今日大禹

Today's Water Conservationists

經濟部水利署

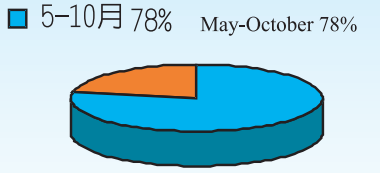
近年來，隨著地球暖化，
產生嚴重的「水失衡」現象，
過度的人為開發，
更讓土地失去原有的應變能力，
氣候的變化及人為的文明衝擊
為世界各地帶來劇烈的衝擊與災害。

Recently, with global warming,
The entire planet has suffered climate change, Resulting in severe "water imbalance", Over development from man, Has robbed the soil of its ability to respond, Exacerbating climate change, And leading to dramatic impact and damage globally.

一直以來，
政府為因應未來越來越不可預知的水災害，不但研發引進世界先進的治水技術及儀器，各單位更是戮力匪懈、不分晝夜的積極研商合作，成立嚴密完整的防救體系，從中央到地方層層努力、運籌帷幄，成為我國治洪防災的時代尖兵。

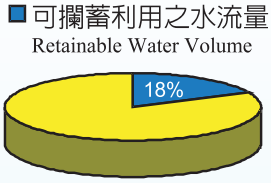
Over the years,
The government, responding to unpredictable flooding in the future,
Not only has developed and introduced advanced global water control technology and equipment, But also unites the strengths of every agency, to actively research and cooperate around the clock,
And set up stringent and complete disaster relief systems, From the central government to the various levels of local government, strategic plans are mapped out,
And form Taiwan's modern flood prevention and disaster relief corps.

全年雨量分配圖
Annual Rainfall Distribution Chart



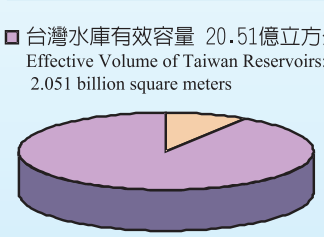
▶ 五月至十月之雨量即佔全年之78%，枯水期長達六個月
Rainfall from May - October comprise 78% of annual total, the dry season lasts up to six-months.

攔蓄利用之水流量
Retained Water Volume



▶ 台灣河川坡陡流急、腹地狹隘，逕流量被攔蓄利用的僅有177.54億立方公尺，約佔年總逕流量之18%。
Taiwan's rivers are very steep and rapid, within a narrow landscape, with only 17.754 billion square meters of water volume can be retained, which accounts for about 18% of total annual volume.

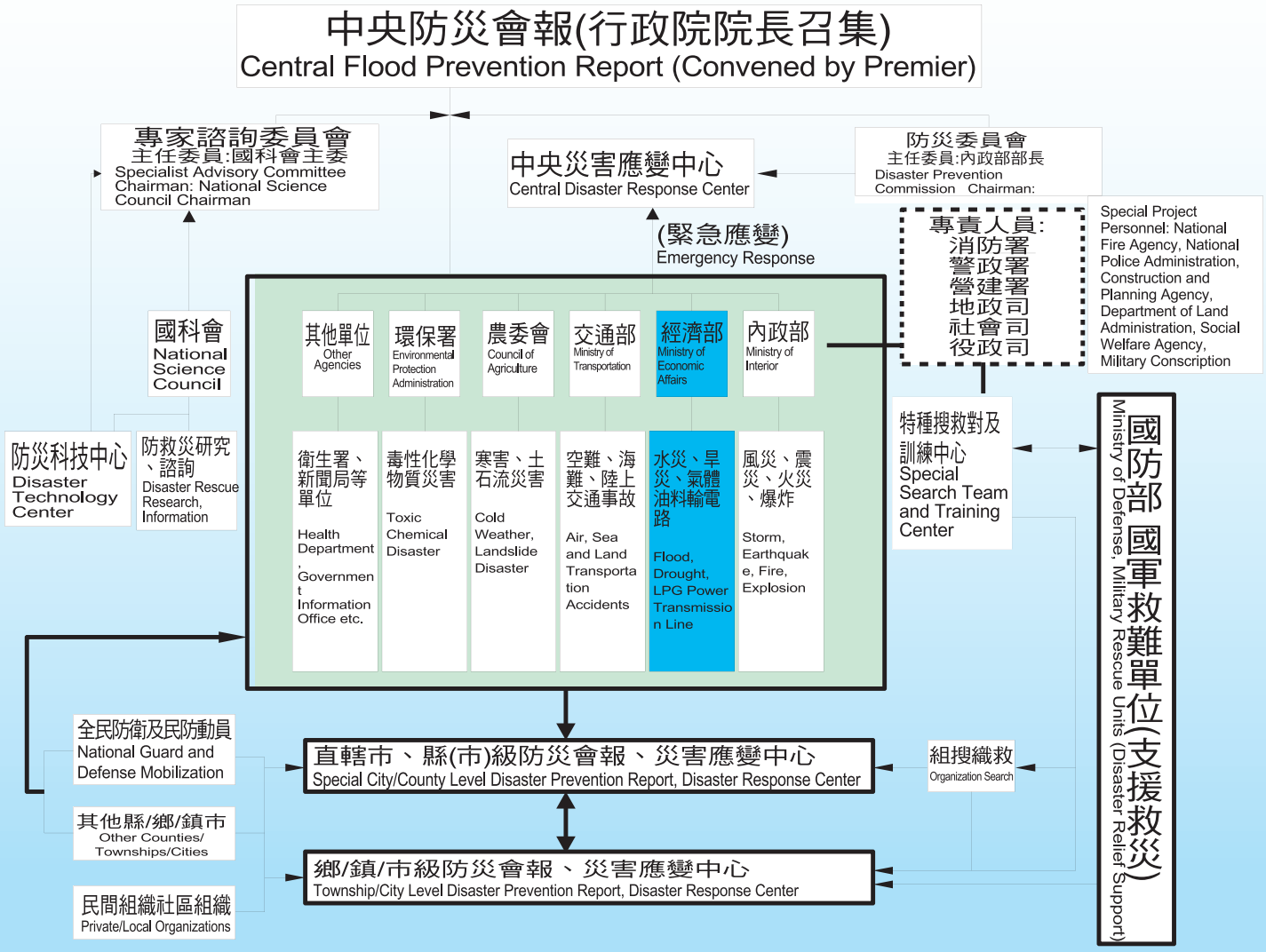
台灣水庫有效容量
Effective Volume of Taiwan Reservoirs



▶ 台灣水庫總容量約22.43億立方公尺，有效容量為20.51億立方公尺
Total volume of Taiwan reservoirs is approximately 2.243 square meters, with effective volume equal to 2.051 square meters.

台灣天然的水文條件不佳，以及全球氣候變遷等因素，水災災害應變工作更顯重要。因此，在行政院院長召集下，由防災委員會、專家諮詢委員會共同組成「中央防災會報」，並由防災委員會成立「中央災害應變中心」，彙集各級相關部門，各司其職，共同成立緊急應變體系，並串聯各直轄市、縣、鄉鎮市級地方災害應變中心，從中央到地方，建構了完善的災害應變體系。

Taiwan's natural water conservation conditions are not ideal, combined with factors such as climate change; therefore water conservation and flood control takes on added importance. Under the direction of the Executive Yuan, the Disaster Prevention Commission and Professional Consultative Commission, jointly formed the "Central Disaster Response Center", which collects information from relevant government agencies, to jointly establish emergency response systems, and link emergency response centers at the local level, from the central government to local governments, forming a complete emergency response system.



》健全防災體系
Robust Disaster Relief System

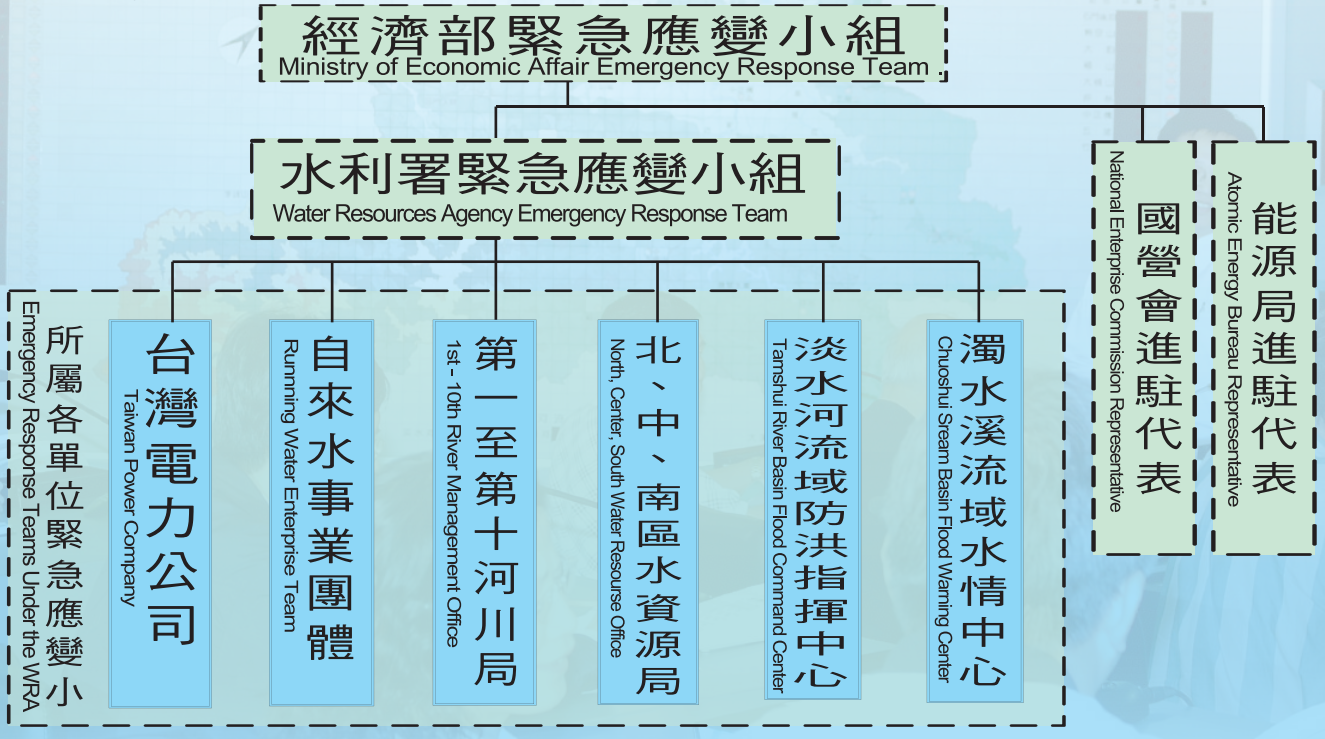
【經濟部水利署緊急應變小組(水災、旱災)】
Water Resources Agency Response Team (Flood, Drought)

經濟部依『災害防救法』第三條第二款規定為中央災害防救業務水災主管機關，負責指揮、督導及協調各級相關行政機關及公共事業執行及各項水災災害預防、緊急應變及災後復原重建工作。

Tamshui River Command Center's Command System According to the "Disaster Prevention and Relief Law", Section 3.2, the Ministry of Economic Affairs is responsible for flood and disaster prevention and relief operations. It handles commanding, supervising and coordinating flood and disaster prevention and relief among all relevant administrative agencies and public enterprises, as well as all flood and disaster prevention, emergency response and post-disaster reconstruction.

統合所有治水單位成立經濟部水利署，針對全台各區域不同的水利需求，成立第一至第十河川局與北、中、南水資源局、淡水河防洪指揮中心、濁水溪流域水情中心、台灣電力公司、自來水事業團隊等單位，而經濟部水利署的『緊急應變小組』，更強化災害之預防、災害發生時之緊急應變，及災後之復原重建措施，有效執行防汛檢查等工作

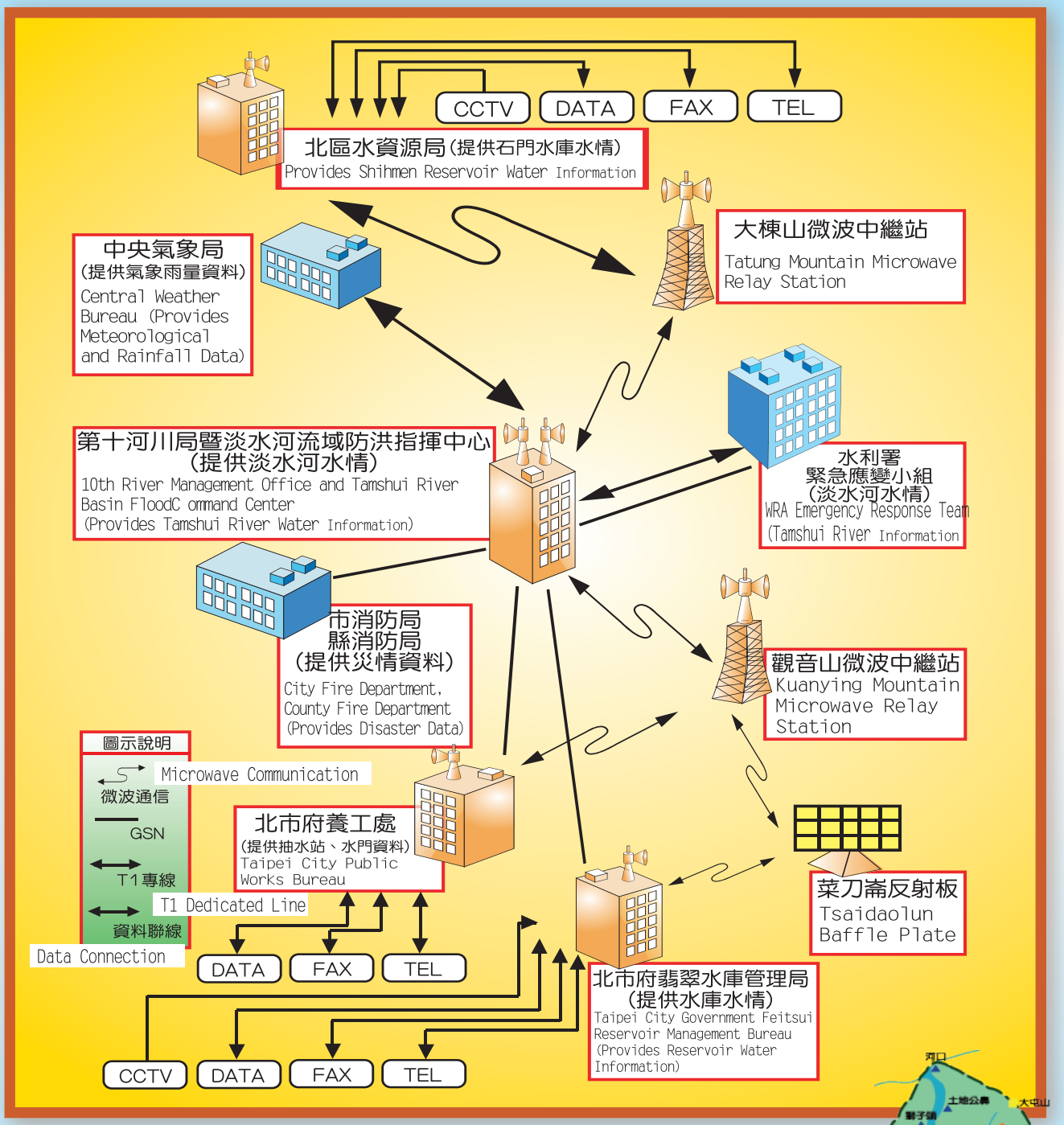
Coordinating all water control agencies the Ministry established the Water Resources Agency. Responding to the diverse water conservation needs of Taiwan's various regions, the Agency has set up the 1st through 10th River Management Office and Water Resources Office, The Tamshui Flood Control Command Center, Chuoshui Stream Flood Prevention Center, Taiwan Power Company, Running Water Business Team, as well as North, Center and South Water Resource Bureaus. The Water Resources Administration's "Flood Affair Response Team" strengthens disaster prevention, emergency response when disaster strikes, and post-disaster reconstruction measures. These effectively implement flood prevention inspections and other jobs.



》淡水河流域水文氣象測、預報系統
Hydrology, Meteorology Monitoring and Forecasting System

1.水文氣象測報系統：以數據路線接收下列單位相關資訊：
第十河川局無線電測報：15座水位站及9座雨量站。
石門水庫系統：4座水位站、10座雨量站及水庫流入量、溢洪量等資訊。
翡翠水庫系統：3座水位站、6座雨量站及水庫流入量、溢洪量等資訊。
中央氣象局：颱風動態、颱風警報、衛星雲圖、五分山雷達觀測及雨量站等資訊。
臺北市系統：水門內外水位、抽水站運轉資訊。
2.洪水預報系統：即時收集水文氣象資訊，輸入電腦程式推算1-6小時後之河川水位。
3.水門、抽水站監測系統：在各抽水站設置監測及傳輸系統，將內外水位及水門、抽水站操作情況即時送至中心展示。
4.資料展示系統：於指揮中心設置大型顯示器及馬賽克看板，立即展示即時獲得之各項資訊。
5.微波通信系統：北市養工處、翡翠水庫、石門水庫等地方運用CCTV監測、電話、傳真、水文資料。
6.有線專線：氣象局、台北縣市政府〈基隆市、桃園縣〉。

1.10th River Management Office
Wireless Testing System Utilizes data lines to receive information from the following relevant agencies:
Water Conservation System: 15 Water Level Stations and 9 Precipitation Stations Feitsui Reservoir System: 3 Water Level Stations, 6 Precipitation Stations and Reservoir Intake Volume, Spillway Volume and other relevant data.
Central Weather Bureau: Typhoon Updates, Typhoon Warnings, Satellite Pictures, Doppler Radar, and Rain Guage Stations and other relevant data.
2.Flood Forecasting System: Real-time Collection of Hydrology and Meteorology Data, Computer Software Input for Calculation River Levels for Next 1-6 Hours.
3.Shihmen, Water Pump Station Monitor System: Monitoring and transmission systems at every water pump station, transmits real-time internal and external water levels and watergate and pump station command conditions to the center for display.
4.Data Display System: Large-scale displays and signboards installed at command center to immediately display the most update information.
5.Microwave Communications System: The Feitsui Reservoir, Shihmen Reservoir and other areas use CCTV monitors, telephone and fax to transmit hydrology data.
6.Dedicated Lines: Central Weather Buerau, Taipei City and County, Government (Keelong City, Taoyuan County).


CCTV
DATA
FAX
TEL
北區水資源局(提供石門水庫水情)
Provides Shihmen Reservoir Water Information
中央氣象局
(提供氣象雨量資料)
Central Weather Bureau (Provides Meteorological and Rainfall Data)
大棟山微波中繼站
Tatung Mountain Microwave Relay Station
第十河川局暨淡水河流域防洪指揮中心
(提供淡水河水情)
10th River Management Office and Tamshui River Basin FloodC ommand Center
(Provides Tamshui River Water Information)
水利署
緊急應變小組
(淡水河水情)
WRA Emergency Response Team
(Tamshui River Information
市消防局
縣消防局
(提供災情資料)
City Fire Department,
County Fire Department
(Provides Disaster Data)
觀音山微波中繼站
Kuanying Mountain Microwave Relay Station
圖示說明
Microwave Communication
微波通信
GSN
T1專線
T1 Dedicated Line
資料聯線
Data Connection
北市府養工處
(提供抽水站、水門資料)
Taipei City Public Works Bureau
菜刀崙反射板
Tsaidaolun Baffle Plate
北市府翡翠水庫管理局
(提供水庫水情)
Taipei City Government Feitsui Reservoir Management Bureau
(Provides Reservoir Water Information)


例 Chart
第十河川局 Tenth River Bureau
相關單位 Relevant Agencies
水庫管理局 Reservoir Management Bureau
水位站 Water Level Station
雨量站 Rain Gauge Station
中繼站 Relay Station
雨量雷達站 Water Gauge Radar Station
河川 Flow Zone Boundry
流域界線
N
S
河口
土地公嶺
大屯山
劍子頭
竹子湖
擺子咀
疏洪道
新海橋
台北橋
五指山
入口處
三鶯橋
石門
板橋
中正橋
氣象局
大直橋
三峽
橫溪
秀朗
大豹
松山
五堵
介壽橋
熊空山
上島山橋
石門水庫
大棟山
平林
青湖

》淡水河流域防洪資訊暨展示系統
Tamshui River Flood Prevention Data and Display System

■ 系統特色 ■ System Features

◎架構設計：MVC模型基礎，以元件為架構，建立新一代淡水河流域防洪資訊系統。

◎資訊傳遞：以網路服務(Web Service)作為底層資料傳輸協定,突破以往主從架構單機操作的限制，可在任何時間、地點、電腦操作。

Structural Design: MVC model foundation, components form the structure to build a new generation Tamshui River Flood Prevention Data System.

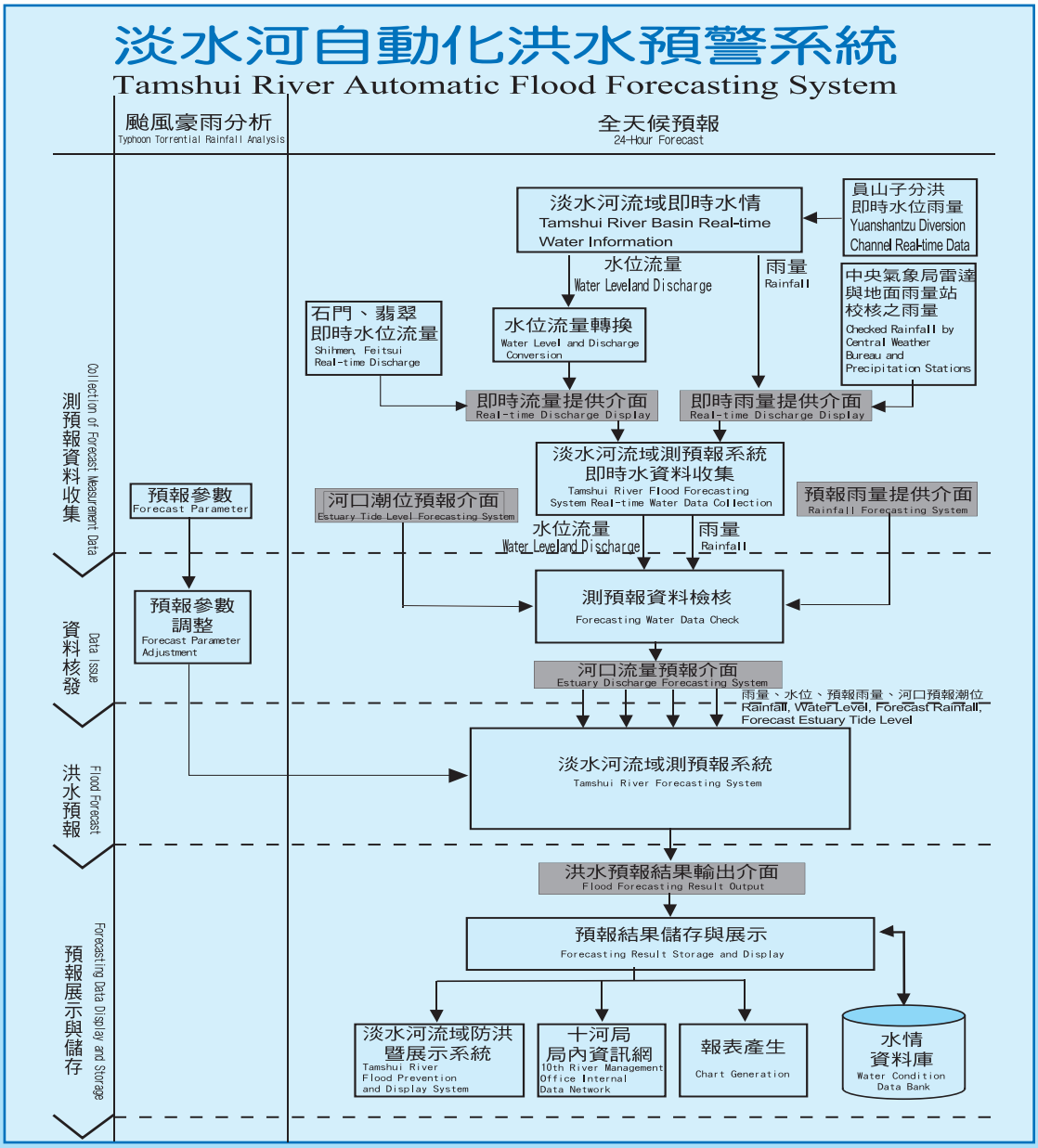
Data Transmission: Uses web services as the basic data transmission protocol, breaking through the restrictions of conventional server/client operation, providing operation from any computer, anytime, anywhere.

■ 系統功能 ■ System Functions

◎ 即時雨量水位展示
◎ 即時氣象展示
◎ 即時淡水河流域洪水預報結果展示
◎ 即時颱風軌跡動態展示
◎ 即時台北縣市水門抽水站資訊展示
◎ 即時石門、翡翠水庫運轉資訊展示
◎ 即時基隆河淹水水偵測及淹沒範圍展示

Real-time Rainfall and Water Level Display.
Real-time Weather Display.
Real-time Tamshui River Flood Forecasting Result Display.
Real-time Typhoon Path Tendency Display.
Real-time Taipei City Water Gate and Pumping Stations Data Display
Real-time Shihmen, Feitsui Reservoirs Operations Data Display
Real-time Keelung River Flood Water Monitors and Flooded Areas Display

淡水河自動化洪水預警系統
Tamshui River Automatic Flood Forecasting System



將流域內收集之各項水文資訊、颱風動態及防洪排水設施狀況資訊等資料提供查詢：

1.防洪指揮決策系統：提供防洪指揮決策所需之各項必要參考資訊。

2.水文資料庫系統：提供流域內防洪作業單位以數據線路連接，並利用點對點查詢作業程式直接查詢各項防洪資訊，以供防洪操作參考。

3.網際網路查詢系統：為提供一般民眾對流域內降雨分布、河川水位等相關資訊有所了解本中心架設網際網路查詢服務系統，提供一般民眾上網查詢

(http://www.wca10.gov.tw)

淡水河流域內防洪設施

1.水庫：石門水庫、翡翠水庫〈台北市轄〉

2.堤防：台北市15,600公尺，台灣省52,500公尺；合計68.100公尺

3.抽水站：台北市50座，台灣省29座；合計79座

4.疏洪道：二重疏洪道

5.水門：

種類Type	臺北市Taipei City	台灣省Taiwan Province	合計Total
疏散門Evacuation Gates	28	8	36
防水閘門Watertight Gates	50	40	88

6.洪水預報系統：水利署第十河川局於淡水河流域共設有即時遙控雨量站9站，即時遙控水位站15站，中繼站3站，配合洪水預報模式，組成洪水預報系統。

Collects and makes available data from the flow zone, including hydrology data, typhoon updates and flood prevention and discharge equipment:

1. Typhoon Prevention Command Decision-Making System: Provides Flood Prevention Command Decision-Makers with the data they need.

2. Hydrology Database System: Provides flood prevention operations data from within the flow zone, and using point-to-point data inquiries.

3. Internet Inquiry System: In order to provide the public with rainfall distribution data from within the flow zone, as well as river level data and other relevant information, this center has set up an internet data inquiry system for the public to access online. (http://www.wca10.gov.tw)

Tamshui River Flood Prevention Facilities

1. Reservoir: Shihmen Reservoir, Feitsui Reservoir (Jurisdiction of Taipei City)

2. Dike: Taipei City 15,6000 meters, Taiwan Province 52,500 meters: Total 68,100 meters

3. Water Pump Stations: Taipei City, 50; Taiwan Province; Total: 79

4. Spillways: Erchong Spillway

5. Watergates：

6. Flood Prediction System: WRA Number Ten River Vureaus has installed 9 remote control rain gauge stations within the Tamshui River Basin, realtime as well as 15 control water level stations

洪水預警報系統三級警戒水位定義
(以淡水河為例)

Definitions of Flood Forecasting Systems Three Levels of Alerts
(ex : Tamshui River)

三級警戒水位：係為水防準備
當河川水位未來二小時內可能超過高灘地高程
立即通知縣市政府關閉水門、疏散門及抽水站
準備防汛工作，民眾應離開行水區。

Alert Level 3 Water Level: Refers to preparation level for possible flooding. Indicates that within the next two hours the water levels may surpass the highest level along the riverbank, and local government must be notified to close water gates and discharge gates, and that pumping stations should prepare for flood waters. Residents should leave water flow areas.

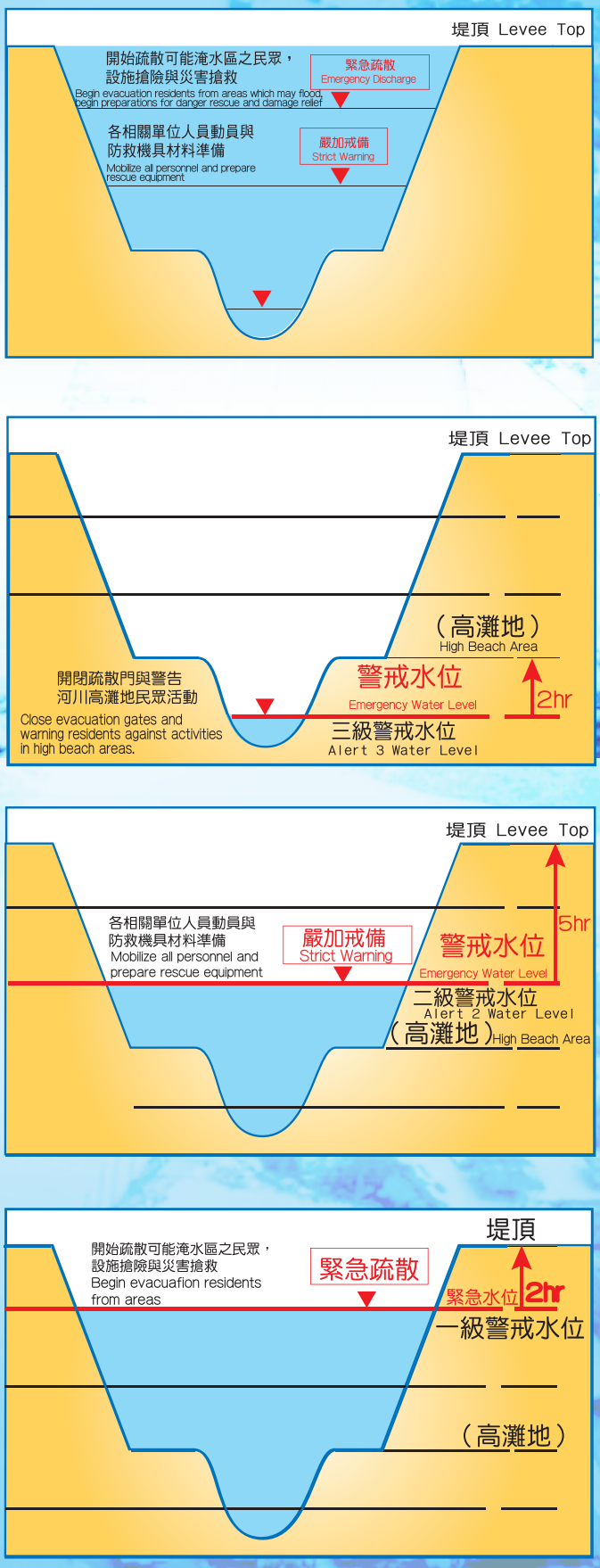
二級警戒水位：
即表示未來五小時河川水位可能超過現堤岸高程時，
疏散低窪地區居民，各防汛單位動員準備防救災機具材料
及嚴加戒備。並管制橋樑、封堵涵洞及啟動防汛應變措施。

Alert Level 2 Water Level: Indicates the river's water level may surpass the dike levels within five hours. Low-lying residents should be evacuated, all flood control agencies should mobilize flood prevention equipment and be sternly prepared. Plus, restrictions should be imposed on bridges, tunnels shut and flood control response system initiated.

一級警戒水位：
即河川水位已達到計畫洪水位，或未來二小時可能超過
現有堤岸高程之緊急水位時，決定疏散低窪地區居民時機
及開始疏散可能淹水民眾，設施搶險，災害搶救，
做緊急疏散措施。

Alert Level 1: The river's water level has already reached the predetermined flood level, or within 2 hours the water level may reach the emergency level and possibly exceed existing dikes. The time for evacuating low-lying areas and residents must be decided. In areas that may flood, plans must be made to evacuate resident, begin relief and rescue operations and commence and emergency evavuations.

警戒水位與河道斷面關係示意圖
Alert Water Level and River Cross-Section Chart



》淡水河流域防洪指揮作業示意圖

Tanshui River Basin Flood Prevention Command Operations Chart

中央氣象局

提供颱風動態、即時雨量、各式氣象雲圖、雷達回波圖
Provides Typhoon Updates, Real-time Rainfall, Meteorological Cloud Charts , Radar Echo Charts

點對點 VPN 專線
Peer-to-Peer VPN Dedicated Line

水利署第十河川局

提供淡水河流域即時雨量、水位及影像監控資訊
Provides Tamshui River Basin Rainfall、Water Levels and Video Monitor Data

無線電、微波、專線、撥接
Wireless, Microwave, Dedicated Line, Dial-up

員山子分洪管理中心

提供員山子分洪道、攔河堰即時水位及影像監控資訊
Provides Yuanshantzu Diversion Channel, Dam, Real-time Water Level and Video Monitor Data

衛星、專線
Satellite, Dedicated Line

北區水資源局

提供石門水庫運轉現況及上游集水區之雨量、水位與影像資訊
Provides Shihmen Reservoir Current Operations Conditions and Upstream Catchment Area Rain Level,Water Level and Video Monitor Data

微波、水利署VPN專線
Microwave, WRA VPN Dedicated Line

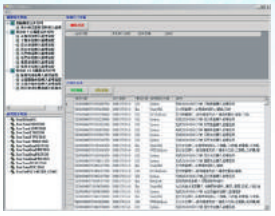
翡翠水庫管理局

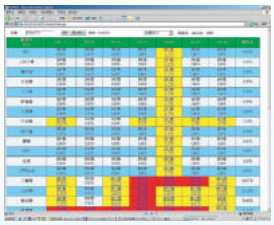
提供翡翠水庫運轉現況及上游集水區之雨量、水位與影像資訊
Provides Fuitsui Reservoir Current Operations Conditions and Upstream Catchment Area Rain Levels, Water Levels and Video Monitor Data

微波、專線、撥接
Microwave, Dedicated Line, Dial-up

自動化即時水情資料收集與檢核系統

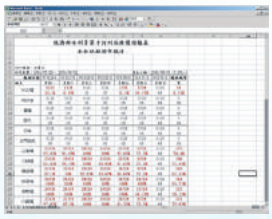
Automatic real-time water infomation collection and inspection system





通訊方式：無線電、衛星、微波、專線及多埠撥接系統，確保資訊通道暢通
收集方式：定時傳送、主動轉入資料庫
工作流程導向：從收集、檢核、資料補遺以及資料儲存，至後續的洪水預報及決策支援展示一系列串接整合
檢核機制：自動監控，掌握資料進出狀態，提供各式維護報表，作為問題原因分析及改善追蹤

Communication Method: Wireless, satellite, microwave, dedicated line and multi-port dial-up system. Methods for ensuring smooth data collection: fixed-time transmission, automatic insertion in data bank. Direction of Work Flow: The system is connected and integrated, from collection, inspection and data addendum and saving, to updated flood alert and decision support display.
Inspection Mechanism: Automatic control, keeps abreast of data flow and provides all maintenance reports for troubleshooting and improvements.

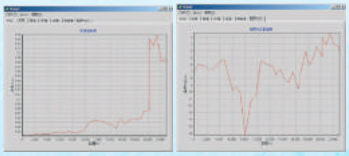


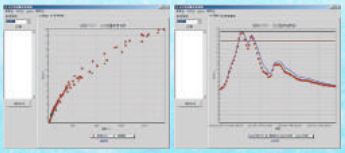
淡水河流域洪水預報系統

Tamshui River Flood Forecasting System

系統以淡水河流域16集水分區為基礎，預報淡水河流域各支流(大漢溪、新店溪、基隆河)1-6小時之水位及流量
自動化驅動並執行淡水河流域預報系統，達成全天候水情預報能力
系統正進行石門水庫、翡翠水庫集水區入流量預報，以及員山子分洪分洪量預測
系統可依照颱風或是豪雨事件將預報結果儲存，可作為預報分析或是參數調整依據

The system is based on the Tamshui River Basin´s 16 catchment zones, and issues an alert for the water level and discharge during the next 1-6 for the main tributaries in the Tamshui River Basin (Tahan Stream, Hsintien Strearm, Keelung River), plus automatically starts and engages the Tamshui River Basin alert system. This achieves round-the-clock water condition alert capabilities and inflow volume alerts for the Shihmen and Feitsui Reservoir catchment areas. Plus the flood diversion alert system for the Yuanshantzu diversion channel can save the results for the typhoon or torrential rain event for forecasting analysis or reference adjustment



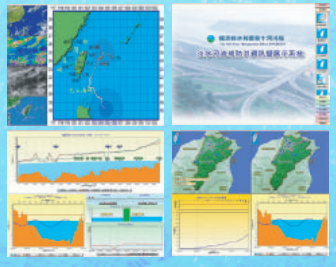


淡水河流域防洪資訊暨展示系統

Tamshui River Basin Flood Forecasting and Display System

氣象展示：颱風軌跡圖、衛星雲圖、累積雨量圖、分區/全區雷達回波圖等
水情展示：雨量/水位/抽水站分布圖、雨量組織圖、水位/抽水站歷線圖、逐時雨量/水位表、抽水站即時影像
水庫展示：大壩現況圖、水庫歷線圖、水庫運轉規線圖、水庫逐時水位/流量表
Meteorological Display: Typhoon Trajectory Chart, Satellite Cloud Chart, Accumulated Rainfall Chart, Partial/Full District Radar Echo Chart
Water Condition Display: Distribution of Rainfall/Water Level/Water Pump Station, Rainfall Organization Chart, Water Level/Water Pump Historical Chart, Rainfall/Water Level Chart Over Time, Water Pump Station Real-time Video
Reservoir Display: Dam Conditions, Reservoir Historical Charts, Reservoir

洪水預報展示：水位歷線計算與實測比較圖、水位流量率定曲線圖、全流域水位/流量縱波圖、16分區平均雨量圖表、河口天文潮位預測圖、橫段面及水位流量圖
Meteorological Display: Typhoon Trajectory Chart, Satellite Cloud Chart, Flood Alert Display: Comparison of Water Level Historical Calculations and Actual Results, Water Level Volume Rate Fixed Flow Chart, Complete Basin Water Level Volume Longitudinal Wave Chart, 16 District Average Rainfall Chart, Estuary Astronomical Tide Alert Chart, Cross Section and Water Level Volume Chart Operation Chart, Reservoir Water Level/Volume Chart Over Time



中央防災應變中心
Central Flood Prevention Response Center

經濟部水利署
Ministry of Economic Affairs Water Resources Administration

台北市政府
Taipei City Government

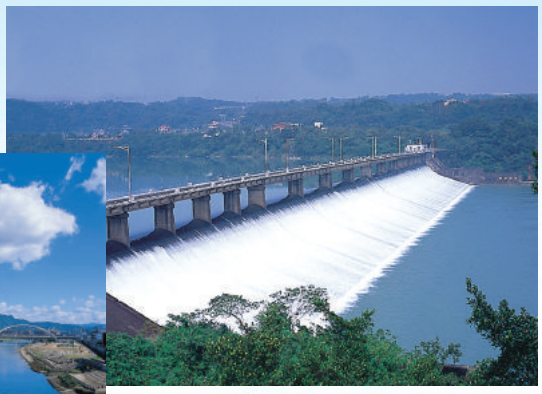
台北縣政府
Taipei County Government

基隆市政府
Keelung City Government

其他相關作業單位
Other Relevant Operations Units

【今日大禹】Today's Water Conservationists

二十一世紀水利工程，不但節流與開源並重，有效利用日益珍貴之水資源；並且生態保育與開發利用兼顧，避免造成不可回復之生態環境破壞。秉持愛水、親水的原則，防止因環境變遷所造成的水患，同時創造永續不竭的水資源，促成人類與自然環境和諧發展，這就是”今日大禹”--經濟部水利署的首要任務。



經濟部水利署從中央到地方，組織了健全的防災體系，共同處理不可預知的颱風暴雨等水災害，對於防災措施的具體做法主要分為「積極建設」與「及時預警」，積極建設係針對容易發生水災害的區域，進行完整的評估診斷後，推動水利防洪工程，例如「大台北防洪計畫」。但除了『積極建設』外，對於天災水患的不可測，經濟部水利署暨各河川局仍不敢掉以輕心，採取『及時預警』系統嚴密監測洪流水位，在第一時間將最新的洪流水位資訊呈報至中央災害應變中心，以提供正確的防洪應變措施。

21st century water conservation engineering not only place equal emphasis on water conservation and development, but also effectively use precious water resources. Plus, consider the needs of the ecosystem and development, and avoid irreversible damage to the ecology. Moreover, they implement the principle that the user pays: those who are restricted are compensated and those who destroy must be fined. These ensure social equality and justice, and enhance the reasonable use of water resources.

From the Ministry of Economic Affairs' Water Resources Agency to the local governments, a sound flood prevention system is formed to jointly handle the unforeseen dangers of typhoons and torrential rains. Concrete steps taken for disaster prevention include: "Proactive Reconstruction" and "Warning". Proactive reconstruction is directed at areas that are prone to disaster. After a comprehensive evaluation and diagnosis, water conservation and flood prevention engineering is promoted. For example, the "Taipei Flood Prevention Project". In addition to the "Proactive Reconstruction", with the unpredictable nature of disasters and flooding, the Ministry of Economic Affairs' Water Resources Agency and each River Management Office takes no chances. It adopts "Warning" systems to closely monitor flood water levels, and immediately provides flood water level updates to the Central Disaster Response Center, to provide accurate flood response measures.

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