



Enhance Actions for Water Disaster Warning System and Evacuation

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Disaster Mitigation Center, WRA



經濟部水利署

WATER RESOURCES AGENCY

2009/11/30

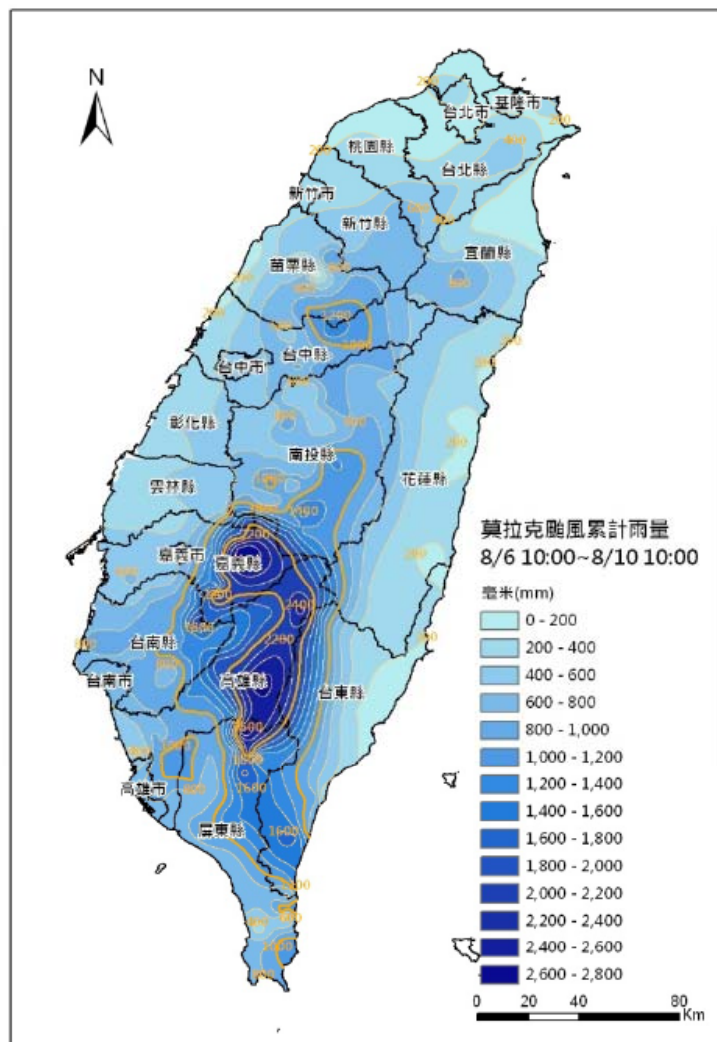


- *Review Morakot Typhoon in Taiwan*
- *Current Water Disaster Warning System*
- *Enhance Action for Water Disaster Warning System and Evacuation*



Review Morakot Typhoon in Taiwan

2009/08/05~08/10



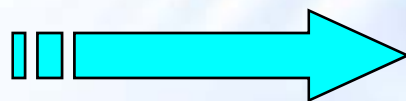
24 hrs precipitation > 1000mm : 31 stations

48 hrs precipitation > 1500mm : 23 stations

72 hrs precipitation > 2000mm : 12 stations

Max. Precipitation 2884mm in Alishan

Huge Precipitation



Long Rainfall
Duration

Landslide & Debris Flow

Natural Reservoir

Dike Overtopping or Breaking

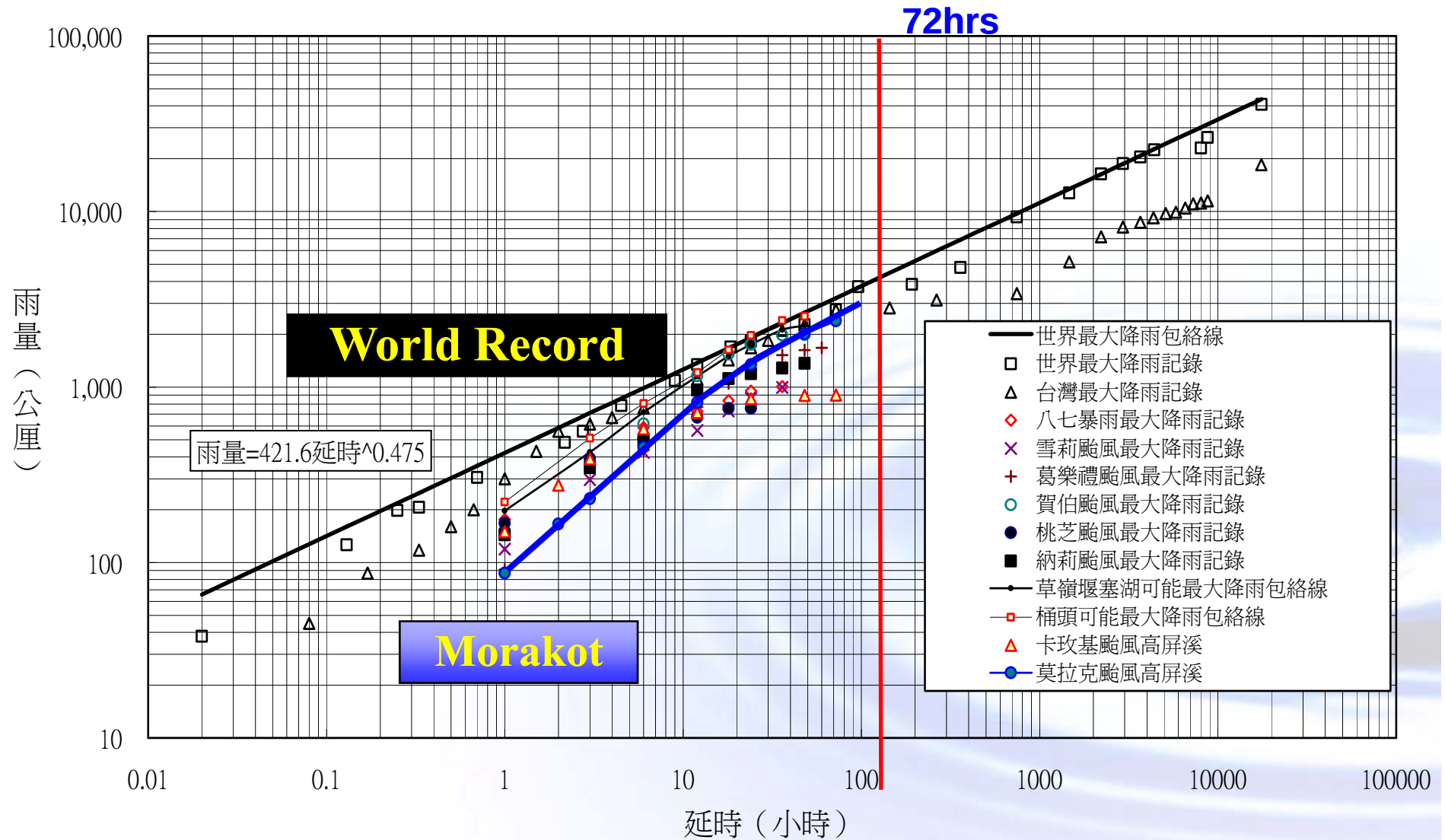
Water Facilities Failure

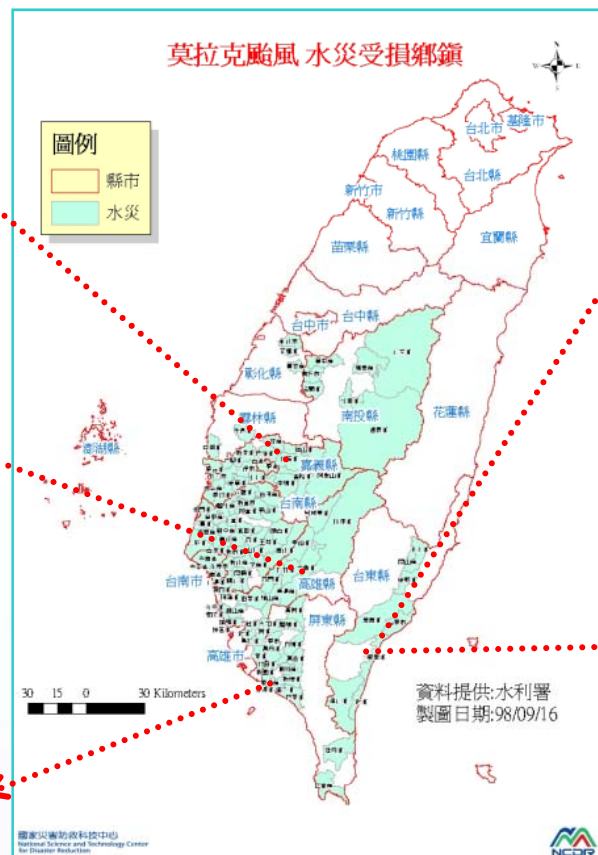
Mud Purging in Linbian & Jiadung

Return Period Analysis of Precipitation

River	Rainfall Stations	24 hrs		48 hrs		72 hrs		Rainfall in Morakot (mm)
		Rainfall (mm)	Return Period (yr)	Rainfall (mm)	Return Period (yr)	Rainfall (mm)	Return Period (yr)	
Choshui Creek	Alishan	1624	> 2000	2361	> 2000	2748	> 2000	2884
Pachang Creek	Chuchi	1583	90	2107	147	2504	238	2637
Chishui Creek	Dadongsan	759	> 2000	1181	> 2000	1467	> 2000	1522
Tsengwen Creek	Tsengwen	1089	489	1644	> 2000	1914	> 2000	1948
Erhjen Creek	Mocha	828	> 2000	1105	> 2000	1191	> 2000	1221
Kaoping Creek	Santimen	1415	> 2000	2216	> 2000	2564	> 2000	2701
Kaoping Creek	Chiahhsien	1078	> 2000	1601	> 2000	1856	> 2000	1916
Tungkan Creek	Laii	829	101	1168	1534	1289	> 2000	1339

Extreme Rainfall in Kaoping Creek Basin





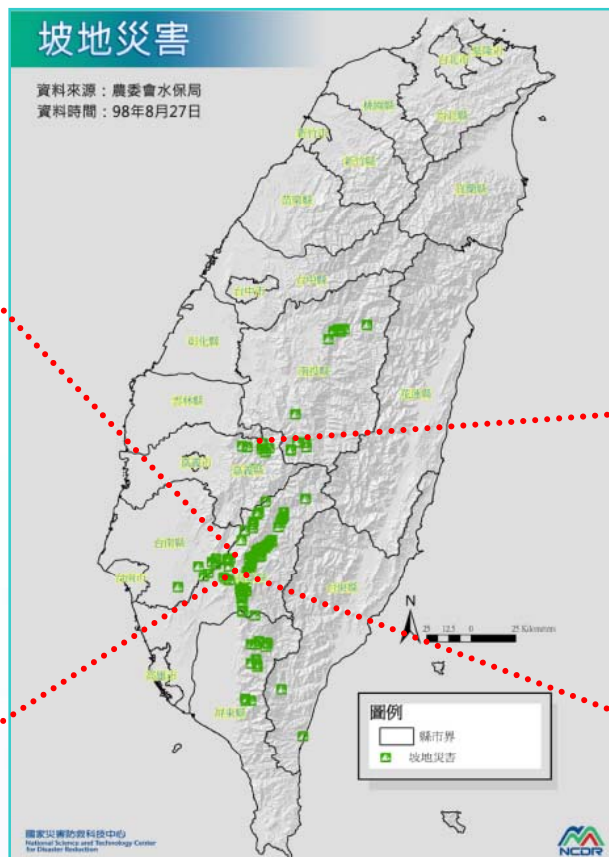
173 Townships

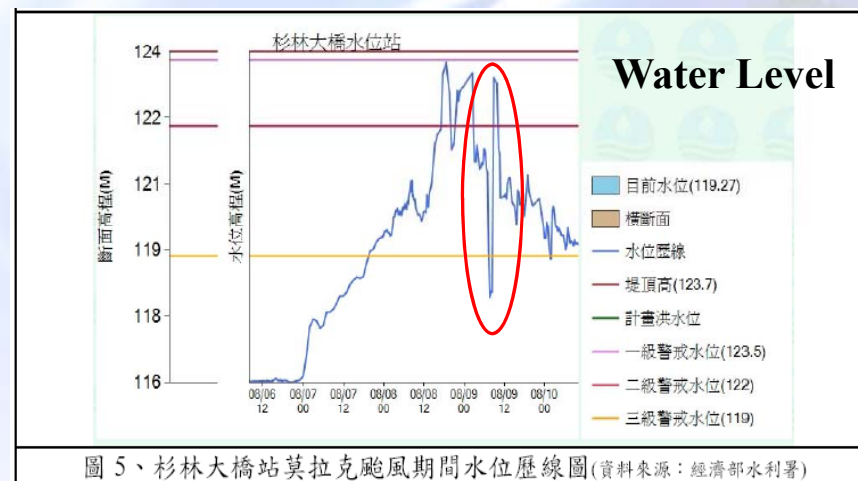
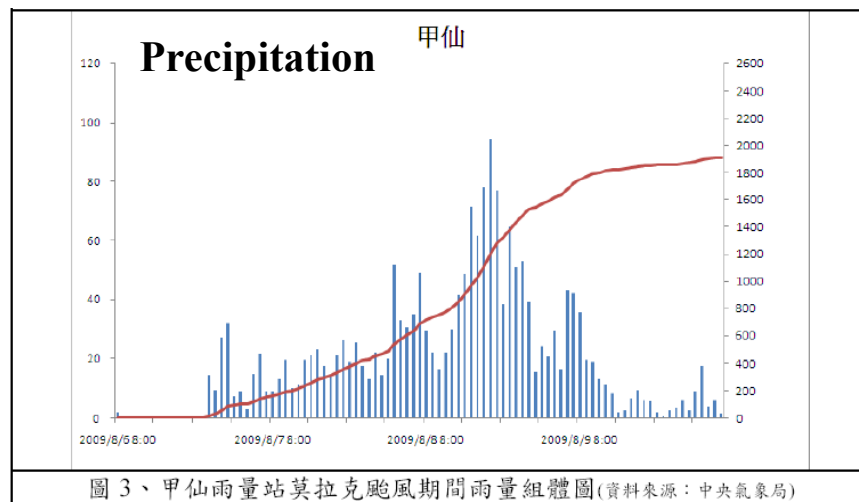
Review Morakot

Statistic	Morakot
Dead & Missing	769
Traffic Interrupted	254
Power Supply Failure	1,595,419
Water Supply Failure	769,159
Agriculture Loss	16,468,630,000 NT\$
Hydraulic Facilities Failure	174
Evacuation	24950



1688 landslides & debris flows occurred in Morakot Typhoon





Before Morakot



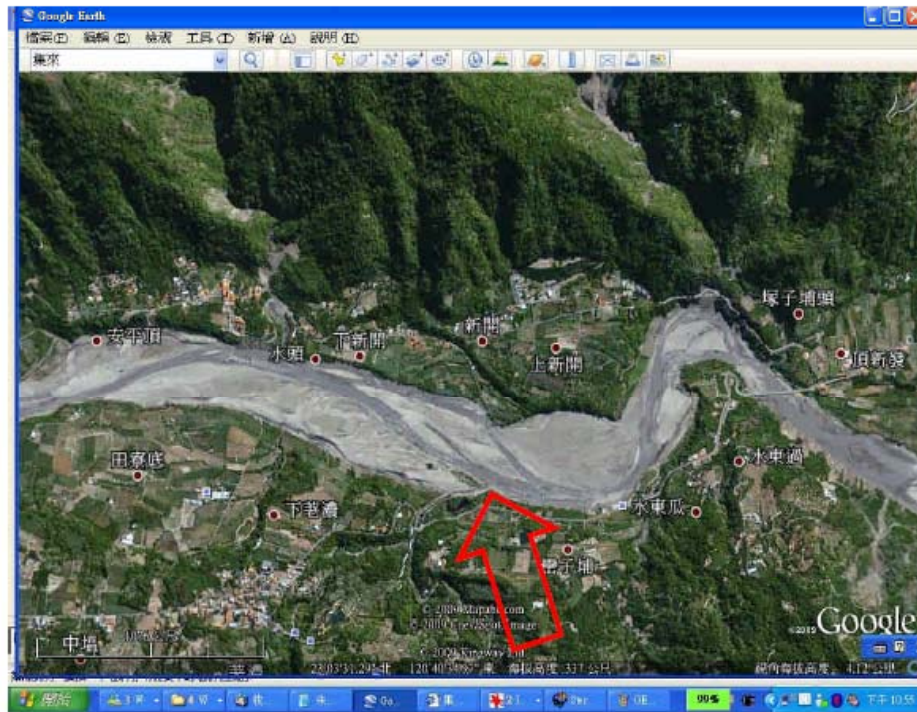
B



After Morakot



Hsieh-Kai Village



六龜鄉新開村32人遭活埋



六龜鄉新開村災後實景

Nature Reservoir

18 Nature Reservoirs are observed during Morakot



高雄縣那瑪夏鄉民生村上
游堰塞湖

At least 57 dikes overtopping or breaking



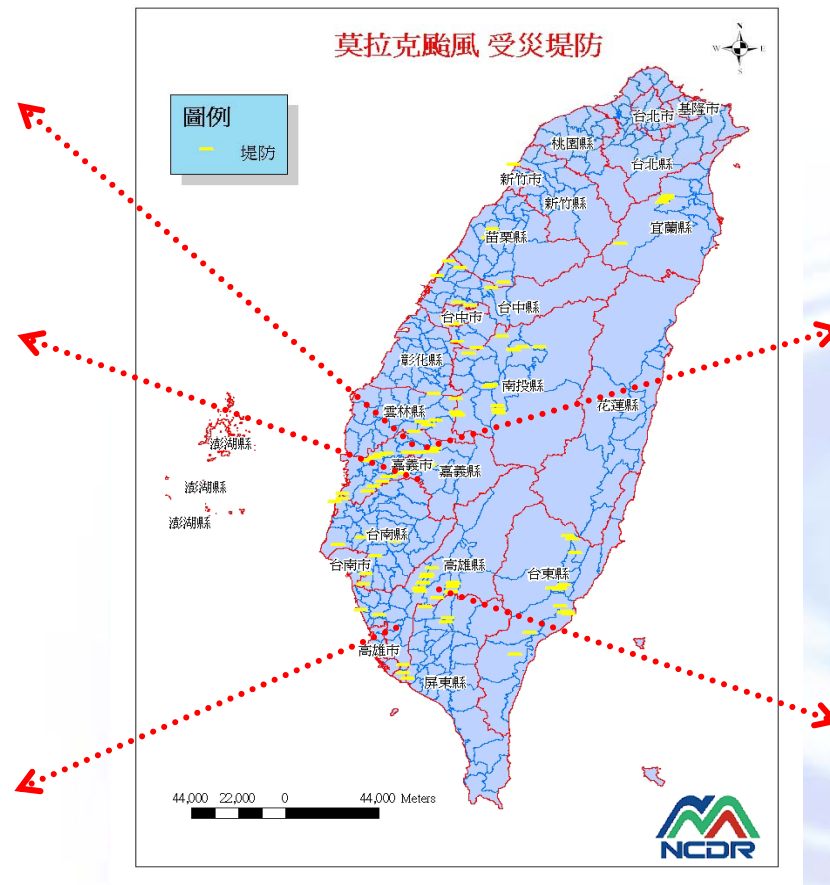
牛稠溪堤防搶險



朴子溪堤防搶險



荖濃溪堤防搶險



赤蘭溪堤防搶險

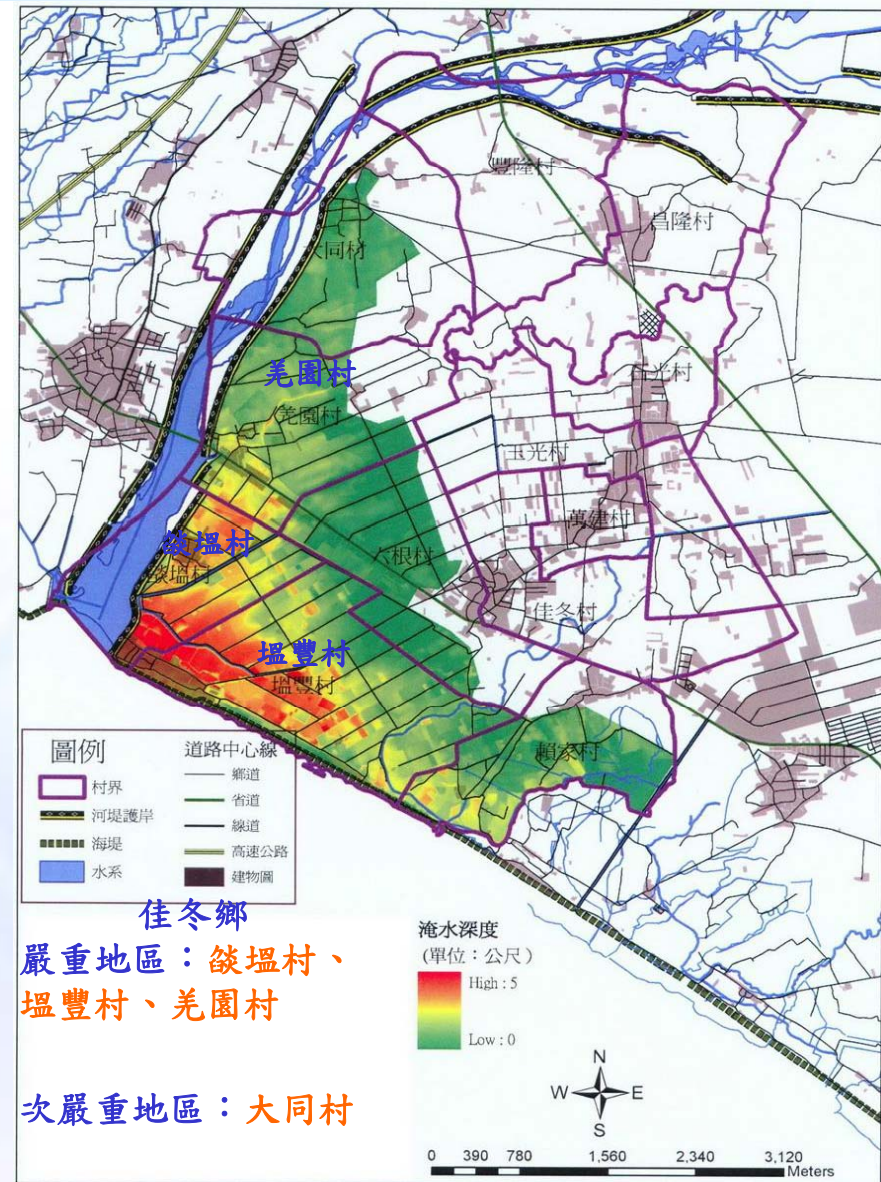
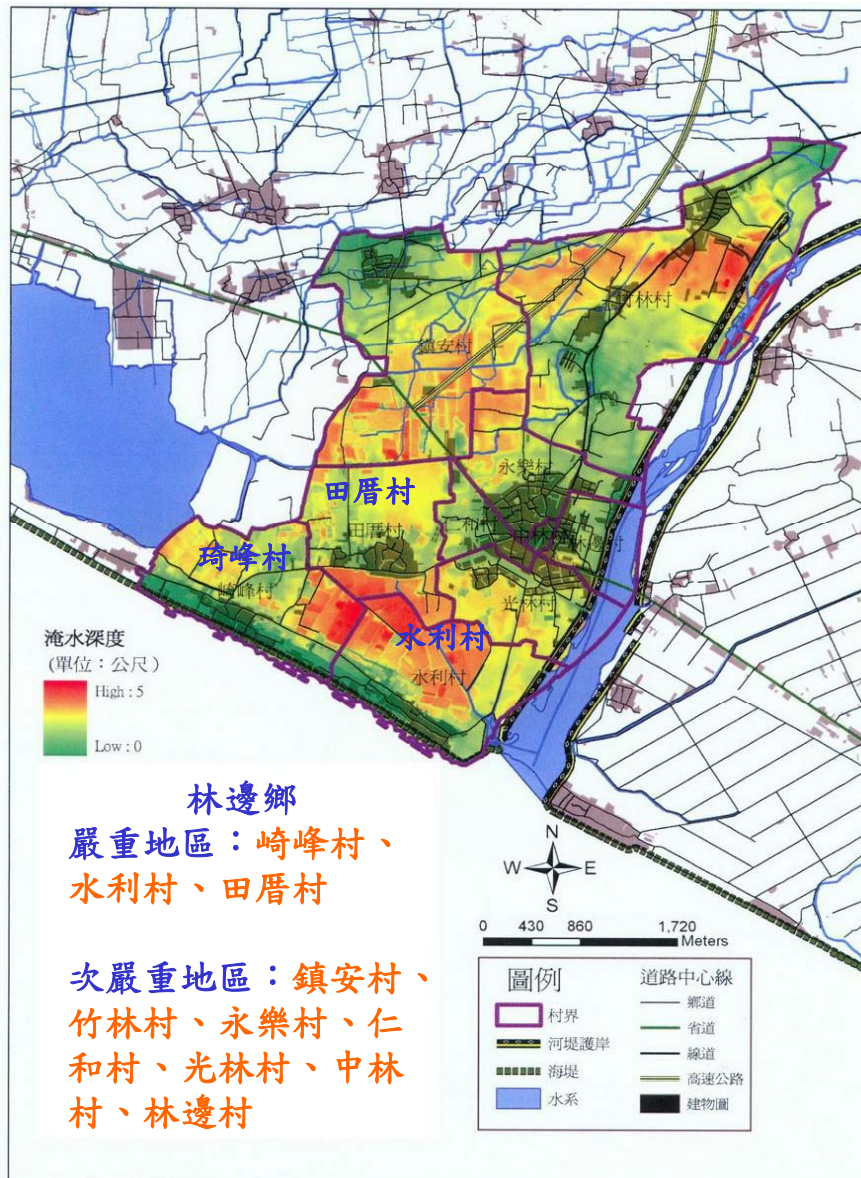


高屏溪堤防搶險

Water intakes, weirs and pipeline in Kaoping Creek were damaged in Morakot



Inundation area in Linbian & Jiadung Township



We used Portable Pumping Machines purging mud and water

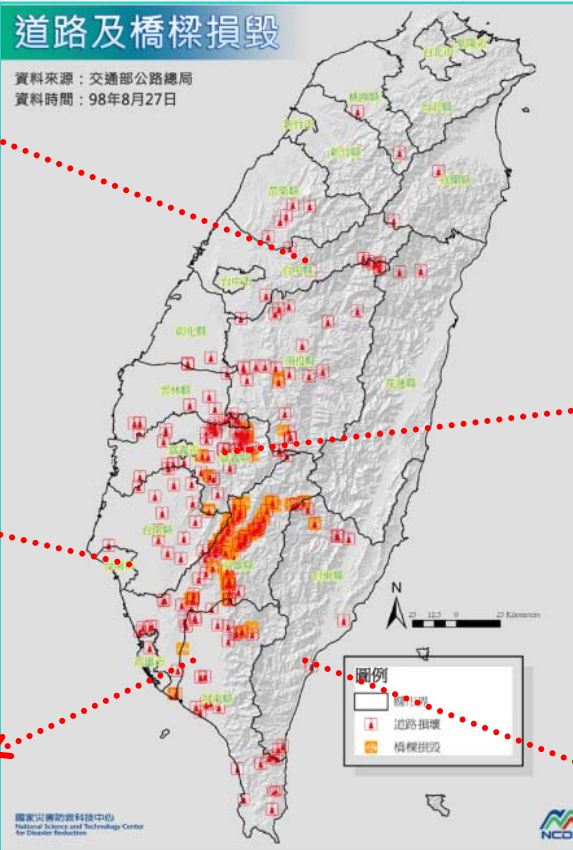


96 Bridges were damaged by floods during Morakot

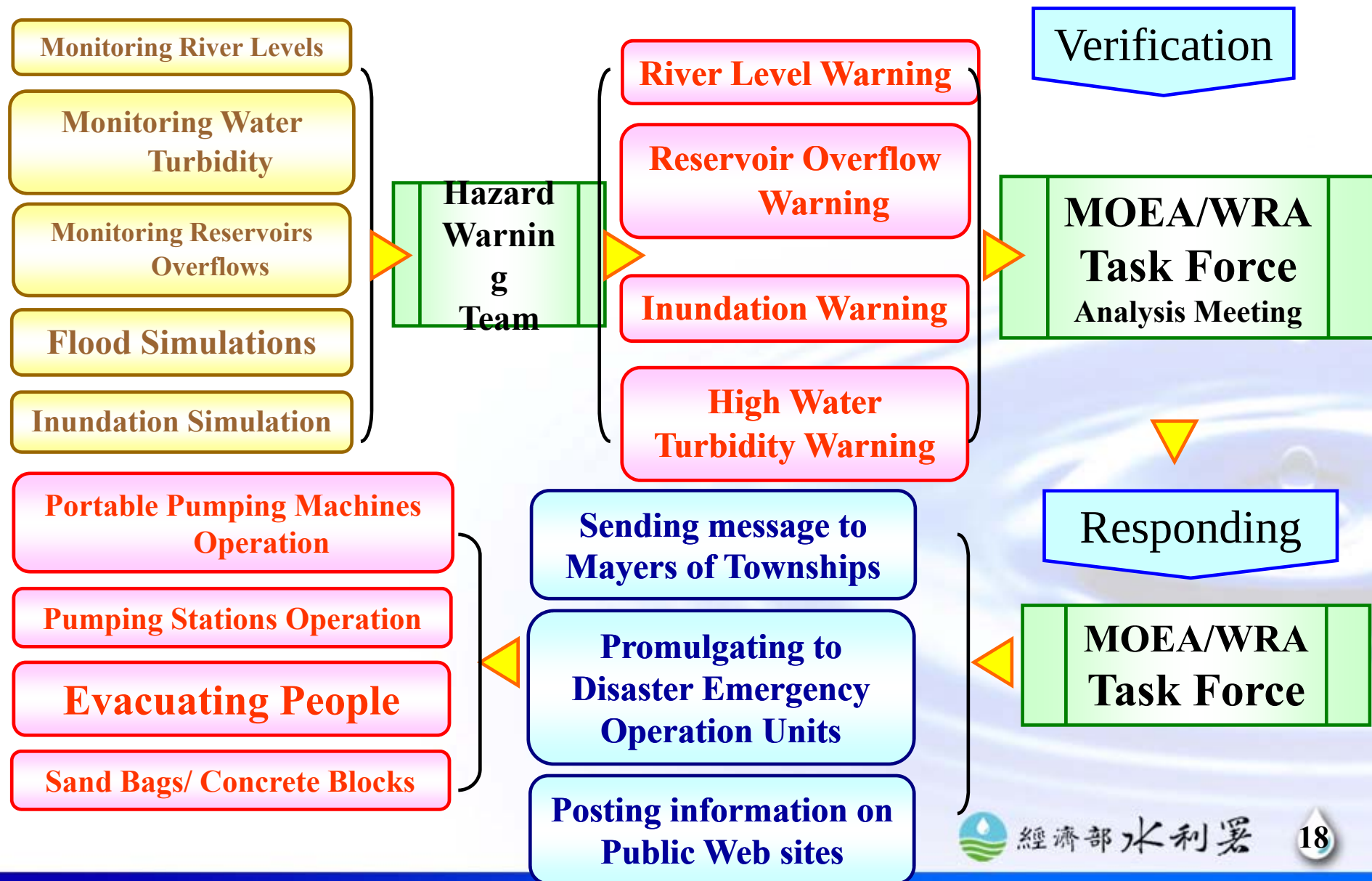


道路及橋樑損毀

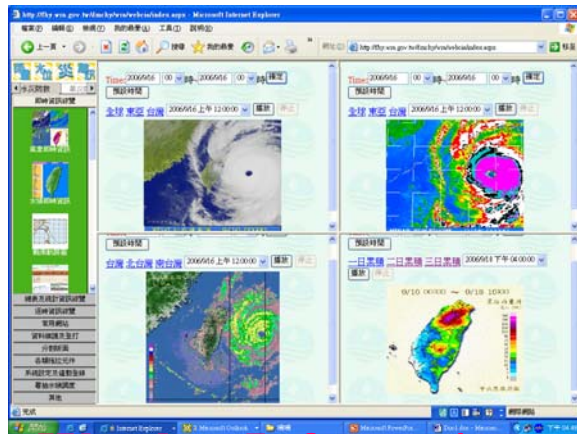
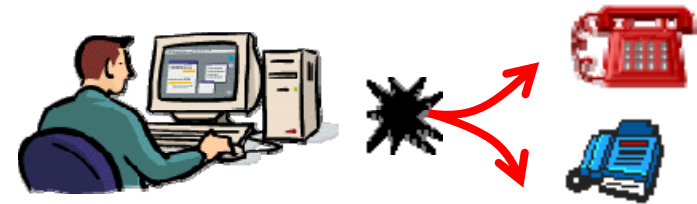
資料來源：交通部公路總局
資料時間：98年8月27日



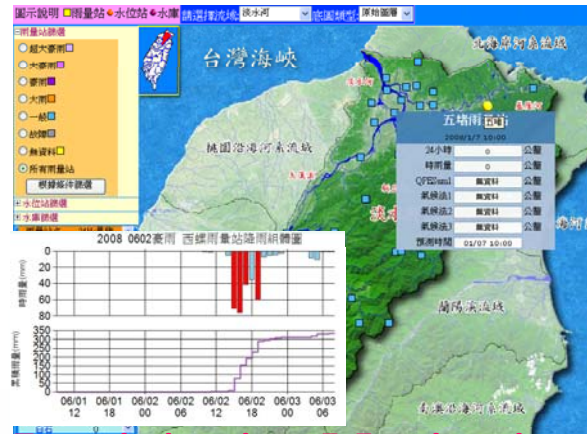
Current Water Disaster Warning System



Flood Emergency Information System



Weather Information



Precipitation Monitoring



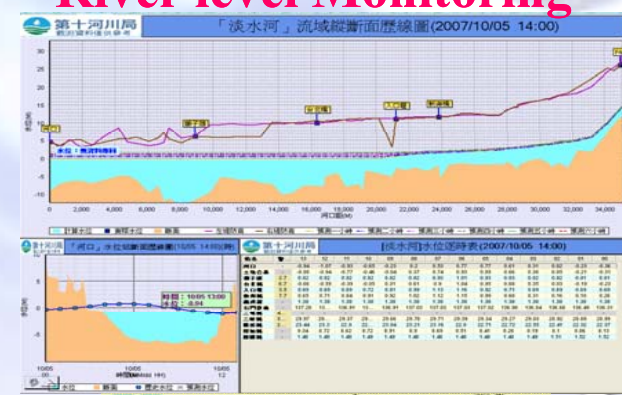
River level Monitoring



Reservoir Monitoring



Coastal Monitoring



Flood Forecasting

地圖

監視站 行動站

查詢

確定

行政劃分

選擇

地理劃分

選擇

設施劃分

選擇

狀態列

系統資訊

水林鄉-萬興閘門橋 網路異常

後湖堤防 網路異常

蘭陽橋 網路異常

曾文二橋 網路異常

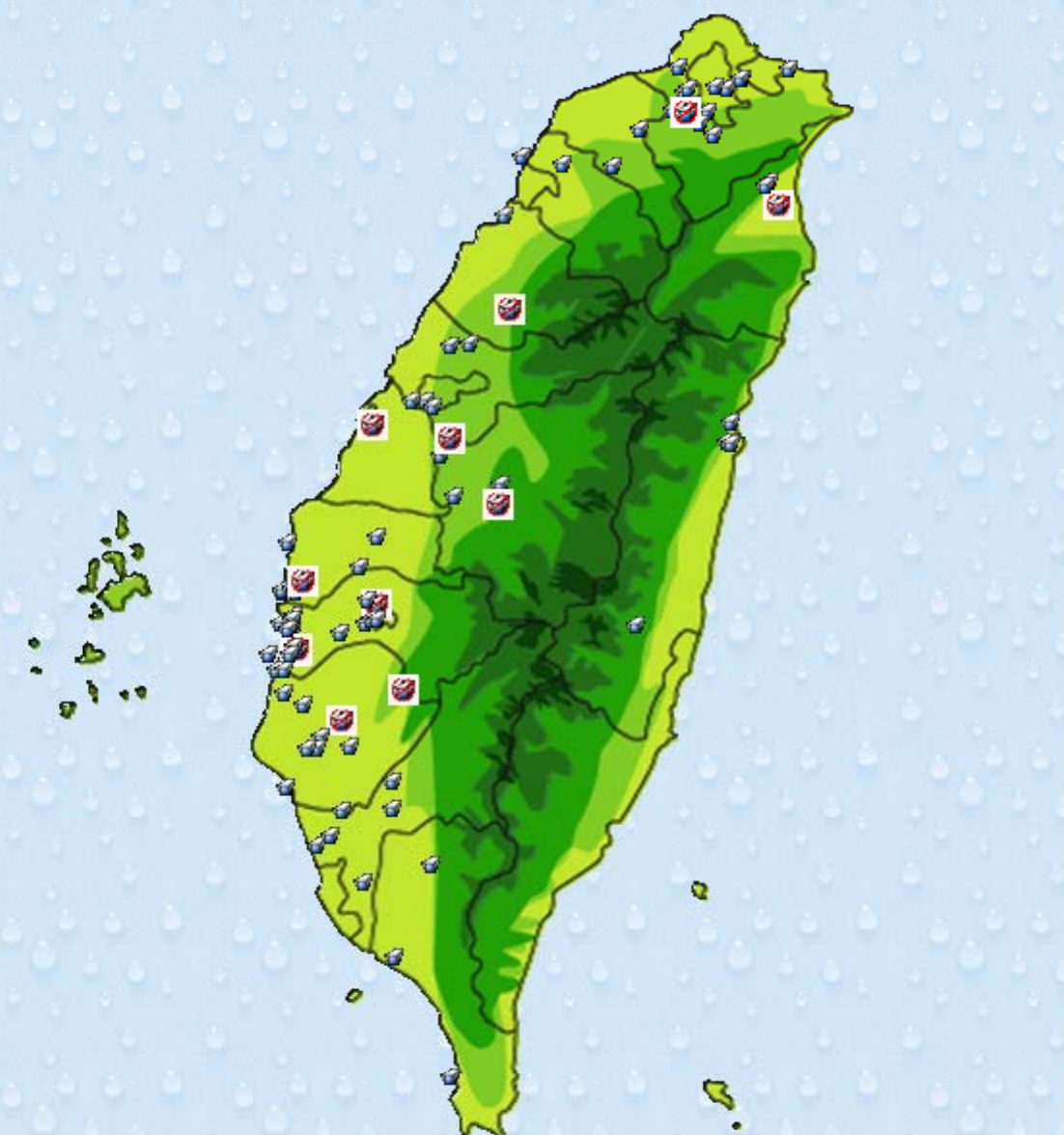
玉峰大橋 網路異常

四汴頭 網路異常

曾文水庫 網路異常

(274155,2634898)

CCTV Disaster Monitoring System

A map of Taiwan with a green and yellow topographic background. Numerous small icons representing monitoring stations are scattered across the island, particularly along the coast and in mountainous regions. The map is displayed on a light blue background with a subtle pattern of white dots.

展示區

圖層

☐ 雨量站

☐ 河川局

☐ 水庫集水區

☐ 水庫堰壩

☐ 水門

☐ 抽水站

☐ 河川

☐ 水位站

☒ 監視站

☐ 超過警戒水位

GIS控制

影像控制

開始

下午 12 星期

Promulgating Warning Messages on Web Site

The screenshot shows the homepage of the Economic Water Bureau's Disaster Information Service Network. The header features the bureau's logo and name in Chinese. Below the header is a navigation bar with links to Home, Emergency Response Organization, Disaster Policy, Water Information, and Disaster Education and Promotion. On the left side, there are three buttons for Flood Warning, Water Level Warning, and Reservoir Warning. Below these is a photo of the bureau's director, Chen Shun-jie. The main content area is titled 'Disaster Information Service Network > Home' and contains a 'Warning Information' section with a list of recent news items, including reports from the Central Weather Bureau and local government disaster response centers. A 'Disaster Information Announcement' section is also visible at the bottom.

經濟部水利署
防災資訊服務網

... 首頁 應變小組組織 防災政策 水情資訊 防災教育宣導

● 淹水警示 ●
● 水位警示 ●
● 水庫警示 ●

台灣
Taiwan

經濟部水利署署長 陳仲賢

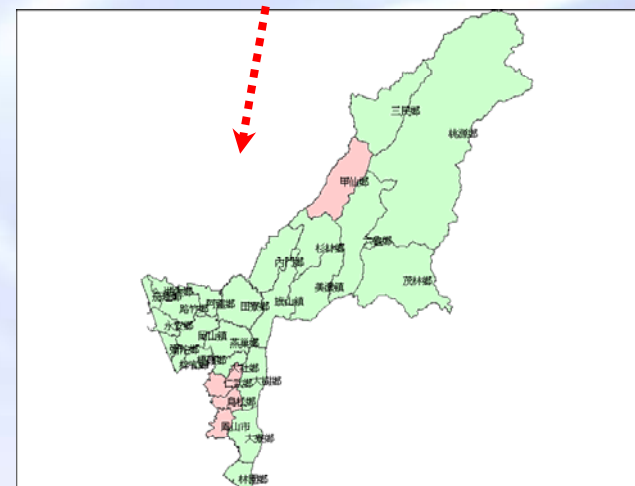
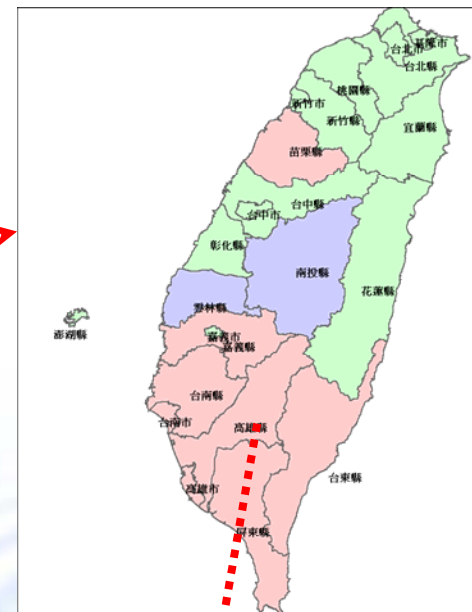
防災資訊服務網 > 首頁

警戒資訊

- 中央氣象局大雨特報
- 中央氣象局發佈低溫特報
- 市政會議報告案(鳳凰颱風)
- 市政會議報告案(辛樂克颱風)
- 市政會議報告案(卡玫基颱風)
- 《臺北市各級災害應變中心》抽水機調
- 「辛樂克颱風災害防救處理檢討」會

防災訊息公告區

- 中央氣象局大雨特報
- 中央氣象局發佈低溫特報



http://fhy.wra.gov.tw/pub_web/

Inundation Warning in Morakot Typhoon

經濟部暨水利署災害緊急應變小組警示單 (莫拉克)

發佈時間	98 年 8 月 7 日 21 時 30 分			編號	13
類型	☒ 淹水潛勢	☐ 水庫洩洪	☐ 水庫濁度	☐ 警戒水位	
警戒區域	詳如附件之主要警戒單位				

警戒事項

1. 依據經濟部水利署降雨-淹水預警系統

(1) 屏東縣：墾丁站時雨量 17.3 小時雨量 54.5, 可能淹水區：恆春鎮-網沙里, 崁頂里, 南灣里, 小腳里, 城南里請及早應變

(2) 高雄縣：甲仙站時雨量 26.3 小時雨量 71, 可能淹水區：甲仙鄉-台 21 線小林段, 台 21 線里關段請及早應變

上述警戒區未來 1 時內有較高之淹水潛勢, 附近低窪地區需特別注意。

主要警戒單位

縣市政府	高雄縣、屏東縣
屏東縣	恆春鎮
高雄縣	甲仙鄉
河川局、水資源局	第 7 河川局 南區水資源局



水災資訊 水災地圖

摘要資訊
氣象資訊
雨量資訊
水位資訊
淹水資訊

降雨-淹水模式

縣市易淹水區域資訊圖

淹水資訊

水庫資訊
濁度資訊
海岸資訊
開設、值勤及整備資訊
抽水機資訊
災情資訊

編輯

縣太平市-太平里,長億里,中山路二段,太平路,中興路。請及早應變

臺中縣太平市公所 太平站

未傳送

編輯

水利署訊:石岡站3小時雨量0.5,可能淹水區:豐原市-圓環東路道,南陽路。請及早應變

臺中縣豐原市公所 石岡站

未傳送

編輯

水利署訊:石岡站3小時雨量0.5,可能淹水區:后里鄉-廣福村,仁里村,后里村,聯合村(三重路),墩北村,泰安村,公館村。請及早應變

臺中縣后里鄉公所 石岡站

未傳送

SMS詳細資料 - Microsoft Internet Explorer

編輯

上次傳送狀態	警戒地點	鄉鎮市長姓名	聯絡電話
上一次傳送的時間	高雄縣甲仙鄉公所	劉建芳	0937-699-868

編輯

水利署訊:石岡站3小時雨量0.5,可能淹水區:神岡鄉-溪洲村,神岡村,庄後村,和睦村,三角村,北庄村,新庄村,神洲村。請及早應變

臺中縣神岡鄉公所 石岡站

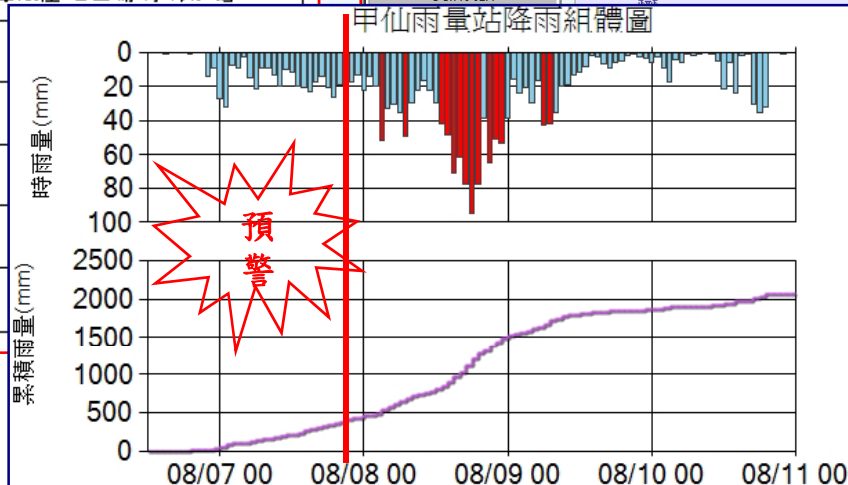
未傳送

編輯

水利署訊:甲仙站6小時雨量102.12小時雨量185,可能淹水區:甲仙鄉-台21線小林段,台21線里關段 請及早應變

高雄縣甲仙鄉公所 甲仙站

已傳送





New Policy & Enhance Action for Water Disaster Mitigation

Life is the first priority

Enhance Water Disaster Warning System

Enhance Evacuation Actions

Hazard Map Publication





Enhance Water Disaster Warning System

Expand Water Warning System

- **Expand Flood Simulation to all major River Basins**

Tsengwen Creek, Dali Creek will be built in 2010

- **Build New Radar Stations for Rainfall Observation**

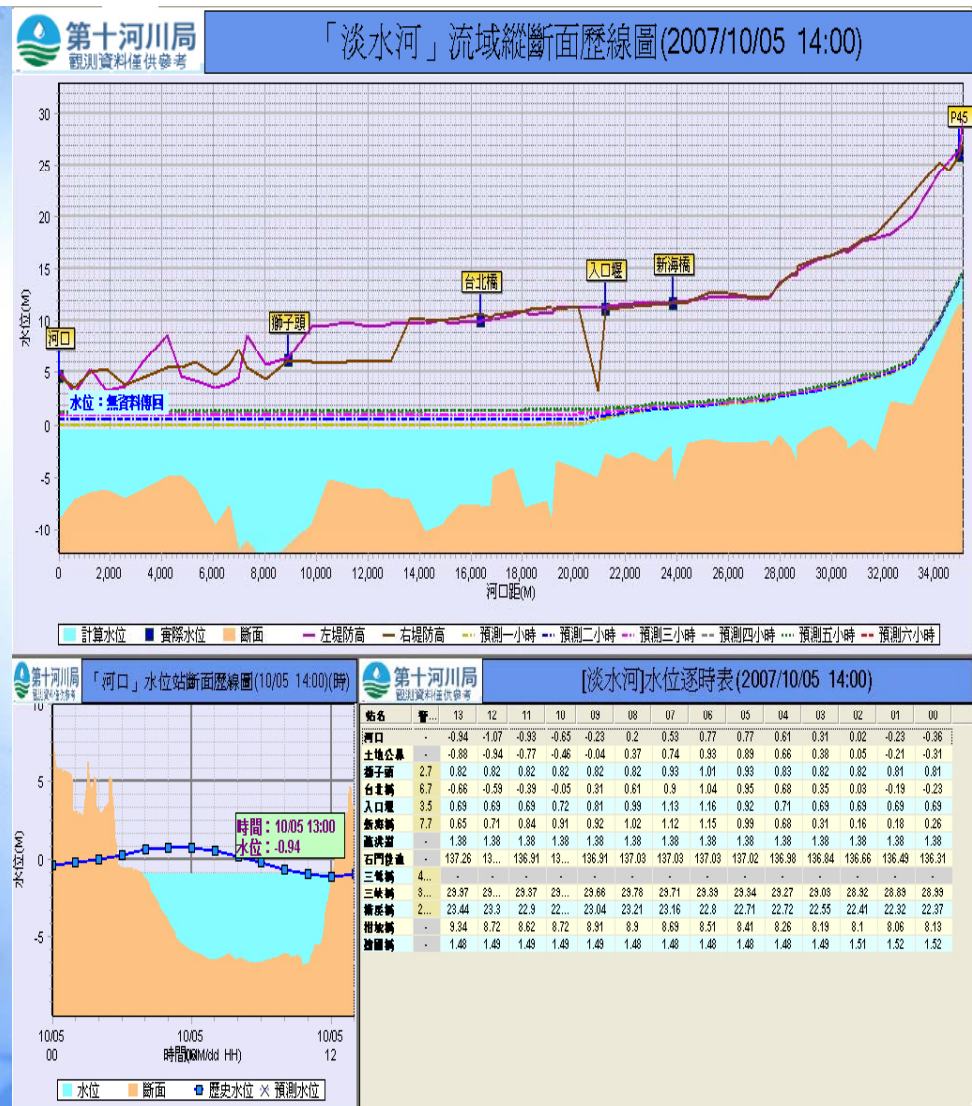
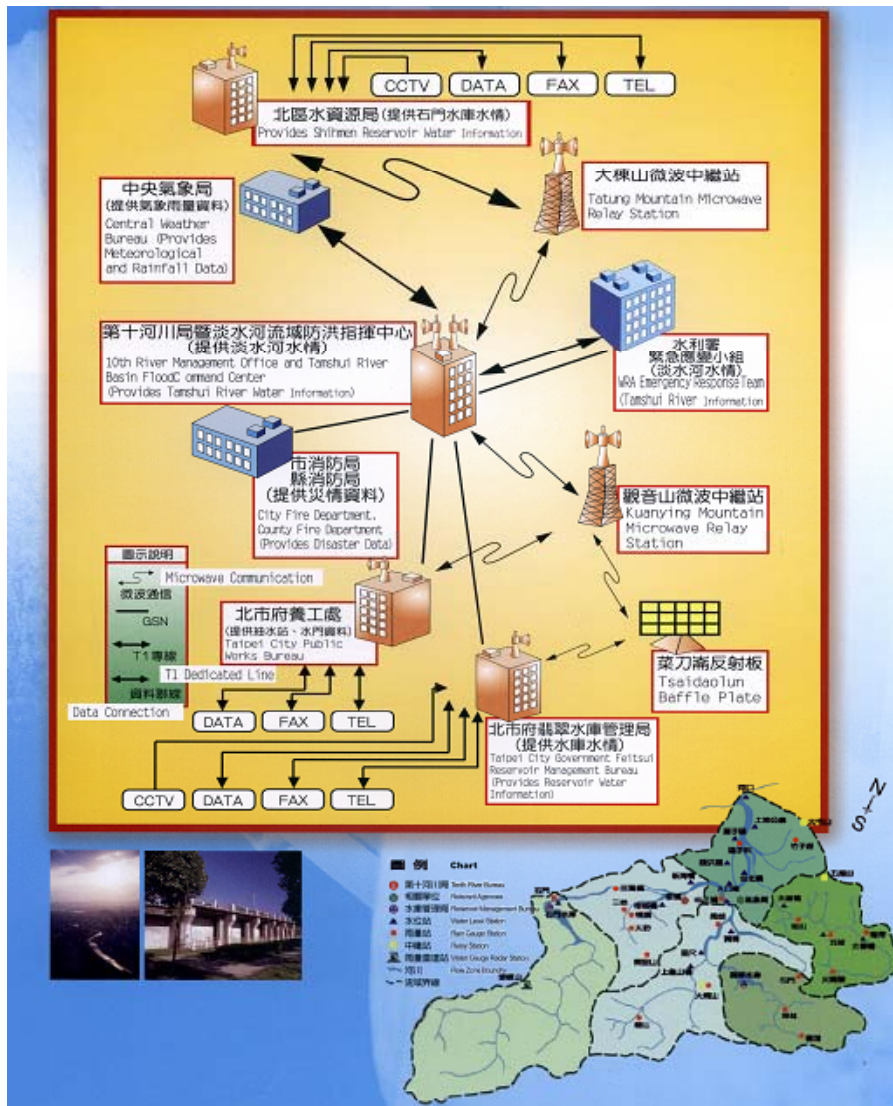
3 Rainfall Observation Radar Stations will be planned

- **Setup Disaster Monitoring System for Local Government**

New CCTV, River level observation Network will be built before May, 2010



Expand Flood Warning System to all major river basins





Enhance Water Disaster Warning System(conti.)

Upgrade Flood Simulation Technology

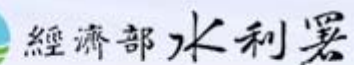
- Develop Weather-report type Flood Warning System
- Develop Integrated Disaster Warning System

Integrated Landslide, Debris flow, flood and inundation warning messages

- Develop a more public friendly Warning System

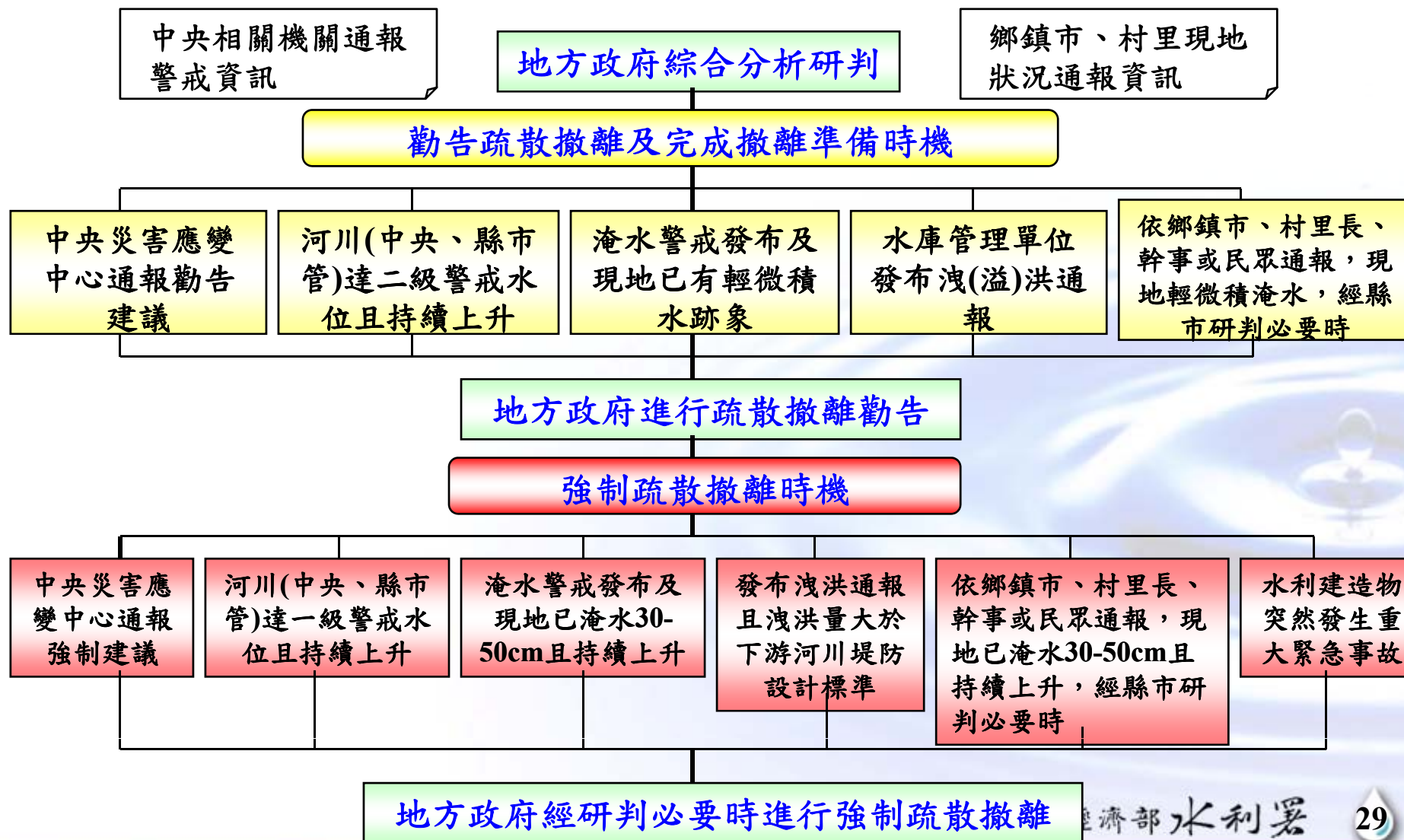
Promulgating warning messages through Cell phone system , Cable TV channel and police/fire station broadcasting system





Enhance Evacuation Actions

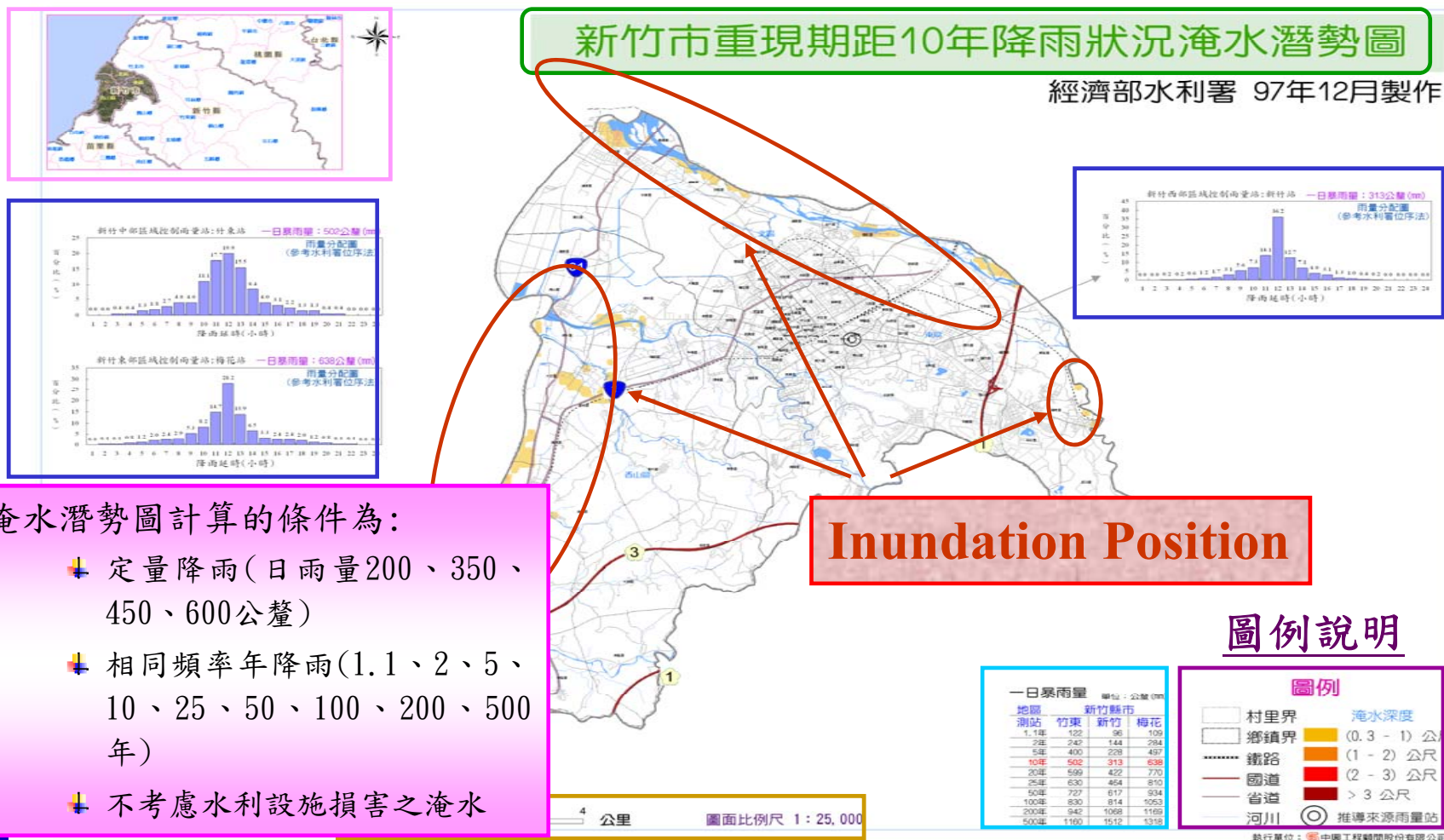
Combine Warning Message and Evacuation Action



Hazard Map Publication

Renew Hazard Map continuously

Promulgate Maps on Web Site Upgrade to Risk Map





Conclusion

- ④ The Disaster brought by Morakot *will come over anytime in the future ! Maybe more often !*
- ④ *Useful and Precise Information is the keep for Disaster Mitigation Management.*
- ④ Water Disaster Warning System and Evacuation need *more advanced and people-friendly information technology* to enhance !



簡 報 完 畢
敬 請 指 教



經濟部水利署