



**Asia-Pacific
Economic Cooperation**

2016/SOM3/EPWG/019

Agenda Item: 9.8

Emergency Responses to Kaohsiung Earthquake and Typhoon Nepartak in Chinese Taipei, 2016

Purpose: Information
Submitted by: Chinese Taipei



**APEC PERU
2016**

**10th Emergency Preparedness Working Group
Meeting
Lima, Peru
15-16 August 2016**



Emergency Responses to Kaohsiung Earthquake and Typhoon Nepartak in Chinese Taipei, 2016

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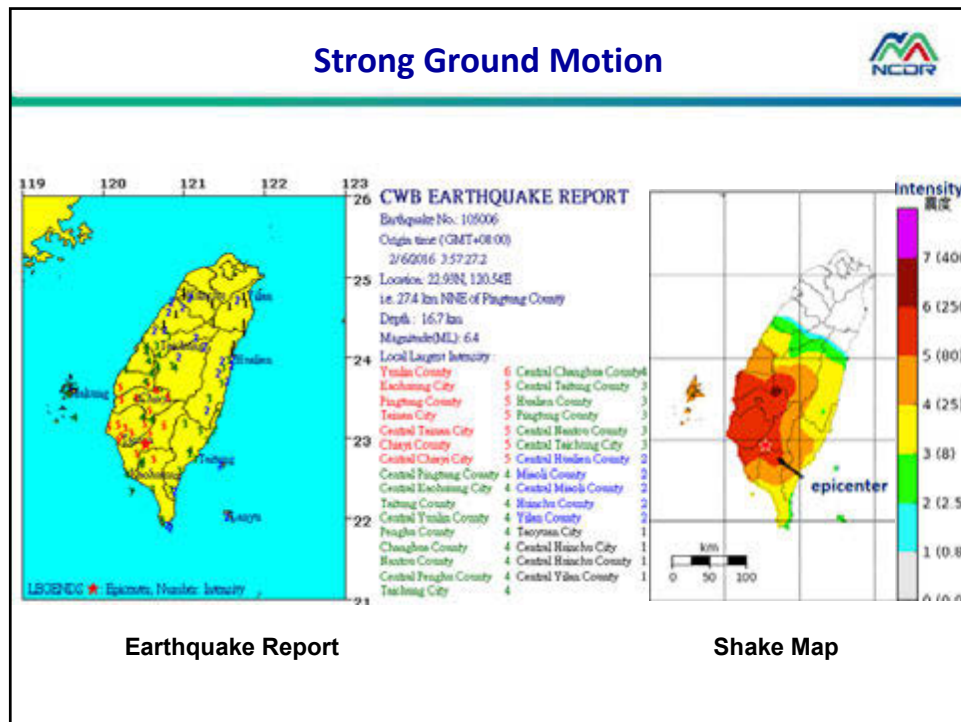
The 10th APEC Emergency Preparedness Working Group Meeting
2016.08.15, Lima, Peru

Summary of Kaohsiung Earthquake



- **A magnitude-6.4**
 - Date and Time: **February 6, 2016 at 3:57 am**
 - Epicenter: at Meinong, Kaohsiung City and with a **focal depth of 16.6 Kilometers**
 - in-land and shallow earthquake
- **Casualties**
 - 117 died and 546 wounded
- **Major losses**
 - over 60 buildings totally or partially collapsed.





Summarized numbers of damages and casualties





| Items | Descriptions |
|--|---|
| Casualties | 116 dead, 551wounded |
| Interruptions to lifeline systems | <ul style="list-style-type: none"> • Power supply: 173,000 households • Water supply : 400,300 households • Land-line telephone: 1,248 households • Mobile phone station: 143 • Natural gas supply: 1,304 households |
| Damaged building | After quick assessment: Red-tagged 249, Yellow-Tagged 336 |
| Damages or suspension to transportation systems | <ul style="list-style-type: none"> • Highway: 2 sections • High-speed rail: a temporary suspension to south-bound operation from Taichung soon after the quake |
| Damaged school | 469 |
| Mobilized personnel | 33,343 |

Data source : Central Emergency Operation Center

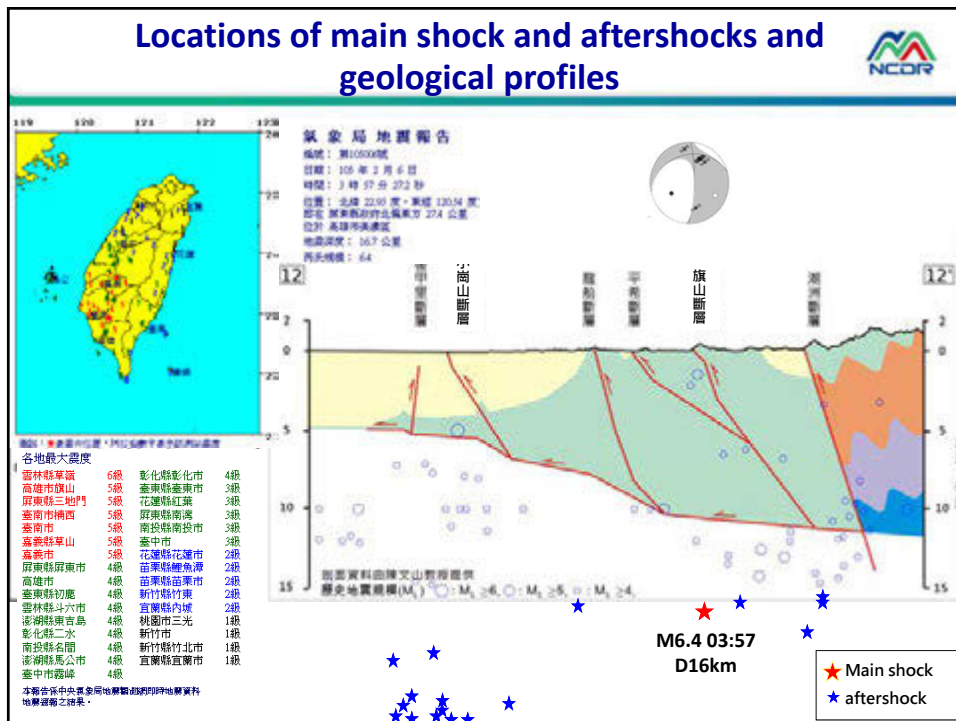
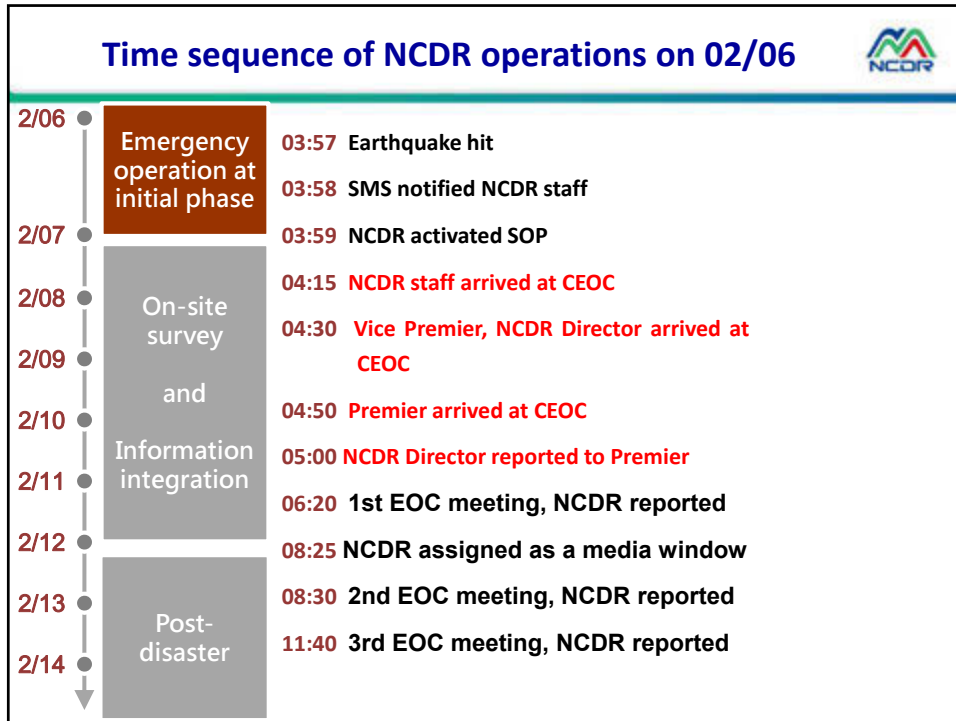
Emergency Operation

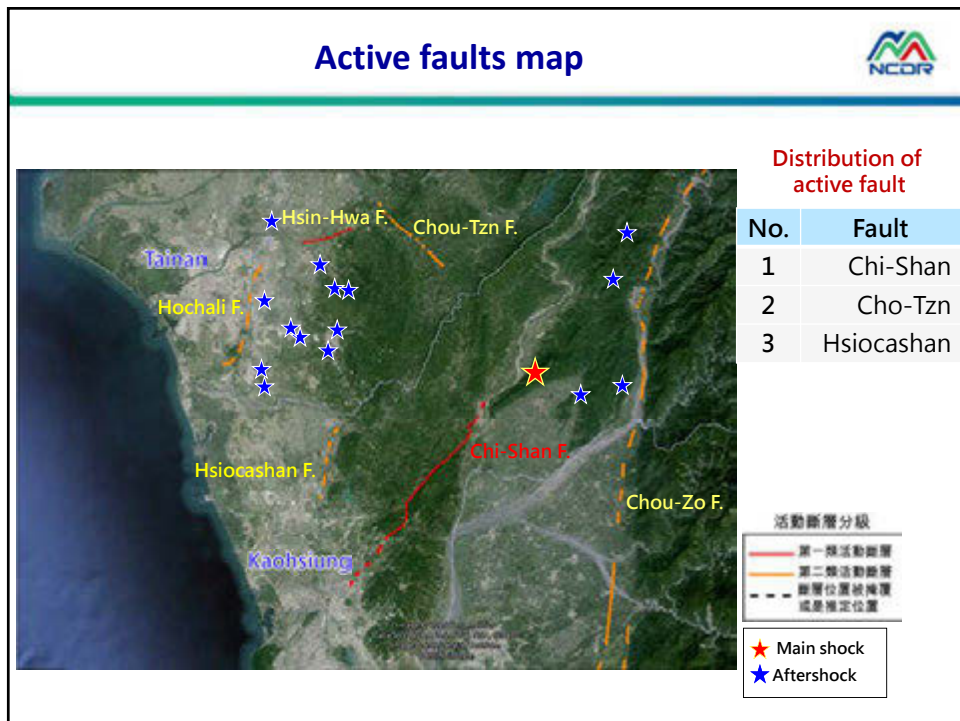
- **Level 1 operation**
 Started from **4:15 am on Feb 6** to collect situations, and coordinate search and rescue efforts
 Ended at **4:00 pm on Feb 14**
- **In total**
 33,343 of urban search-and-rescue team, firefighters, police officers, volunteers and soldiers had ever joined the operation

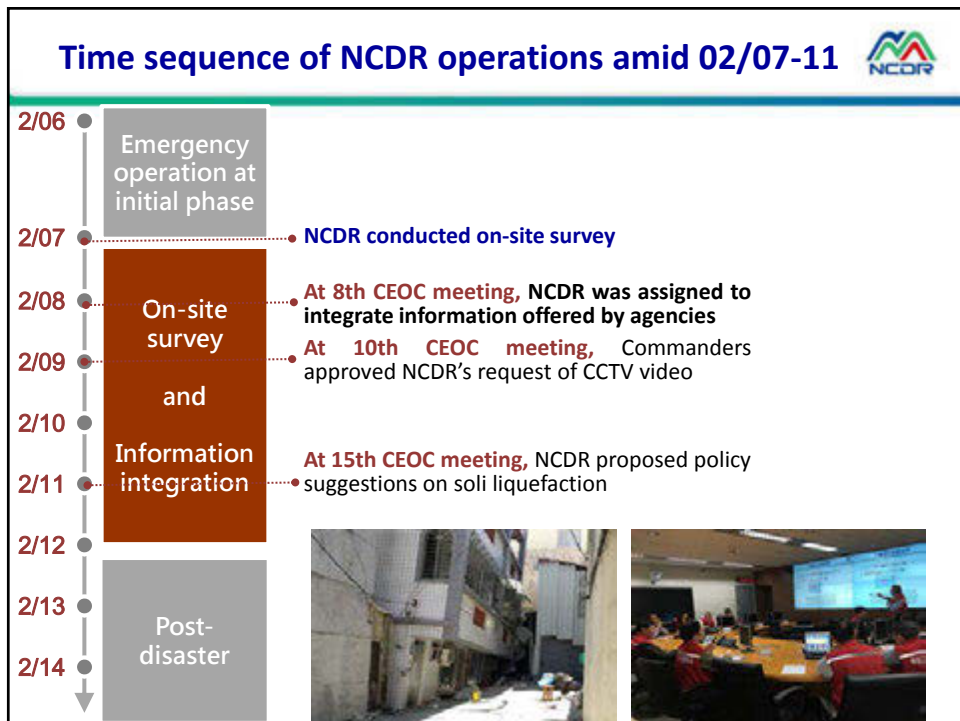
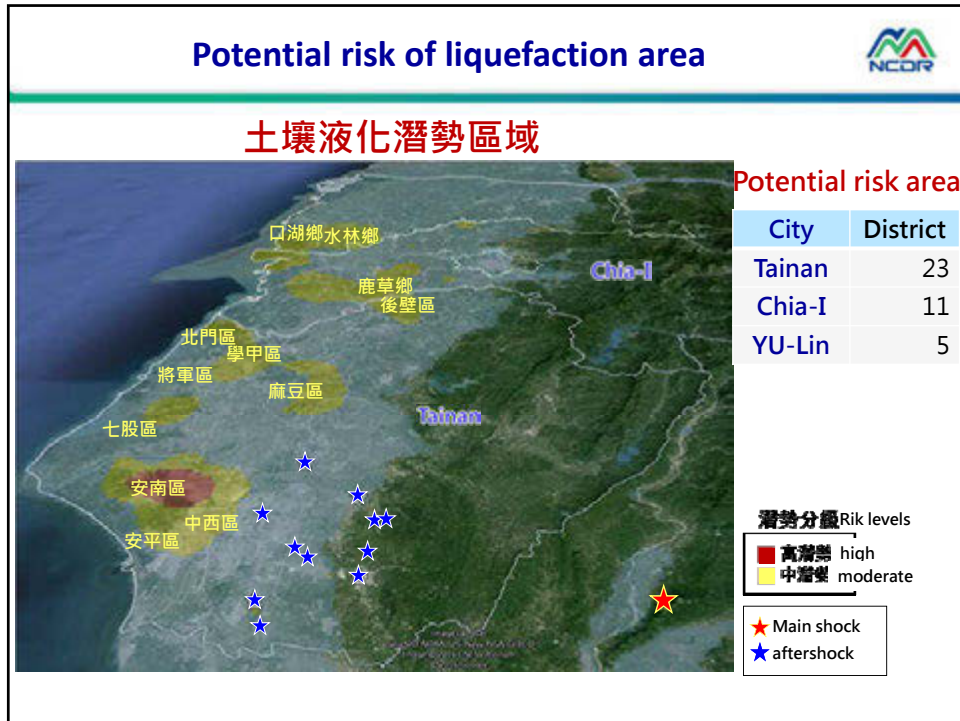



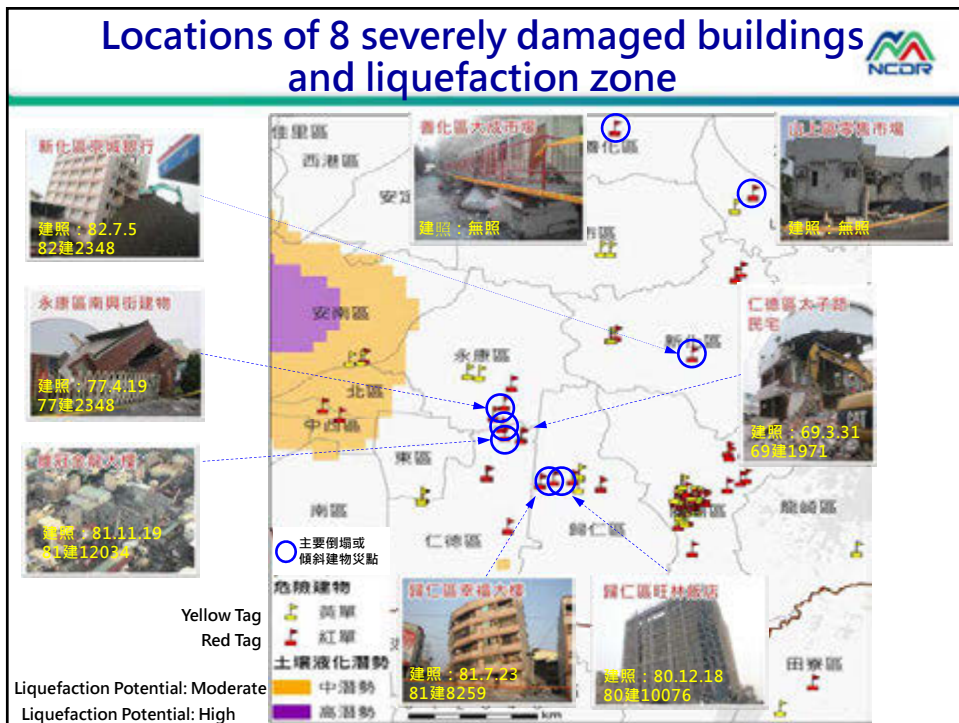
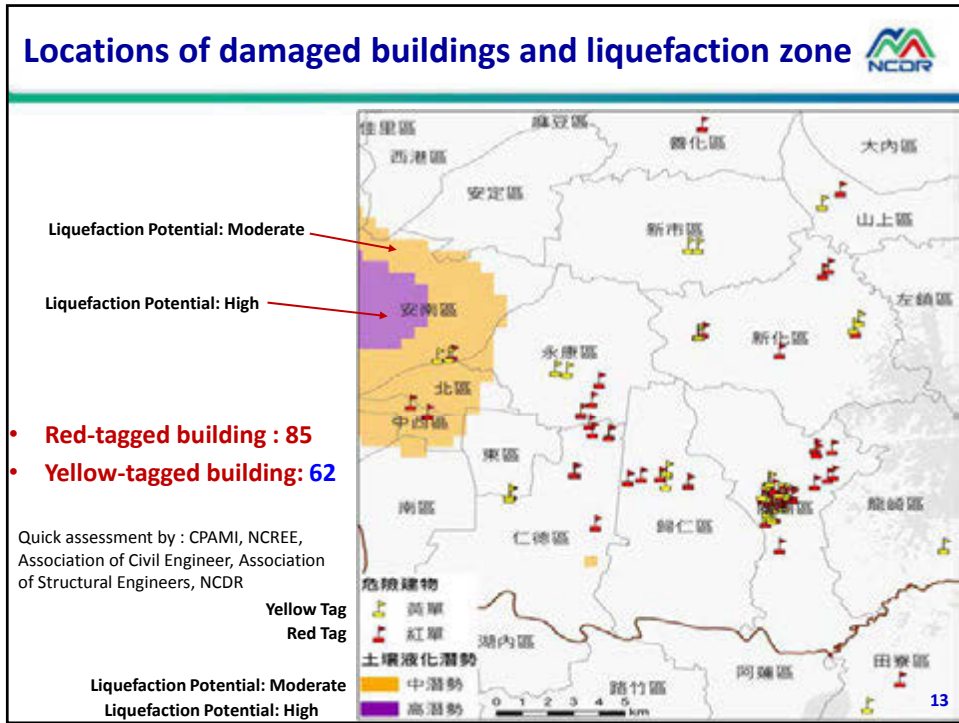
Summarized NCDR Operations during 2/06-14

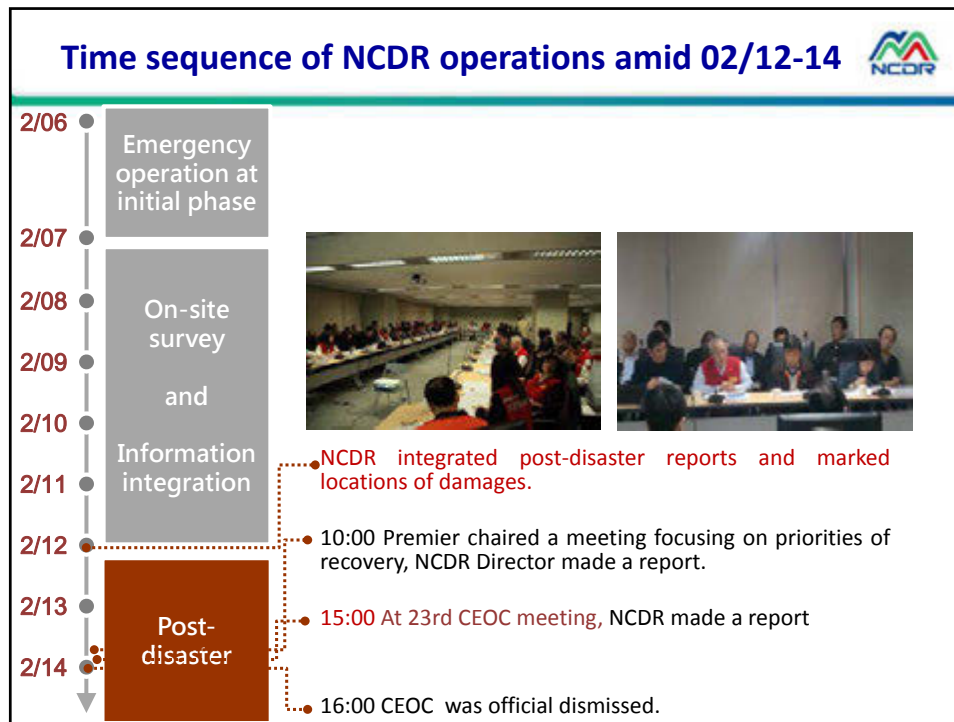
| | | |
|------|--|---|
| 2/06 | Emergency operation at initial phase | <ul style="list-style-type: none"> • 0206 03:57 quake hit · 03:59 NCDR's system activated • 0206 04:15 NCDR reported to CEOC • 0206 05:00 NCDR Director reported to Primer and Vice Primer |
| 2/07 | On-site survey and Information integration | <ul style="list-style-type: none"> • NCDR was assigned as contact window to international media |
| 2/08 | | <ul style="list-style-type: none"> • In seven days, NCDR motivated 120 persons to collect information and situations, provide suggestion, and post-disaster survey |
| 2/09 | | <ul style="list-style-type: none"> • During 9-day emergency operation, NCDR attended 23 working meetings, 5 press conferences; and issued 16 |
| 2/10 | | <ul style="list-style-type: none"> • Follow instructions, NCDR received six interviews by local media |
| 2/11 | Post-disaster | <ul style="list-style-type: none"> • NCDR and NCREE were assigned to propose a survey report |
| 2/12 | | <ul style="list-style-type: none"> • 0214 16:00 CEOC dismissed |
| 2/13 | | <ul style="list-style-type: none"> • 0214 16:00 CEOC dismissed |
| 2/14 | | |







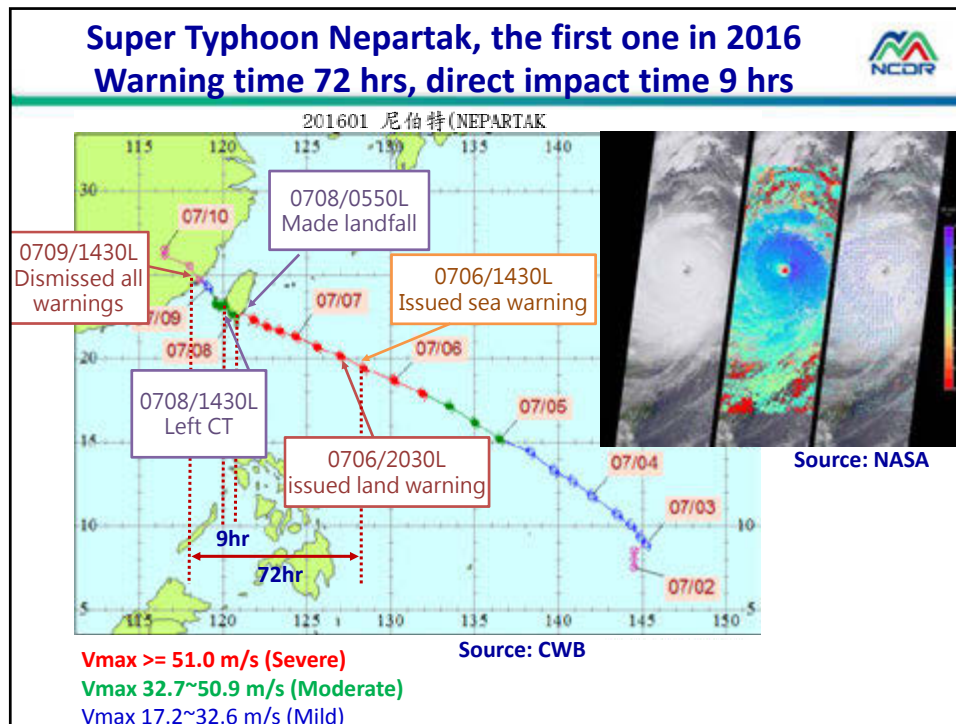




Lessons learned from the quake


- Retrofit on old-existing buildings
 - **Weak story** (insufficient shear capacity) : wide-and-open space.
 - Building **designed before 1999**: lateral reinforcement, seismic hooks and overlap of longitudinal reinforce bars
 - **Mixed-use complex** includes commercial and residential units
- Needs of modern technique to identify people under deep debris
- Enhance resilience of under ground pipelines
- Business continuity plan to help quick recovery
- Raise public risk perception: impacts by soil liquefaction
- Space remodeling requires a professional certificate to ensure seismic safety

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Damages and casualties by Typhoon Nepartak


| Items | Numbers |
|---------------------------------|--|
| Casualty | Death: 3 Injury: 285 |
| Evacuation | Ever evacuated 17,396 |
| Power outage | 523,281 households ever out of electricity |
| Water outage | 24,829 households ever out of tap water |
| Land-line phone interruption | 517 households |
| Mobile phone transmission tower | 2,004 damaged sites |
| Flood | 211 sites |
| Road closure | 10 sites |

NCDR delivered 8 reports during 7/6~8 to provide risk assessment, scenario, monitoring & investigation 


Sea warning Issued: 7/6 14:30


| | |
|--------------------------------|--|
| 1. Report 01: 2016.07.06 15:00 |  Preparation and simulation |
| 2. Report 02: 2016.07.06 20:00 | |

Land warning Issued: 7/6 20:30


| | |
|--------------------------------|---|
| 3. Report 03: 2016.07.07 08:00 |  Close to landfall |
| 4. Report 04: 2016.07.07 14:00 | |
| 5. Report 05: 2016.07.07 20:00 | |

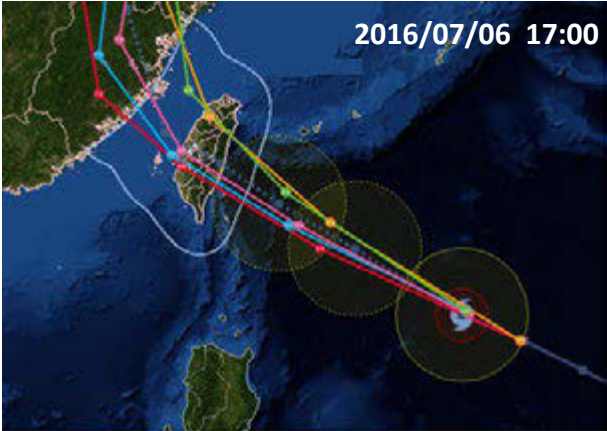
Landfall time: 7/8 05:50 at Taitung

| | |
|--------------------------------|---|
| 6. Report 06: 2016.07.08 08:00 |  After landfall and before departure |
| 7. Report 07: 2016.07.08 15:00 | |

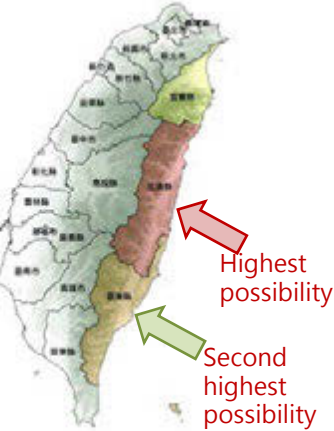
| | |
|--------------------------------|---|
| 8. Report 08: 2016.07.08 20:00 |  After departure |
|--------------------------------|---|

All warnings dismissed 7/9 14:30

Possible areas to have landfall of the typhoon based on regional forecasts 



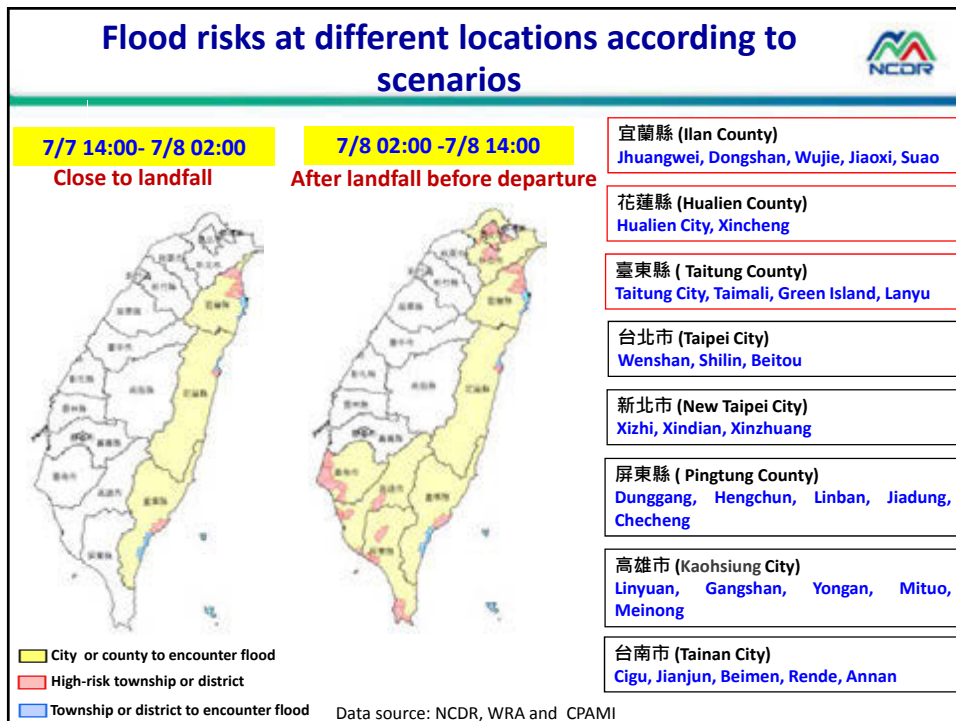
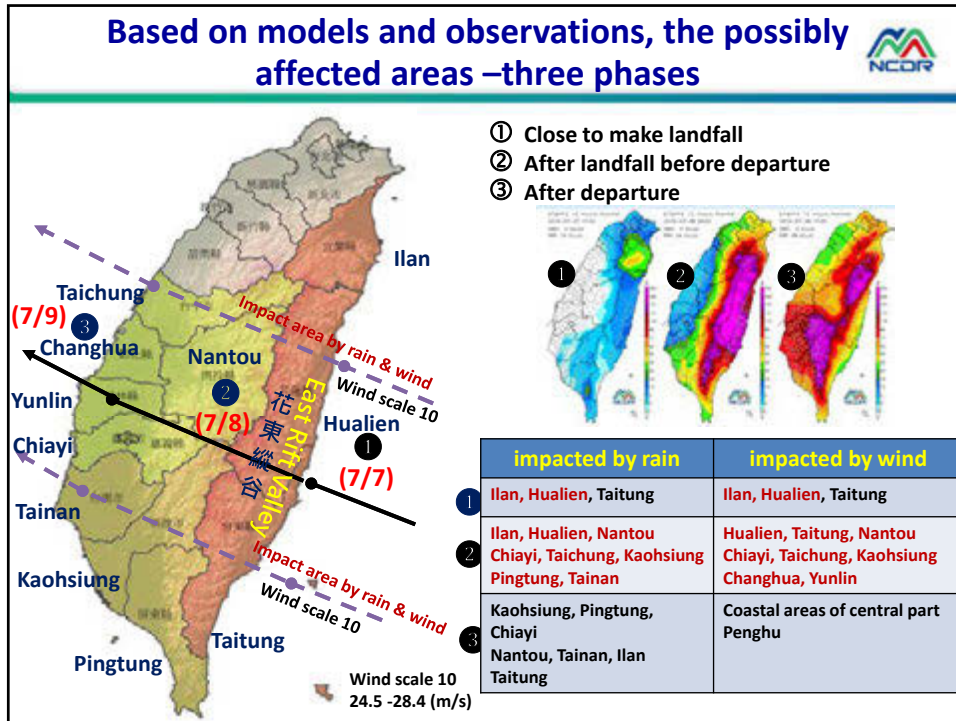
2016/07/06 17:00

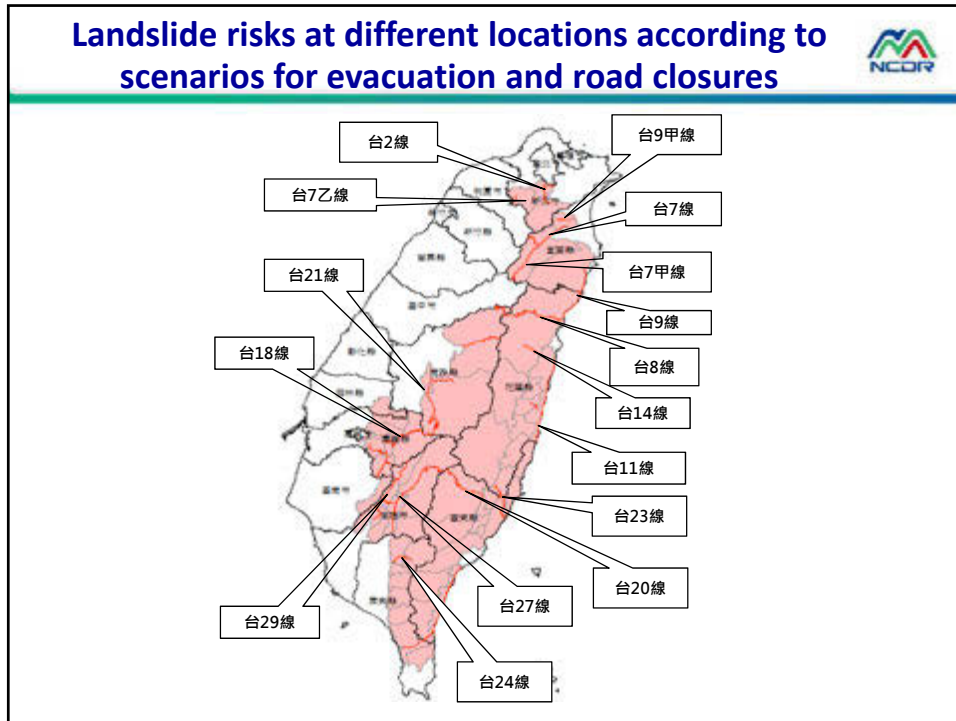


Highest possibility

Second highest possibility

20





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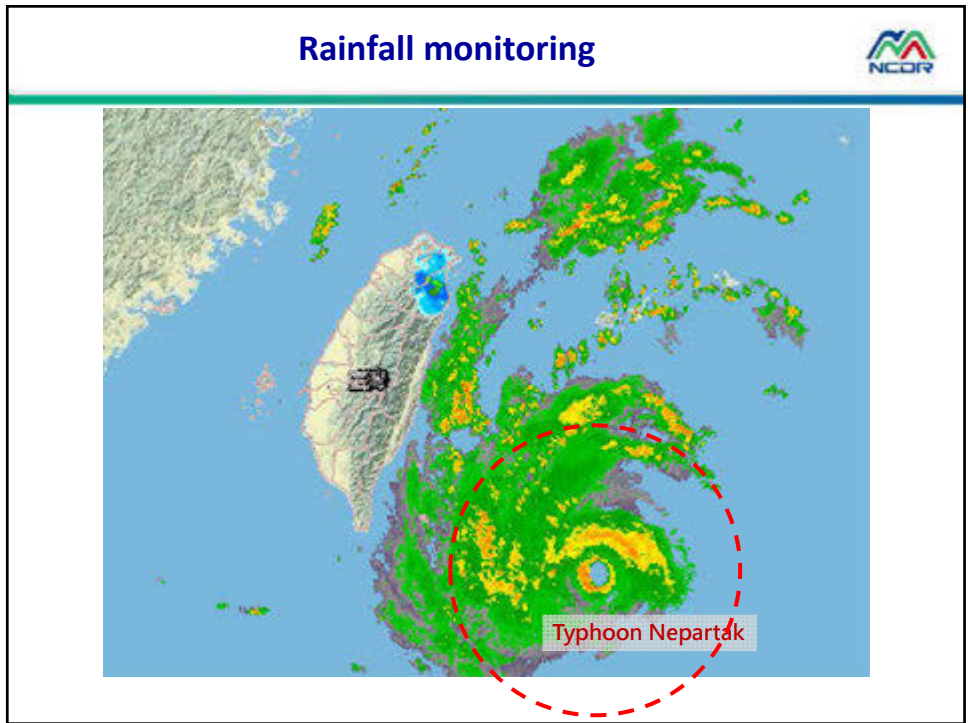
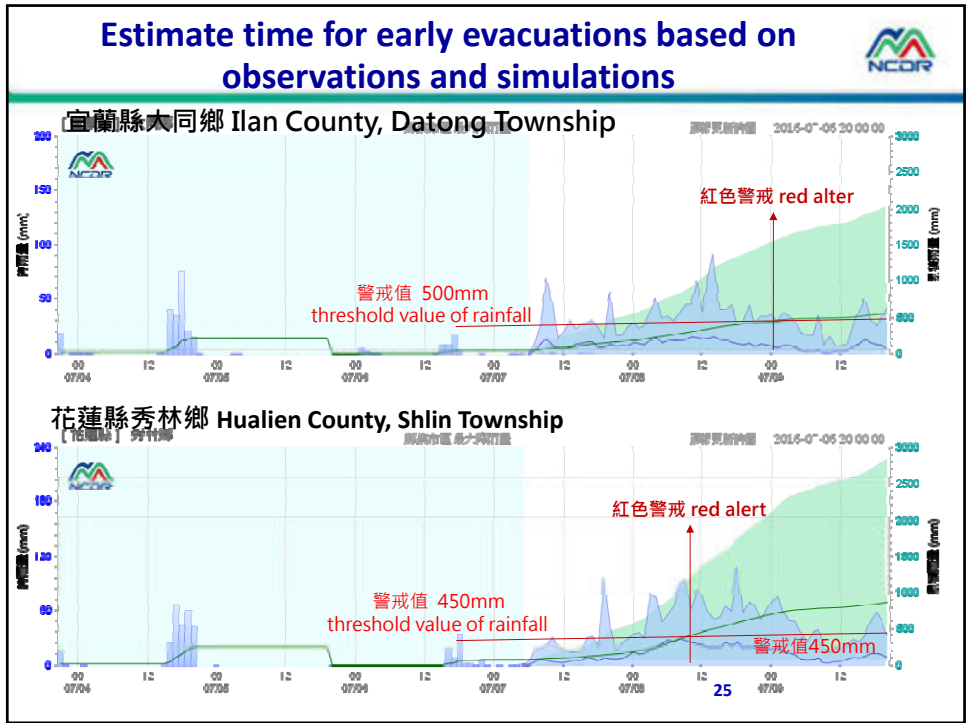
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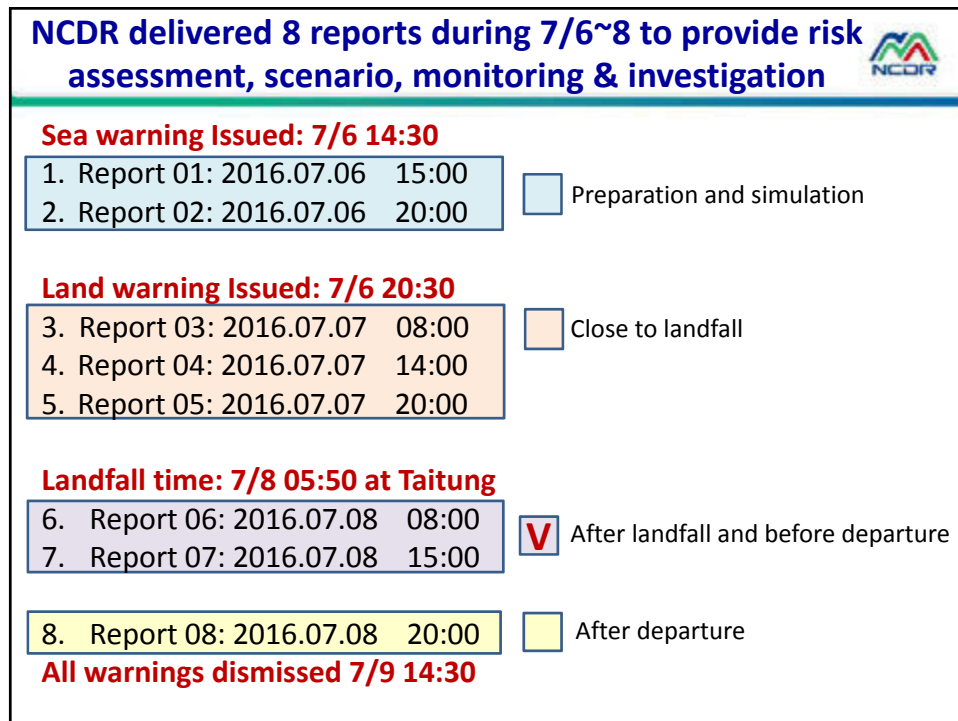
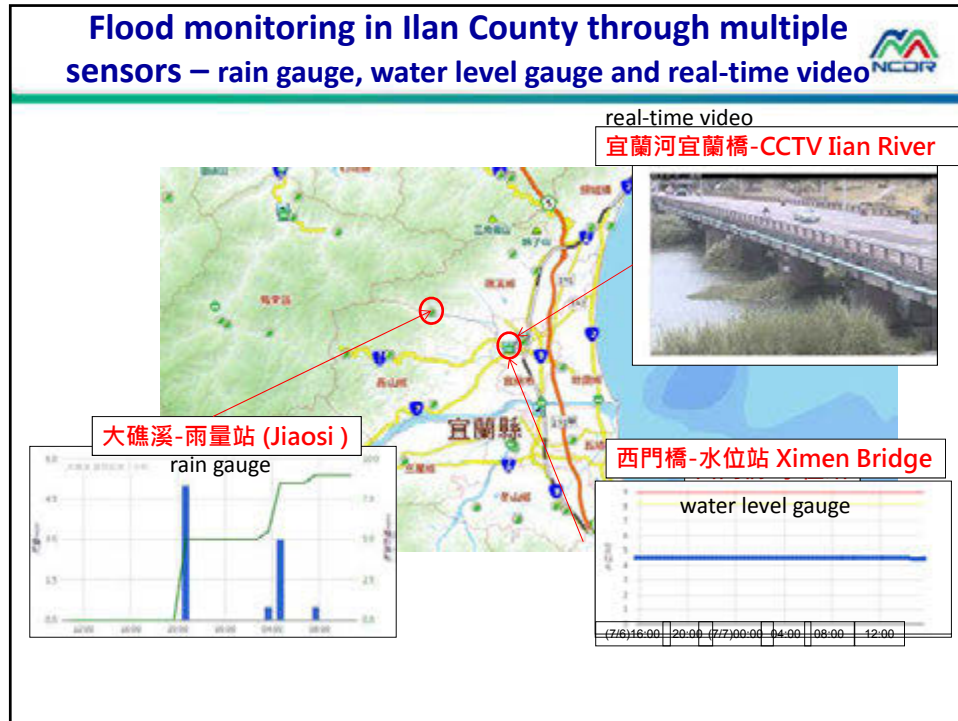
Landfall time: 7/8 05:50 at Taitung

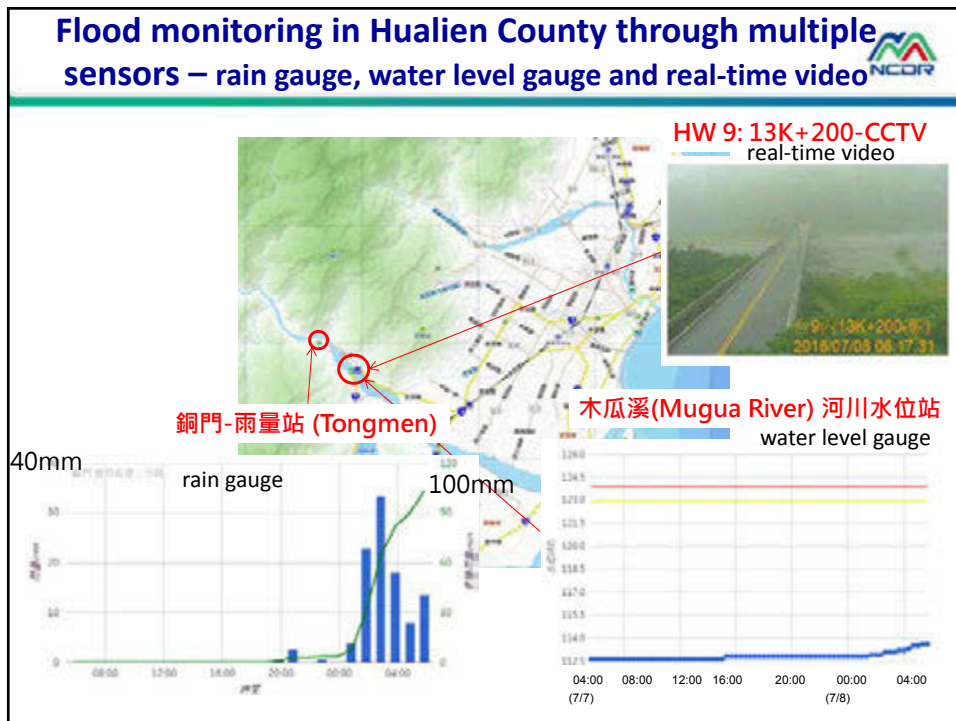
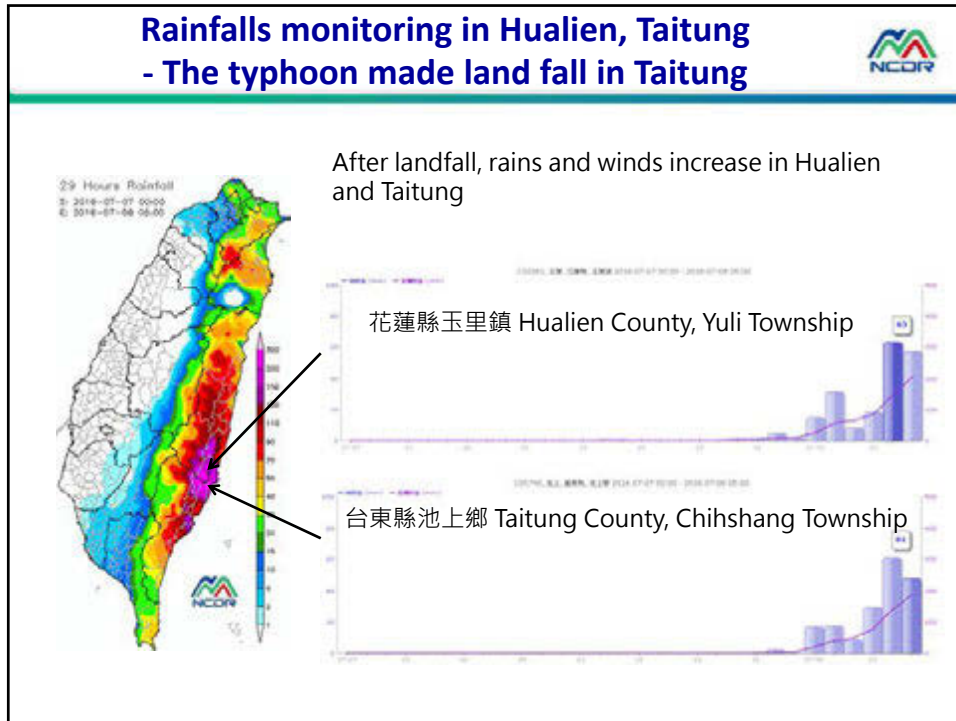
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All warnings dismissed 7/9 14:30







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|---|--|
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| | |
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|--------------------------------|---|

All warnings dismissed 7/9 14:30

Situation monitoring in Hualien County through multiple sensors –water level gauge and real-time video

Hsiukuluan Creek water level

water level gauge
Hualien, Yuli Birdge

一級警戒 Level one warning

Wind damages in Taitung County

Market in Taitung

Taitung City

This block features a map of Taitung County with red arrows indicating wind damage locations. Two photographs show the aftermath: one of a market with a collapsed roof and another of a street in Taitung City with debris and damaged buildings.

Damages in Kaohsiung City

高雄中正四路
Zhongzheng 4th Rd., Kaohsiung City

高雄捷運中央公園
MRT Central Park, Kaohsiung City

This block features a map of Kaohsiung City with red arrows indicating damage locations. Two photographs show the aftermath: one of a street with a large pile of debris and another of the MRT Central Park station with a damaged roof structure.



**Thanks
for
your attention**