support System
- Plants& Animals Epidemic Control System

Disaster Mitigation System - Reference



Central Weather Bureau

DaPingLin Central EOC

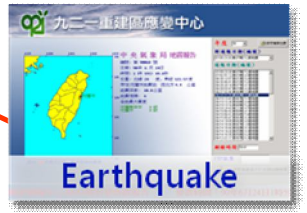
Taiwan Hydrology Information Center

921 Disaster EOC

Tansui-River Flood Control Command Center

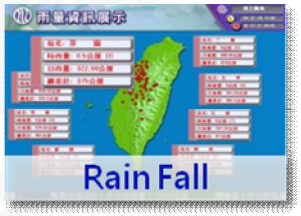
Taipei City Disaster EOC

- Collaborate Central、County (City)、Township with Ministry and Bureau (Office) to set up an integrated 3 dimensional Disaster Mitigation system.
- Empowered by Space、ICT and Image Display System and Decision Support System.



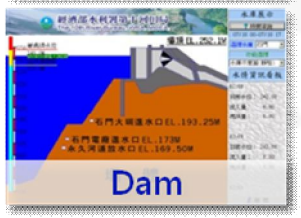
Earthquake

Pumping Station



Rain Fall

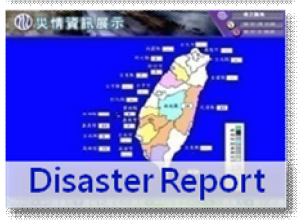
Disaster Summary Report



Dam

Water Level

Nephogram



Disaster Report

Dam