



**Asia-Pacific  
Economic Cooperation**

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**2017/SOM3/EPWG/026**

Agenda Item: 13.6

## **Briefing on Heavy Rainfall and Mudslide in June in Chinese Taipei**

Purpose: Information  
Submitted by: Chinese Taipei



**12<sup>th</sup> Emergency Preparedness Working Group  
Meeting  
Ho Chi Minh City, Viet Nam  
21-22 August 2017**



# Scientific supports to emergency operation of June 1st torrential rain event

**Chinese Taipei**

12th APEC Emergency Preparedness Working Group Meeting

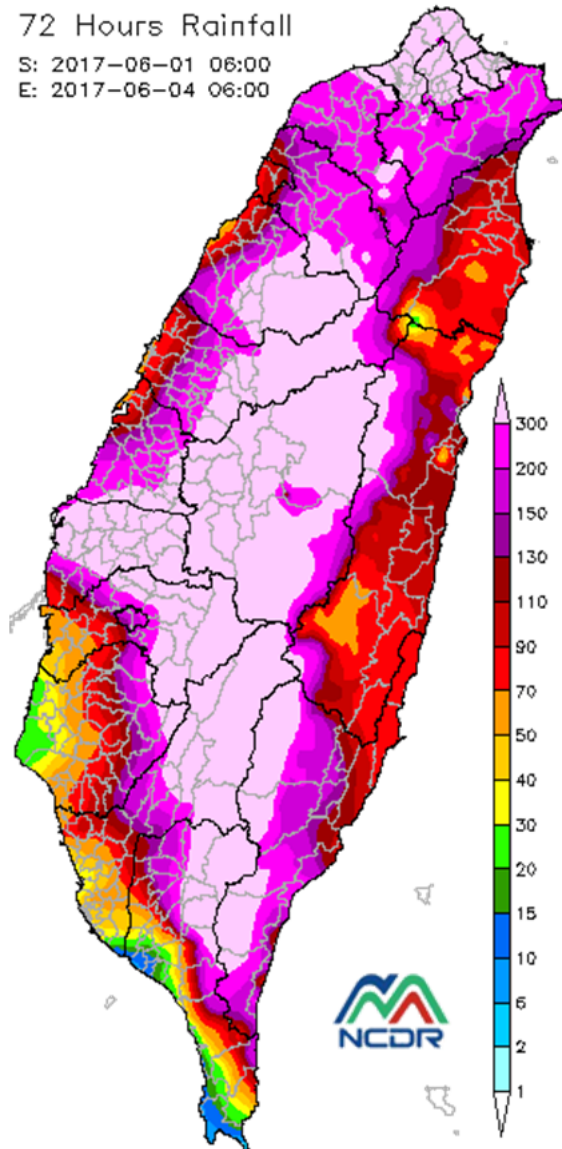
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# Torrential rain event from June 1<sup>st</sup>, 2017 - 06/01~ 06/04



72 Hours Rainfall

S: 2017-06-01 06:00  
E: 2017-06-04 06:00



6/1 06 am -6/4 06 am (72hrs)

- **Max. rainfall amounts in 72hrs**
  - Areas > **1,000 mm** (Nantou County, Chiayi County, Kaohsiung City)
  - Peak value **1,389 mm** (Taoyuan District in Kaohsiung City)
- **Direct impacts**
  - Urban floods, landslides, flash floods, debris flow
- **Indirect impacts**
  - Interruptions to transportation, power and water outages, isolated communities
- **Casualties**
  - **Died: 2; Miss: 1; Injured: 5**
- **Number of evacuation: 5,534**

# NCDR Operations for decision support at the Emergency Operation Center (CEOC)



	NCDR	CEOC
<b>5/31</b>	<ul style="list-style-type: none"> <li>• <b>10:00</b>, NCDR sent the 1<sup>st</sup> early warning</li> </ul>	<ul style="list-style-type: none"> <li>• CEOC operated at Level 3</li> </ul>
<b>6/01</b>	<ul style="list-style-type: none"> <li>• 14:00, NCDR updated early warning</li> </ul>	<ul style="list-style-type: none"> <li>• CEOC operated at Level 3</li> </ul>
<b>6/02</b>	<ul style="list-style-type: none"> <li>• <b>11:00</b>, NCDR Emergency Operation Supporting Team started operation</li> <li>• 13:00, NCDR joined CEOC operation and lead discussions at Situation Assessment Group</li> </ul>	<ul style="list-style-type: none"> <li>• <b>11:00</b>, Emergency declaration</li> <li>• 13:00, EOC operated at Level 1</li> <li>• <b>15:00</b>, EOC meeting</li> <li>• <b>17:00</b>, EOC meeting</li> </ul>
<b>6/03</b>	<ul style="list-style-type: none"> <li>• <b>11:00</b>, Minister of MOST visited NCDR</li> </ul>	<ul style="list-style-type: none"> <li>• 17:30, EOC meeting</li> </ul>
<b>6/04</b>	<ul style="list-style-type: none"> <li>• 16:00, NCDR dismissed Emergency Operation Supporting Team</li> </ul>	<ul style="list-style-type: none"> <li>• 15:00, EOC meeting</li> <li>• 16:00, EOC operated back Level 3</li> </ul>

# NCDR's actions before the event happening through partnerships and networks

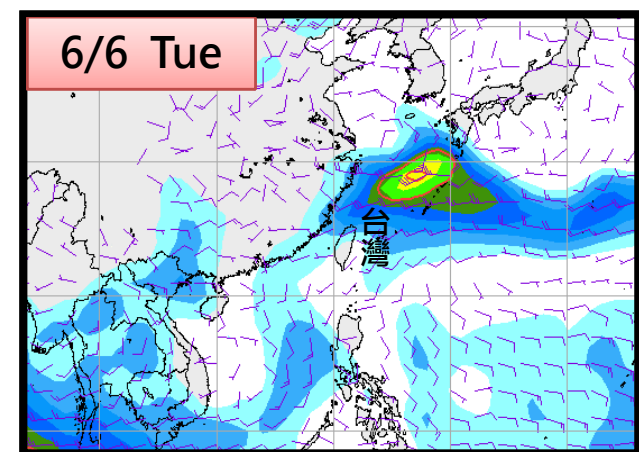
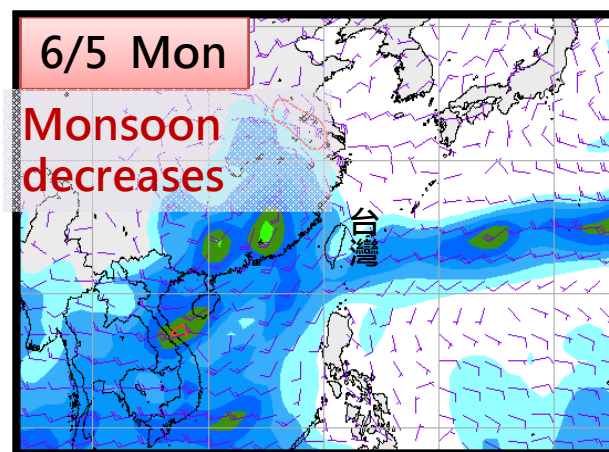
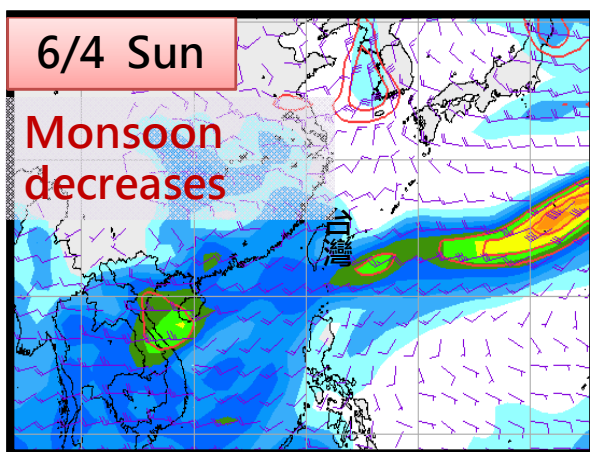
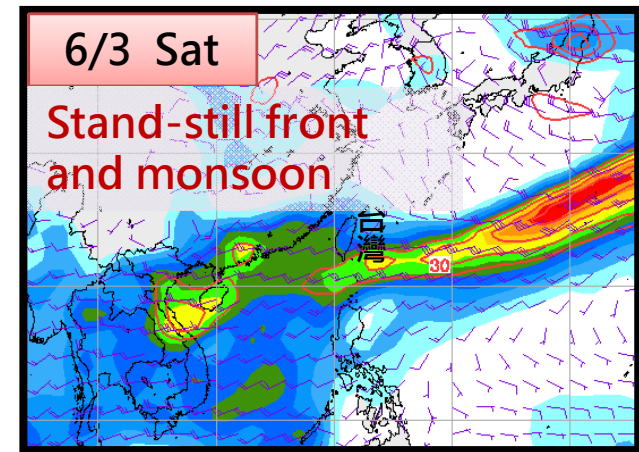
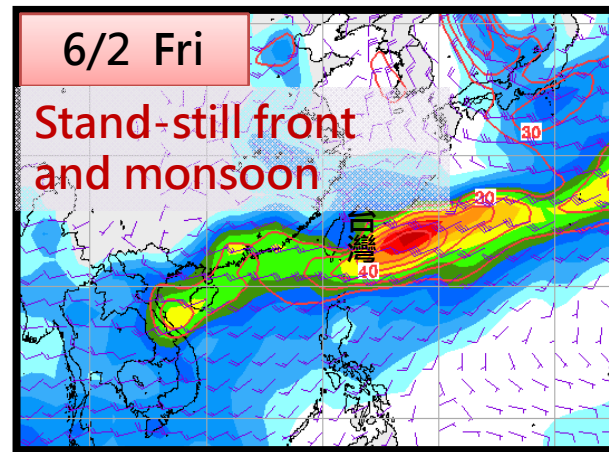
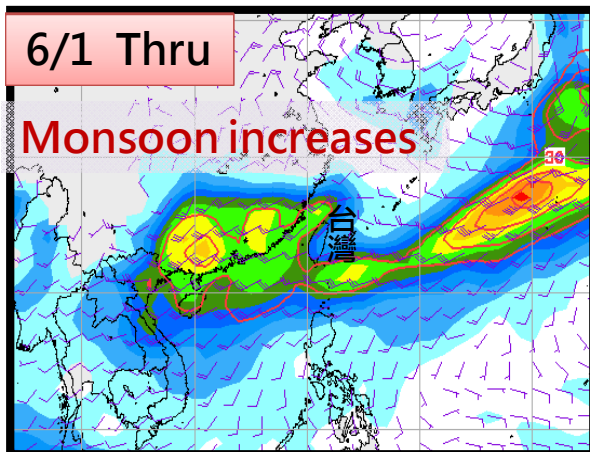


- NCDR proposed an early warning on risk of torrential rains on 05/31 and updated it on 06/01
- The information was designed to remind **emergency responders (central and local)** and NCDR's **collaborative partners** of pre-caution and preparedness
- **Regular mechanism**
  - NCDR routinely offers **integrated information to local and central governments**
  - Ministry of Science and Technology supports a flagship project to find **local research institutes to help local governments** on disaster information management
- **The early warning information provided suggestions for actions in advance.**

# Message on 05/31, NCDR sent the early warning - monsoon plus front will cause downpours



- **From 06/01**, the monsoon's strength increases and will affect Chinese Taipei. **During 06/02-05**, it will interact with a **stand-still front** and trigger downpours (**over 800 mm in total**)

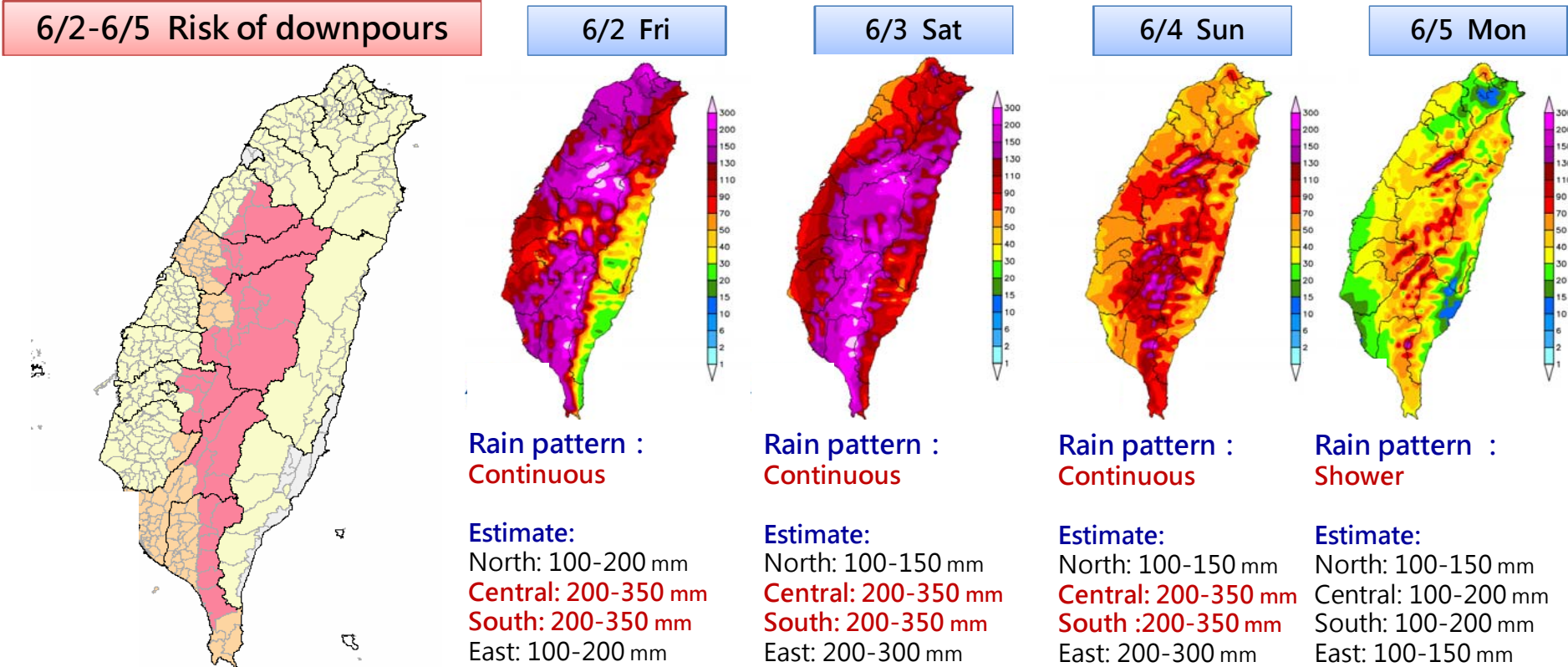




# Message on 05/31, NCDR proposed precautions for torrential rains



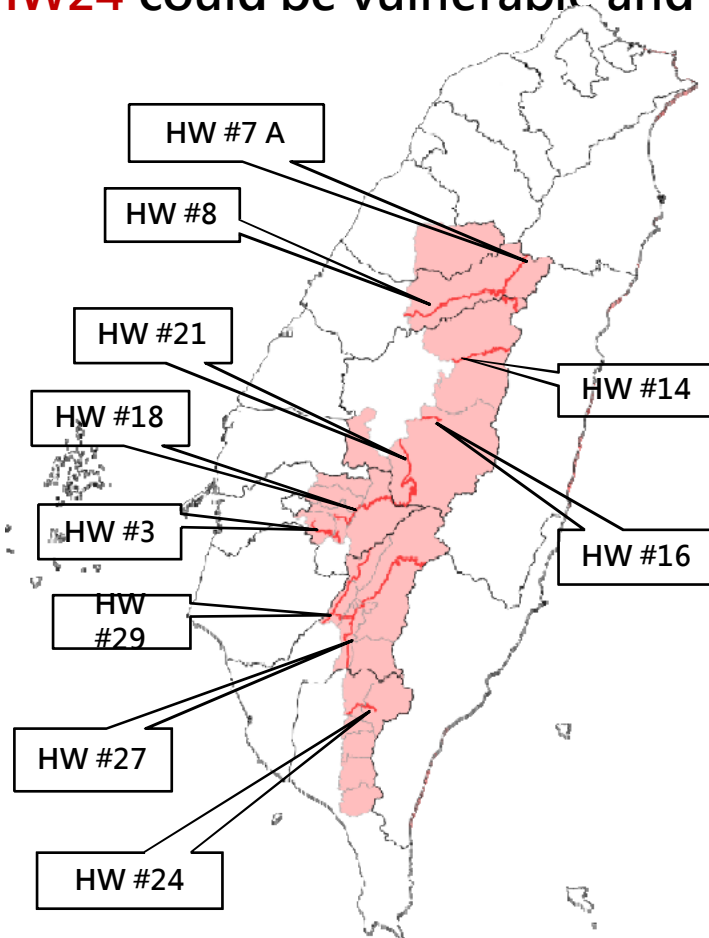
- 06/02~05, estimates of main rains will fall on central and southern parts. **Miaoli, Taichung, Nantou, Chiayi, Kaohsiung and Pingtung** are areas to have heavy rain. Estimate of total rainfalls could exceed 800 mm.
- Heavy rains would concentrate at 6/02~03. One-day rains could reach 350mm, central & southern parts (mountainous) should prepare for impacts brought by continuous rainfalls. As front moves could trigger high-intensity rain at short duration, low-lying areas along the west coast should prepare for floods.



# Message on 05/31, high risk areas of slope-land hazards



- Amid 62~5, because of interactions of monsoon and front, rainfalls would mainly concentrate in mountainous areas of the west.
- Slope-land areas in: Miaoli, Taichung, Nantou, Chiayi, Kaohsiung & Pingtung
- Highways: HW#20, HW#27, HW#21, HW#7A, HW#8, HW#16, HW#13, HW#3, HW24 could be vulnerable and lead to isolated tribes in mountainous areas.



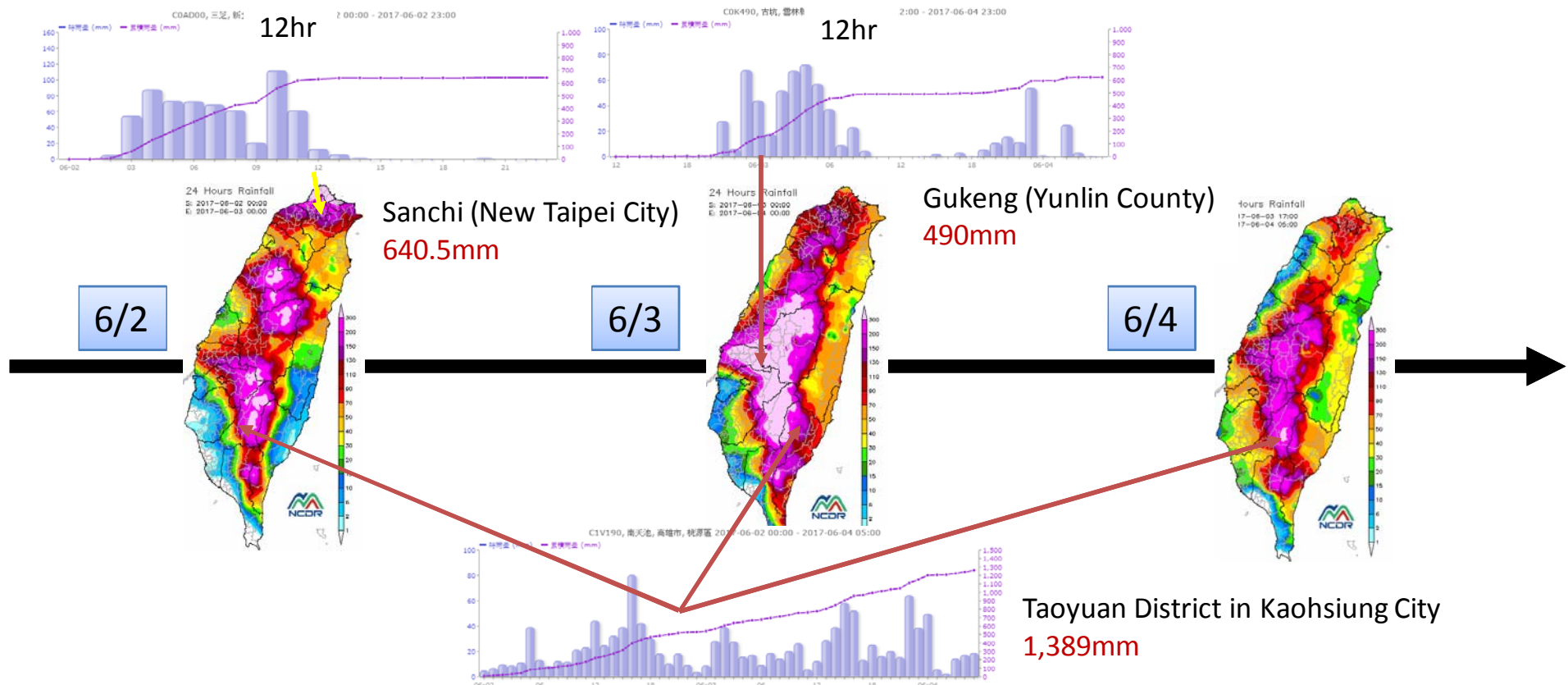
City or County	High risk areas
Miaoli	Taian
Taichung	Heping
Nantou	Chushang, Shini, Renai
Chiayi	Jhongpu, Jhuci, Meishan, Fanlu, Alishan
Kaohsiung	Liouguei, Jiashian, Maolin, Tauyuan, Namasia
Pingtung	Sandimen, Wutai, Majia, Taiwu, Laiyi, Kasugku



# Rain patterns at north and south depending on front movements during 06/02-4



- Before 12 pm, 6/2: the front kept stationary **on north** and brought strong rains
  - Sanchi (New Taipei City) **640.5mm in 12 hr.**; Keelung **337.6mm in 12 hr(record from 1975)**
- From 12 pm, 6/2~6/3: the front moved southward
  - Central area: Kouken (Yunlin County) 12hr 490mm
- 6/1~6/4: SW mason and front brought heavy rains to mountain areas in central and southern parts
  - Taoyuan District in Kaohshung City, **1,389mm**

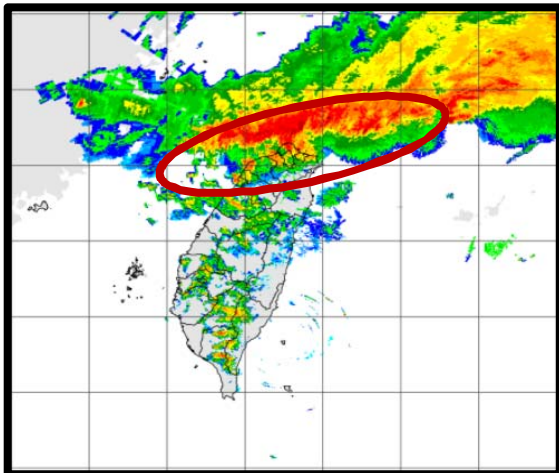


## Situations on 06/02 in northern areas: the stationary front stayed still **over 11 hours**

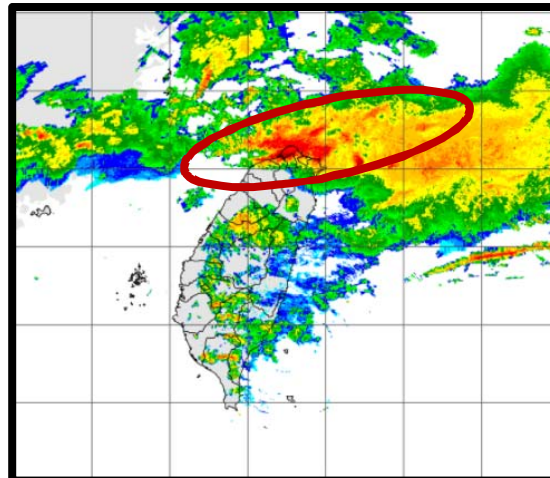


- Since early morning of 06/02, the front stood still over the northern areas, cast downpours (**> 600mm**) and triggered floods

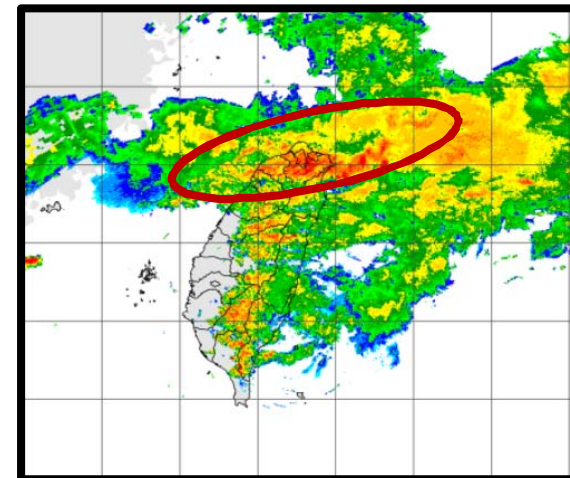
06/02 01:30



06/02 06:30



06/02 12:30



11 hours

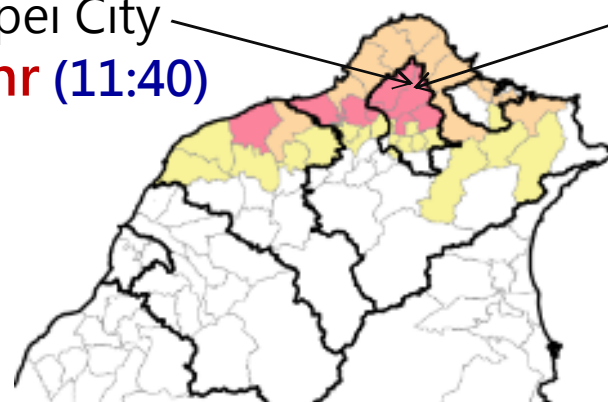
# Situations on 06/02 in northern areas: floods, road interruptions



- Floods have been reported in Keelung, Taipei City and New Taipei City. Roads could be inundated.
- High-intensity-and-short-duration rains could bring floods to low-lying areas.

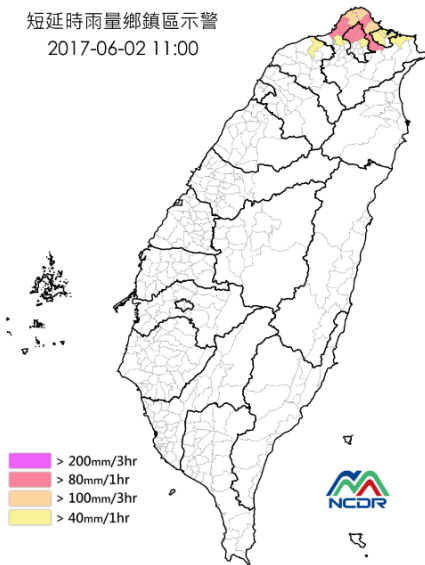
Beitou, Taipei City  
**141mm/hr (11:40)**

Neihu, Taipei City  
**154.0mm/hr (11:50)**

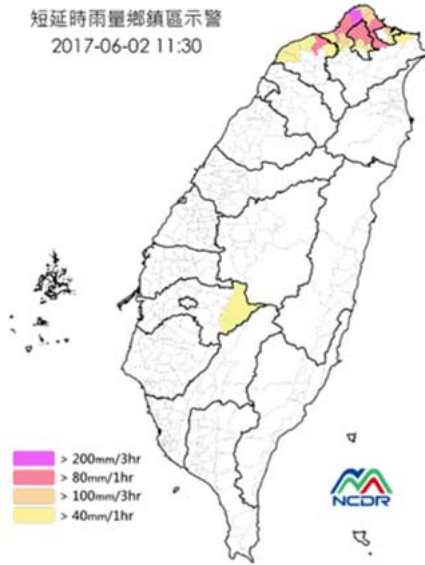


Cidu, Keelung City  
**105mm/hr (12:30)**

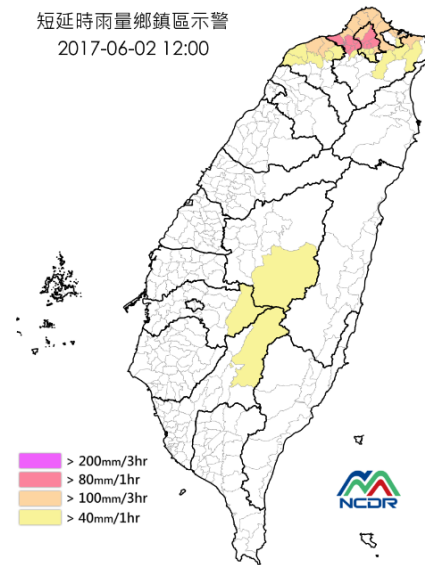
短延時雨量鄉鎮區示警  
 2017-06-02 11:00



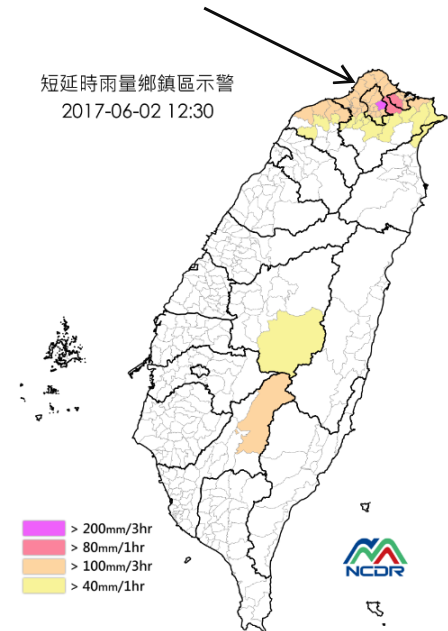
短延時雨量鄉鎮區示警  
 2017-06-02 11:30



短延時雨量鄉鎮區示警  
 2017-06-02 12:00



短延時雨量鄉鎮區示警  
 2017-06-02 12:30





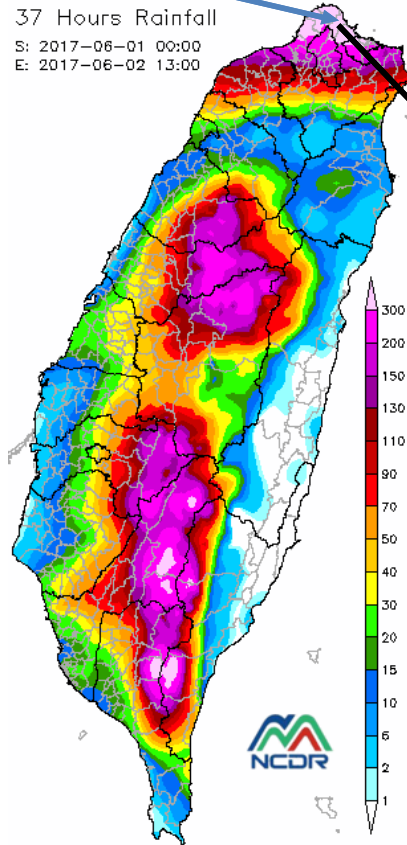
# Situation monitoring by real-time rain gauge data and video of CCTV in the north (floods) (06/02)



Highway #2 (Keelung-Jinsan)43K+500

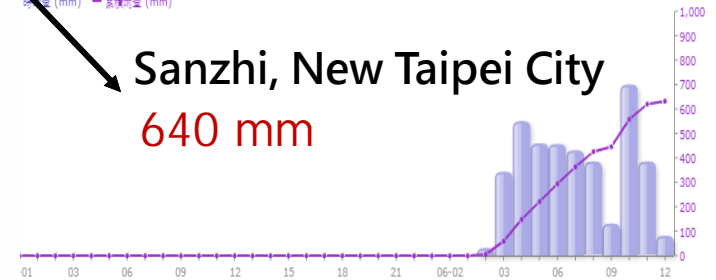


37 Hours Rainfall  
S: 2017-06-01 00:00  
E: 2017-06-02 13:00



COAD00, 三芝, 新北市, 三芝區 2017-06-01 00:00 - 2017-06-02 13:00

Sanzhi, New Taipei City  
640 mm



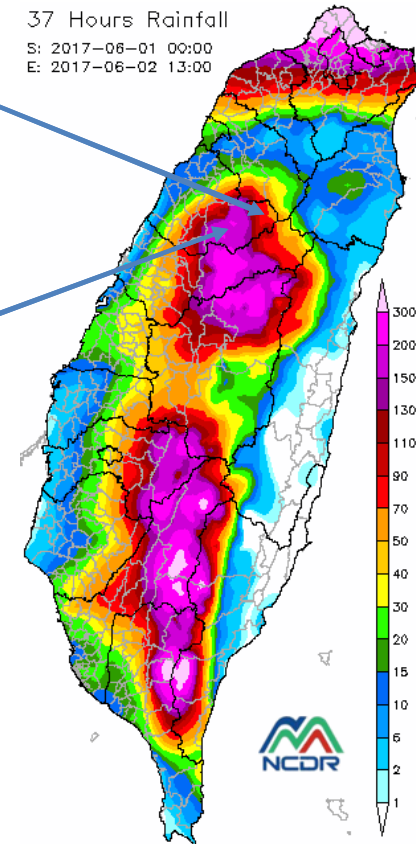
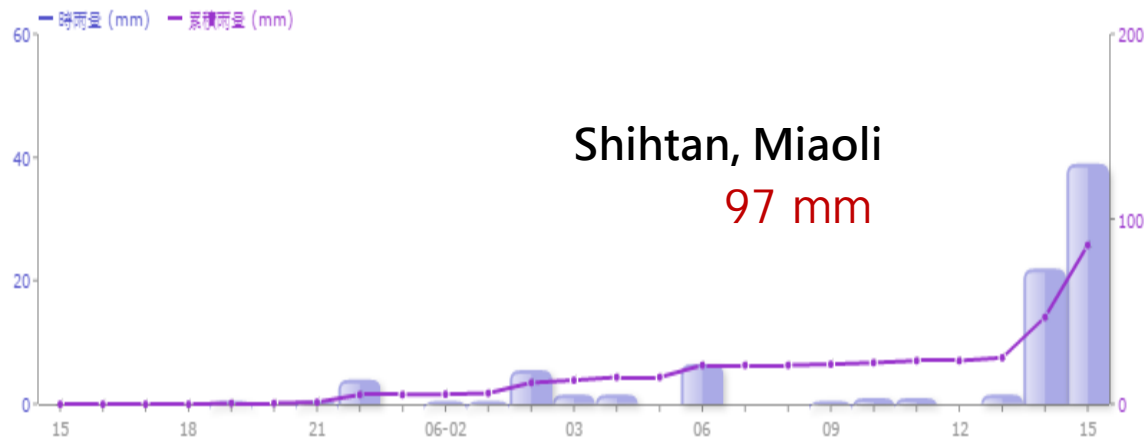
Rainfall distribution  
06/01 00:00 ~ 06/02 13:00

# 06/02, Miaoli, Taichung and Nantou are to be affected by torrential rains



- As the front moves southwards, **central and southern areas could be affected.**

COE820, 獅潭, 苗栗縣, 獅潭鄉 2017-06-01 15:00 - 2017-06-02 15:00



# Monitoring turbidity of raw water at upstream of the Xindian Creek on 06/02



直潭壩

加入監看

位置：新北市新店區 直潭壩  
影像來源：水利署

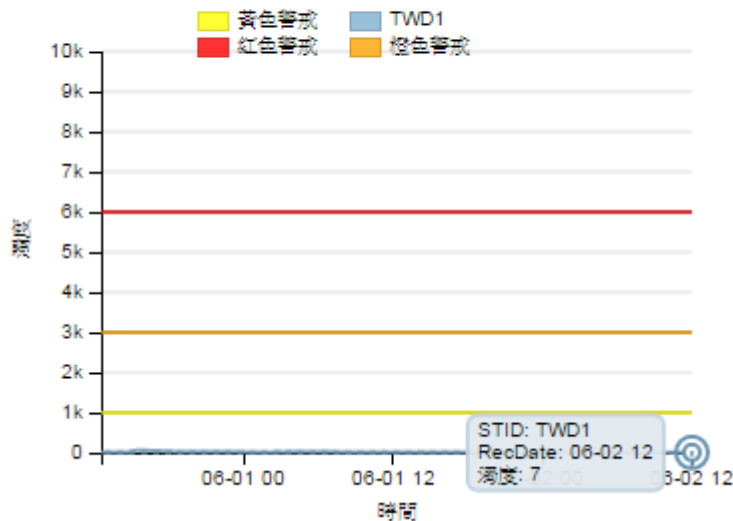


- 12 sites monitor turbidity distributed along Xindian Creek and Peishih Creek.



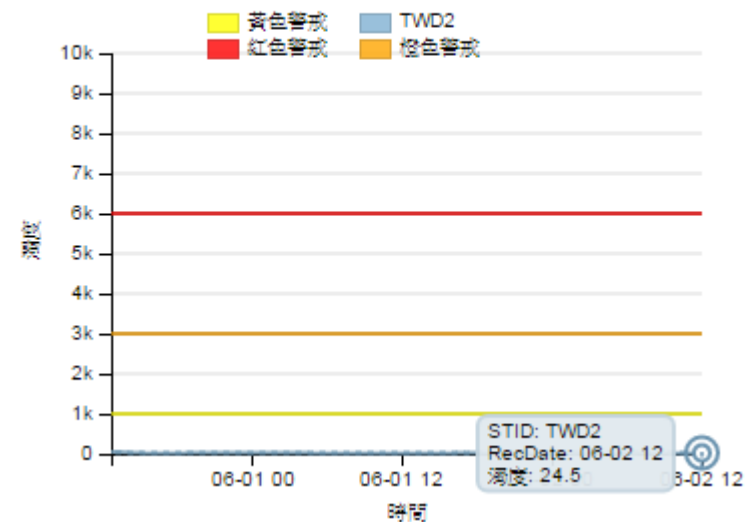
直潭壩

加入監看



青潭壩

加入監看



新北市

烏來區



# Floods in New Taipei City (urban floods)



金山三界壇

三芝道路淹水

# Interruptions to roads in northern Chinese Taipei (mountainous areas)



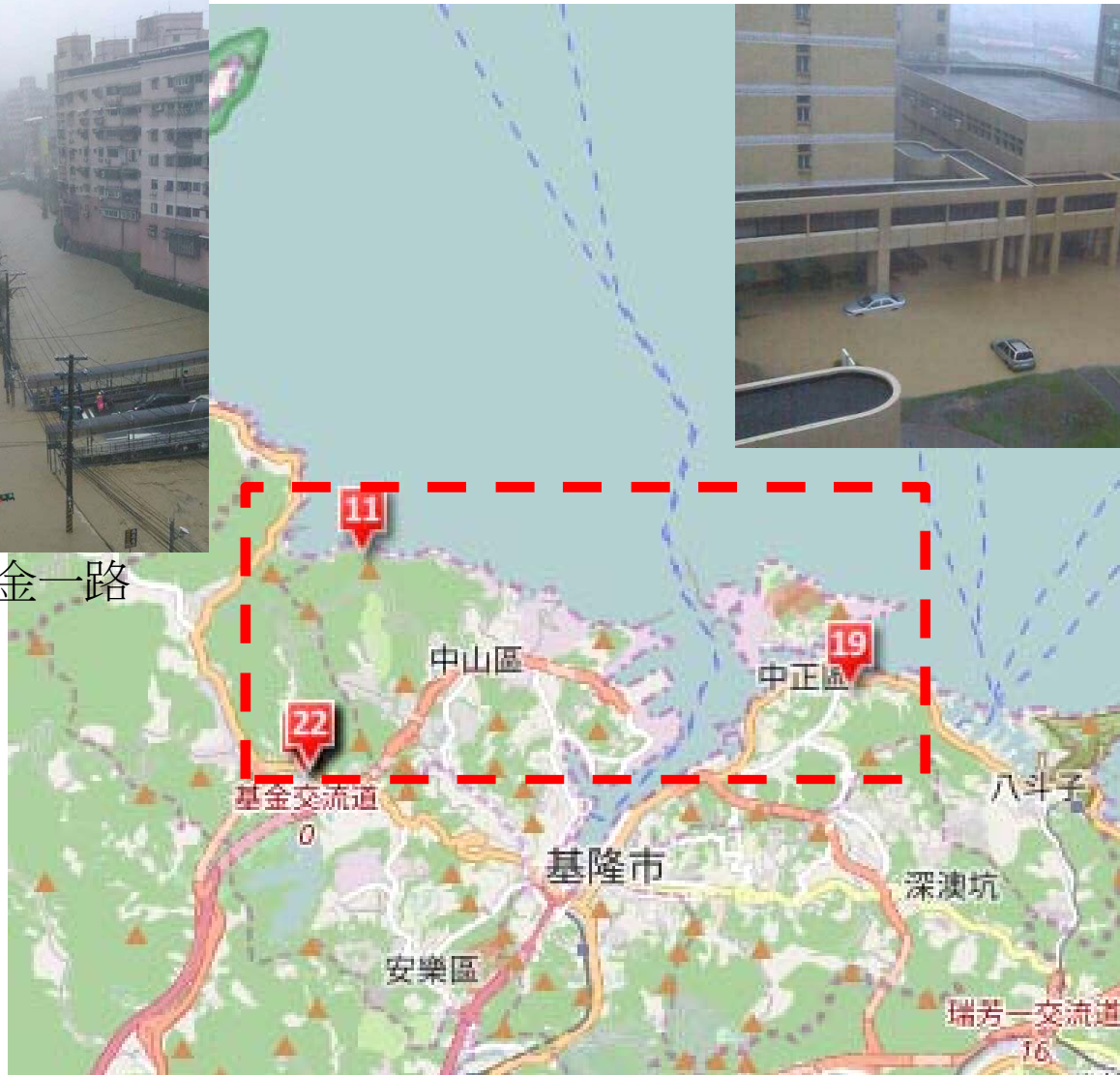
# Floods in Keelung City



基隆市基金一路



海洋大學





# Floods continued at night of 06/03



12 Hours Rainfall

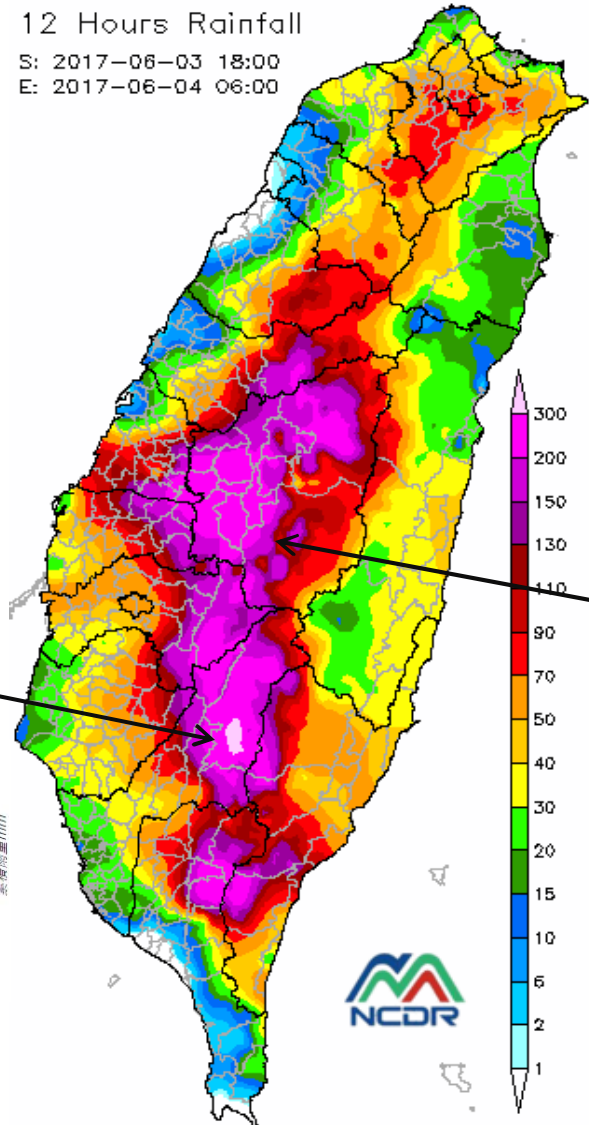
S: 2017-06-03 18:00

E: 2017-06-04 06:00

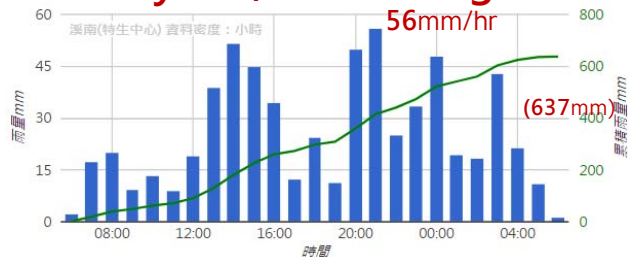
Liouguei, Kaohsiung,  
HW#20 78K+700



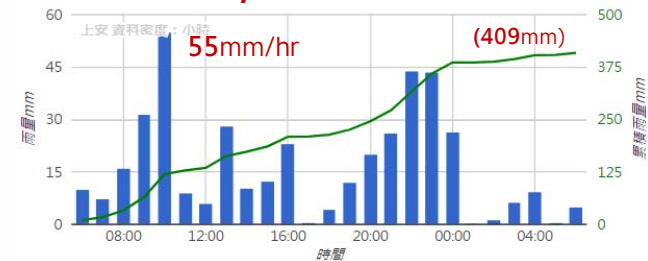
Shini, Nantou, HW#21  
87K+700



Tauyuan, Kaohsiung



Shini, Nantou

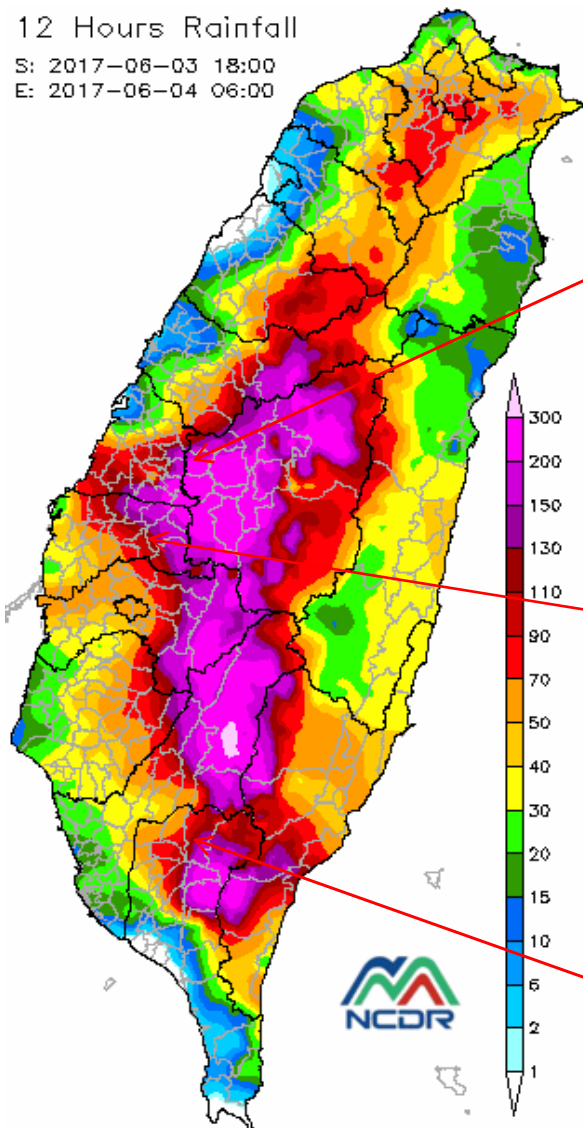


# Monitoring water levels under bridges by water level gauges and CCTV on 06/03



12 Hours Rainfall

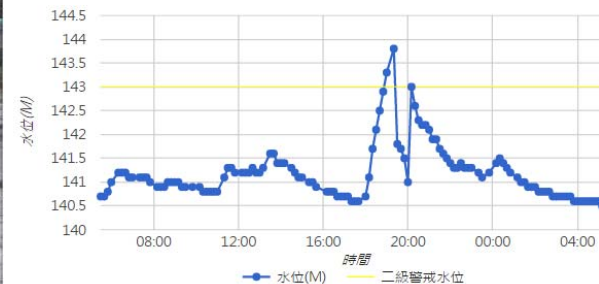
S: 2017-06-03 18:00  
E: 2017-06-04 06:00



Guoshing, Nantou 乾峰橋



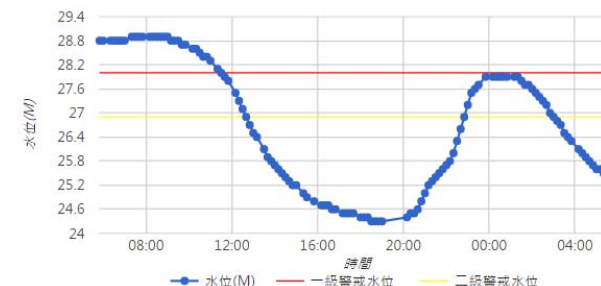
Tsaotun, Nantou 隘寮橋



Dounan, Yunlin 虎尾溪平和橋



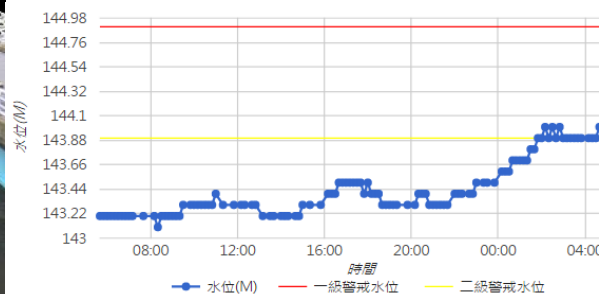
Dounan, Yunlin 田頭橋



Gaoshu, Pingtung 大津橋



Gaoshu, Pingtung 大津橋(1)



# On 6/3, the front stays till over the central and continuous rains fall on Yunlin, Chiayi, Kaohsiung

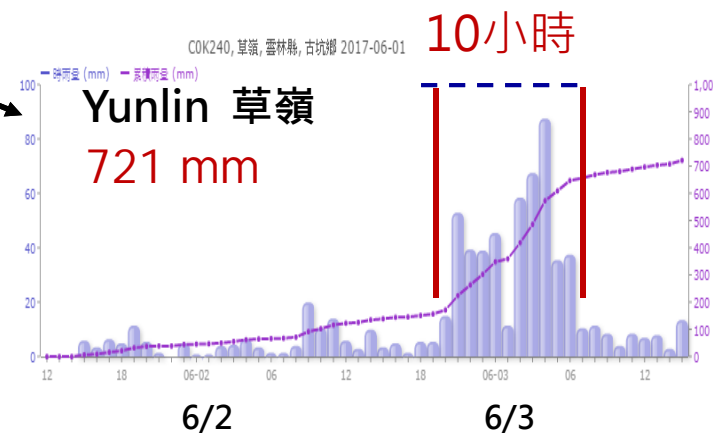
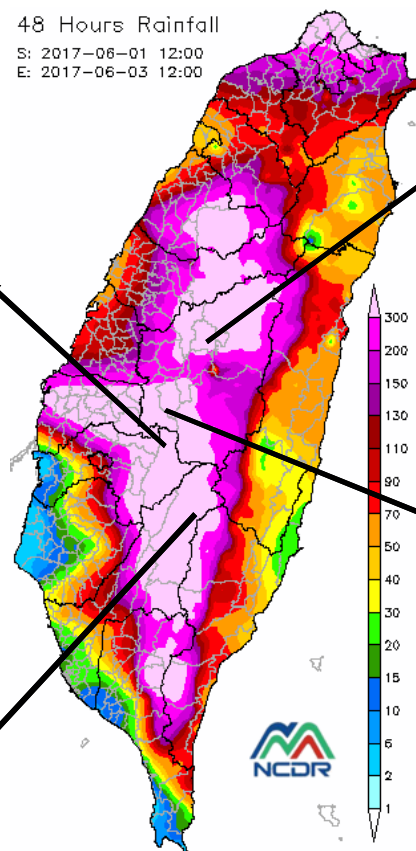


Rain distribution  
06/01 12:00 ~ 06/03 15:00

Max Value > 800mm



48 Hours Rainfall  
S: 2017-06-01 12:00  
E: 2017-06-03 12:00





# Damages along HW#21 88k in Shini, Nantou on 06/03





# Citizen's reports on social media: situations in Keelung, Jinshan and Neihu (floods)



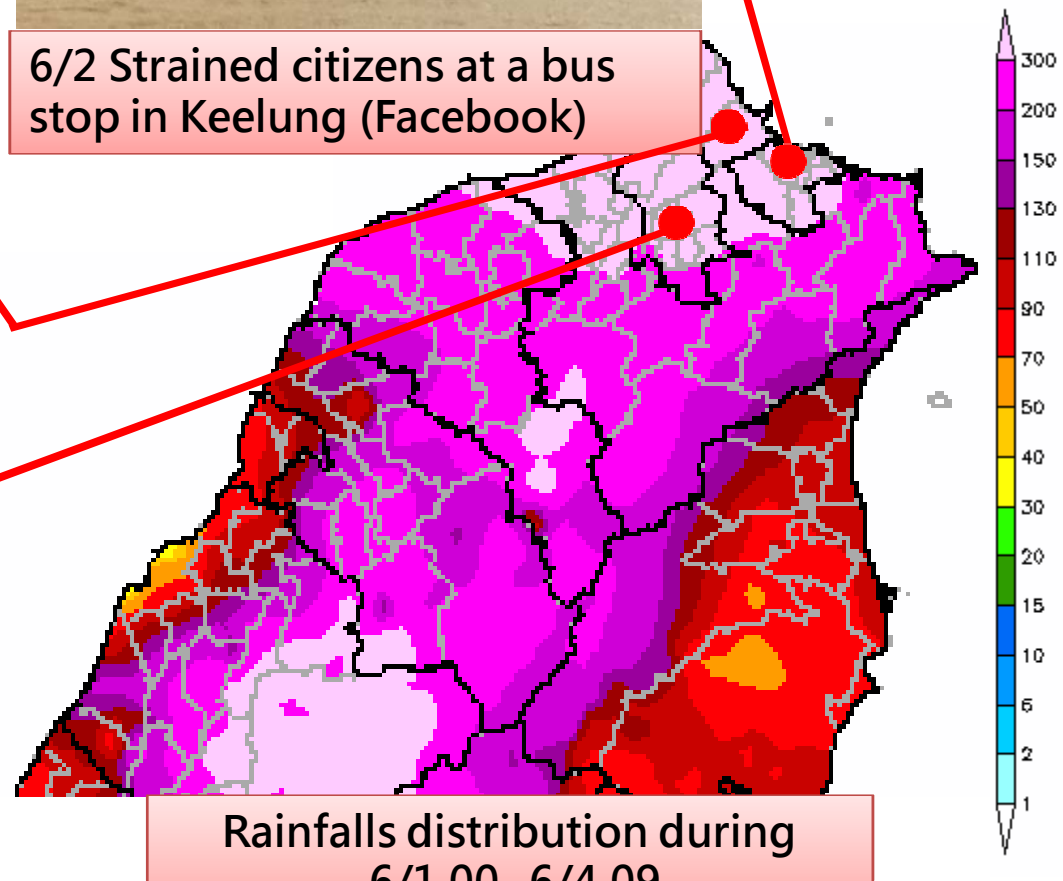
6/2 Broken bridge in Jinshan, New Taipei City (Facebook)



6/2 Strained citizens at a bus stop in Keelung (Facebook)



6/2 Neihu, Taipei City (Facebook)



# Citizen's reports on social media: situations in Shini (Nantou) and Tauyuan (Kaohsiung)



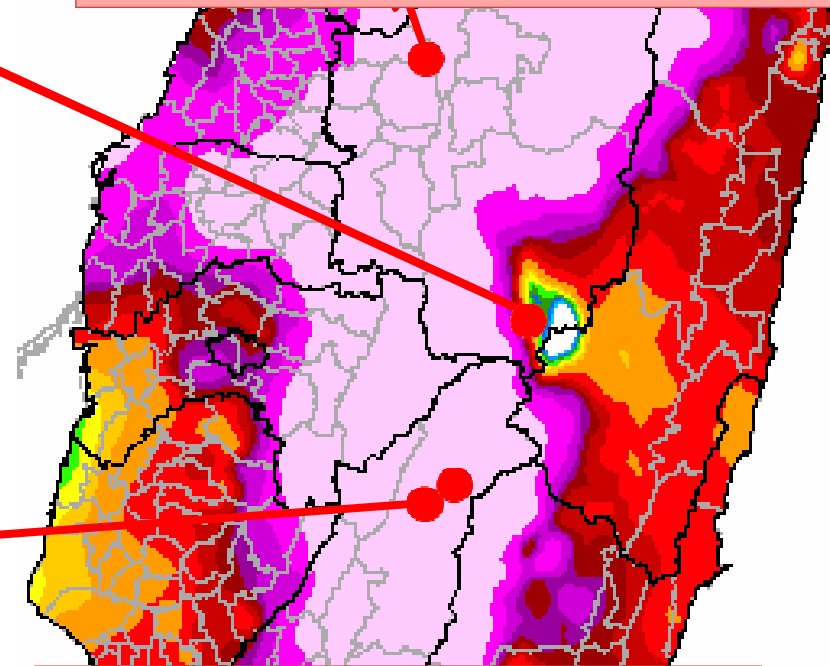
6/3 in Shini (Nantou) 神木村民宅沖毀 (Facebook)



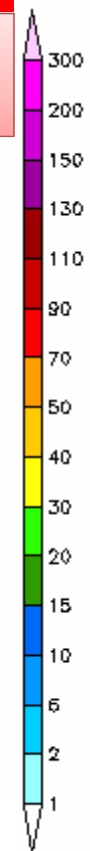
6/2 Guoshing (Nantou) 南港村 (Facebook)



6/3 Tauyuan (Kaohsiung) HW#20 (Facebook)



6/1 00 - 6/4 09 rain distribution





# Citizen's reports on social media: Agricultural damages in Yunlin, Chiayi, Changhua



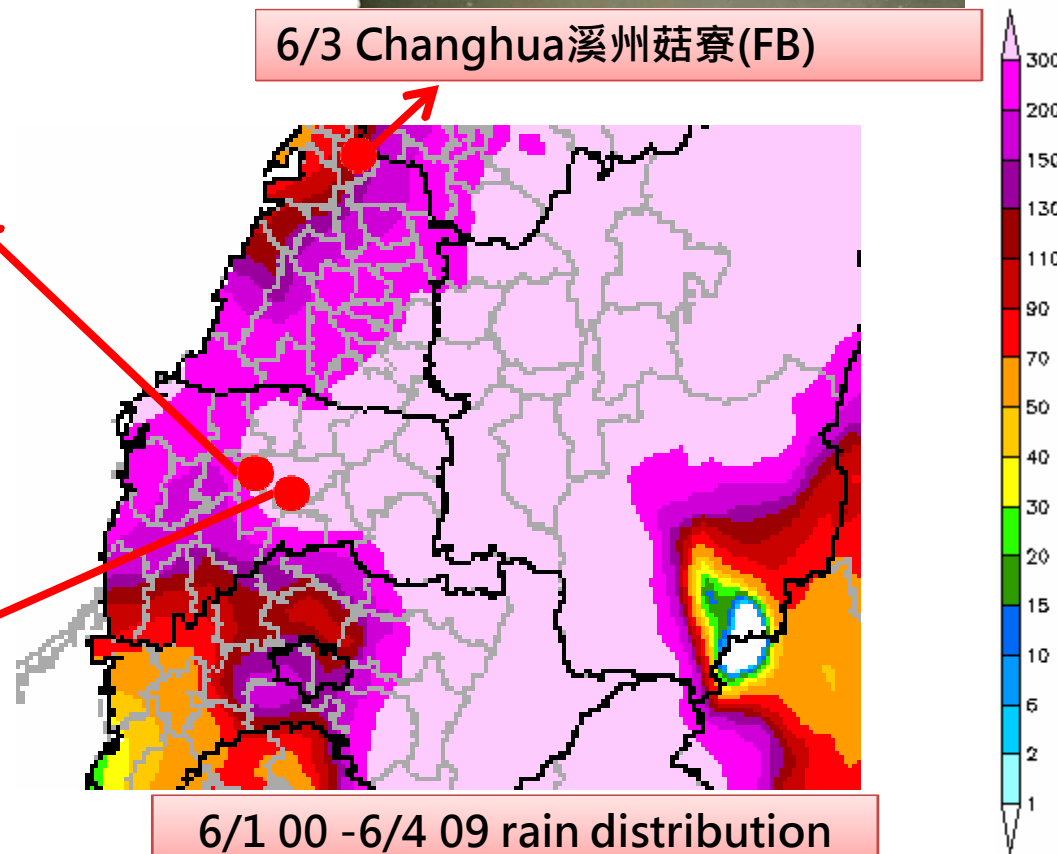
6/3 Yunlin 大埤加油站淹水(FB)



6/3 Changhua 溪州菇寮(FB)



6/3 Yunlin 大埤豐田橋(FB)



## Dawning taxi in Keelung (video)





**Thanks  
for  
your attention**

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