行政院環境保護署
Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

EPA's Typhoon Morakot Disaster Emergency Response

Environmental Protection Administration,
Executive Yuan

August 30, 2009

Presentation Content

1. **Being Ready for the Situation**
   1. Organizational Manpower/Staffing
   2. Emergency Response Vehicles and Equipment
2. **Disaster Management and Follow-up**
   1. Waste removal and equipment/manpower support
   2. Drinking water quality monitoring/control
   3. Disinfection and mobile toilet arrangements
3. **Post-typhoon Restoration Plan**

1. Being Ready for the Situation

Organizational Manpower/Staffing

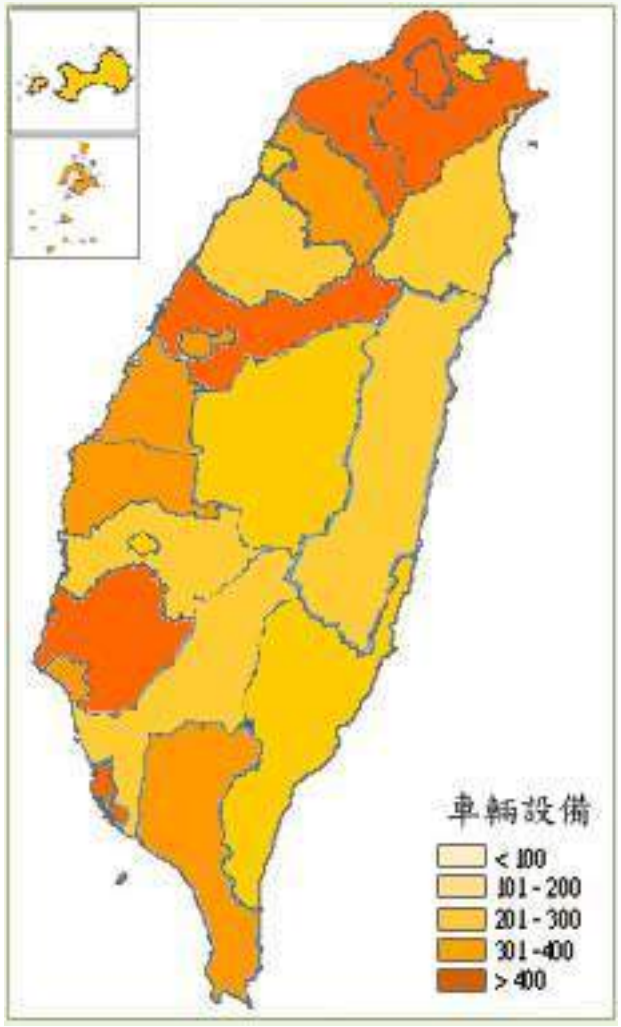
- Land warnings for Typhoon Morakot were issued on Aug. 6, 2009 at 8:30 a.m. The EPA shift supervisor took up station at the Central Disaster Response Center as notified.
- The EPA Natural Disaster Response Task Force was concurrently established, including personnel from Dept. of Water Quality Protection, Dept. of Waste Management, Dept. of Environmental Monitoring and Information Management, Office of the Secretariat, and Dept. of Environmental Sanitation and Toxic Substance Management.
- EPA's environmental disaster management information system(http://emis.epa.gov.tw/) was activated and environmental protection units at all levels (cleanup crews of environmental protection bureaus and township/municipal public administration offices) sent out alerts and prepared to carry out post-disaster environmental cleanup and disinfection work.
- EPA is responsible for the environmental cleanup, disinfection and supervises drinking water quality testing of affected areas in the natural disaster emergency response system.

1. Being Ready for the Situation

Emergency Response Vehicles and Equipment (1/2)

Waste Removal

- Supporting vehicles and equipment used by environmental protection units across Taiwan comprised a total of 3,973 garbage trucks with rear loader compactor, 2,733 hauling trucks, 334 sewer cleaning trucks, 344 street sweeping vehicles, 247 backhoe tractors, 144 bulldozers, 84 loading shovels, and another 797 pieces of cleaning and removal machinery. The EPA adjusts the logistics of the operation as the circumstance dictates.

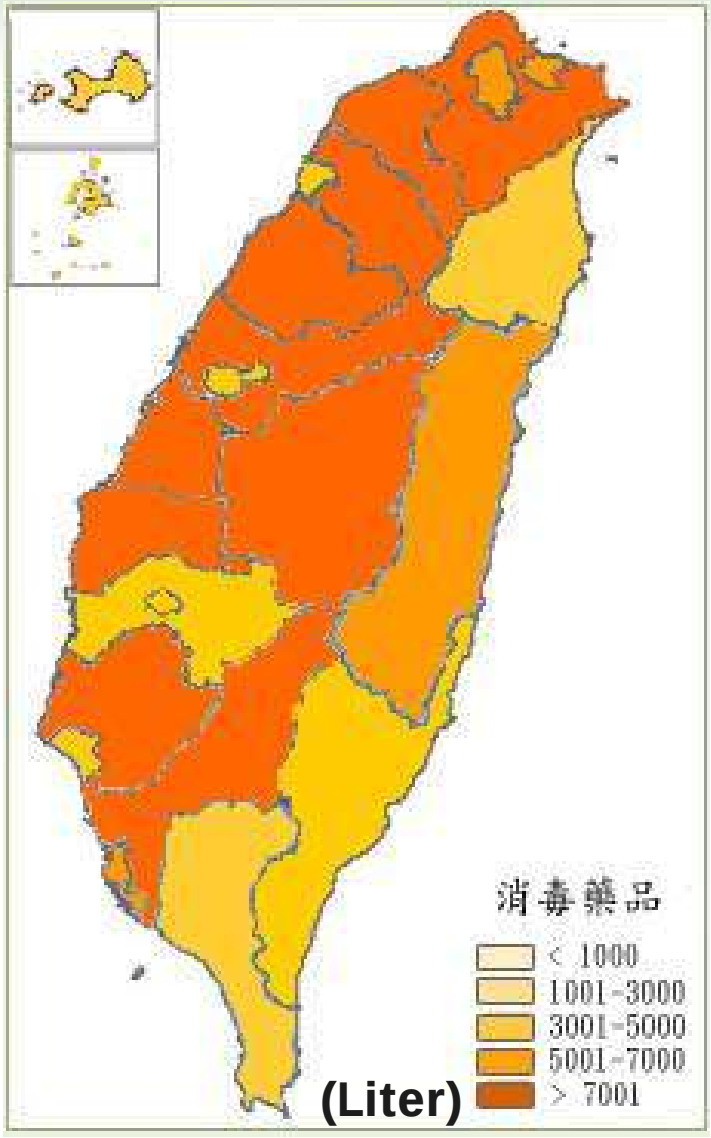


1. Being Ready for the Situation

Emergency Response Vehicles and Equipment (2/2)

Environmental Disinfection

- The EPA has prepared 6,610 liters of disinfectant for use by the county and municipal units to support cleanup efforts in disaster-affected areas.
- Distributed among the environmental protection bureaus: 1,994 pieces of equipment for disinfection, 14,462 kilograms (dry weight) of disinfecting agents, and liquid volume of 224,054 liters of disinfecting agent.



行政院環境保護署
Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

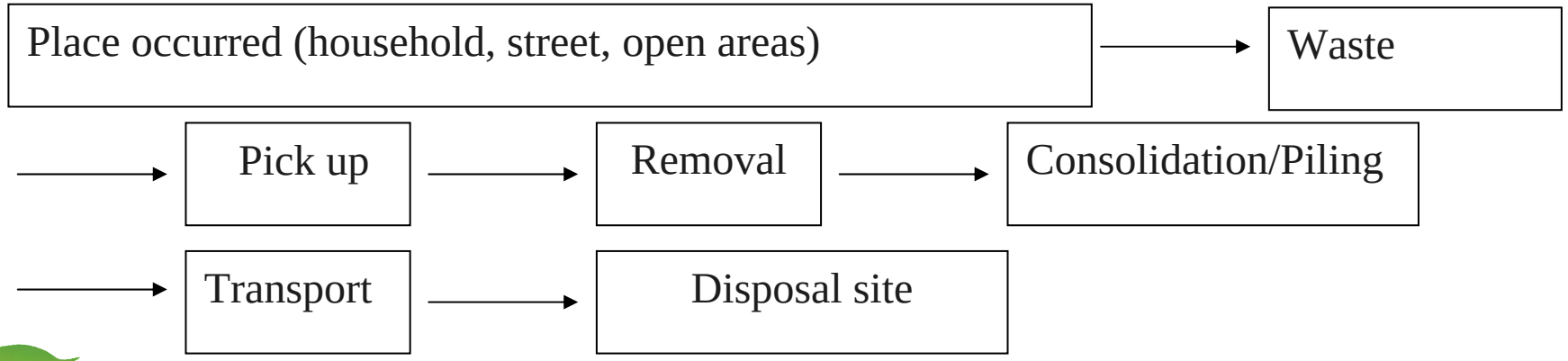
2. Disaster Management and Follow-up

Waste Cleanup (1/3)

Affected areas: Typhoon Morakot caused flooding in 14 counties/cities and 304,354 households.

Environmental cleanup operational procedures:

1. **Waste collection, removal, consolidation, piling, transporting, disposal**
2. **Mud and silt removal from streets**
3. **Street cleaning**
4. **Street disinfection**
5. **Household sanitizing and cleanup**



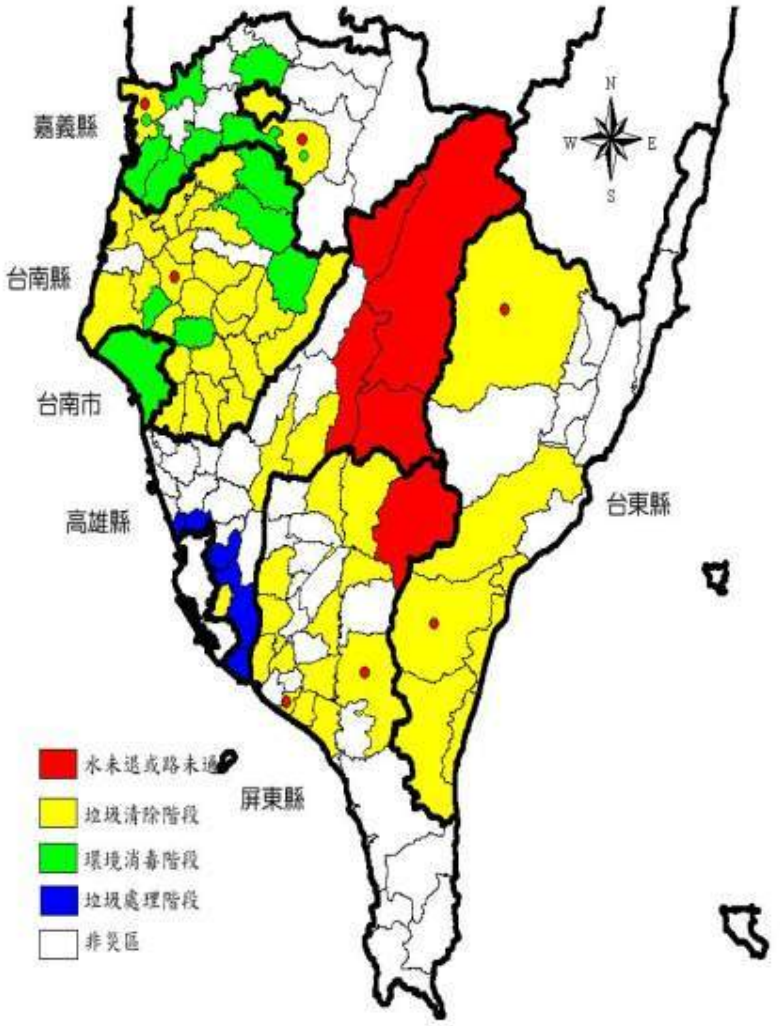
Environmental cleanup of affected areas (mud removal)

行政院環境保護署
Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

2. Disaster Management and Follow-up

Waste Cleanup (2/3)

Garbage that easily rotted and gave off foul odors was first removed. Then, regulated recyclables and other garbage were next for collection. After the water receded, environment cleanup and disinfection was carried out as quickly as possible. As of Aug. 23, 84,726 people had been mobilized for the cleanup effort, and a total of 229,156 tons of garbage and mud had been removed.



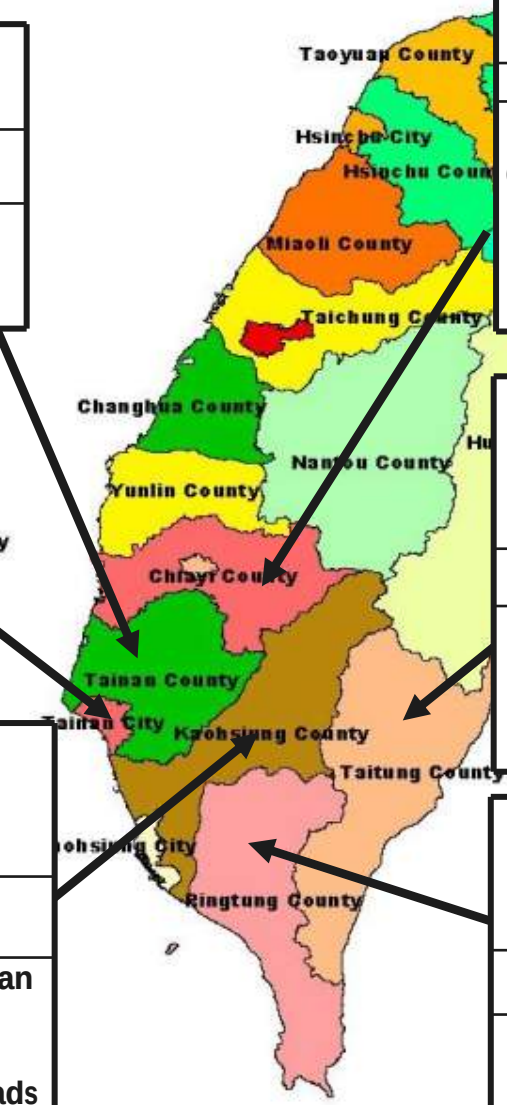
2. Disaster Management and Follow-up

Waste Cleanup(3/3)

cleaned amount of garbage collected	71,261 tons
clean-up %	100%
Cleaning status of township	completed

cleaned amount of garbage collected	18,083 tons
clean-up %	98%
Cleaning status of township	Donglun Vil. and Selun Vil., Dongshi Township have completed. Wenzai Vil.in process. Meishan,Dapu and Alishan Townships roads were disruped。

cleaned amount of garbage collected	10,390 tons
clean-up %	100%
Cleaning status of township	completed



cleaned amount of garbage collected	290 tons
clean-up %	100%
Cleaning status of township	completed

cleaned amount of garbage collected	20,816 tons
clean-up %	97%
Cleaning status of township	Jiaxian,Hunei and Qishan were cleaned up. Tauyuan, Liuguiand Namasia and Maulin roads were disruped。

Estimated amount of garbage collected	108,315 tons
clean-up %	89%
Cleaning status of township	Linbian and Jiadong Townships in some areas flooding has not subsided. Wutai,Laiyi and Sandimen Townships roads were disruped。

2. Disaster Management and Follow-up

Disinfection

County	Disinfecting Agents (liter)	Disinfection Area (km^2)
Pingtung	3,700	49.29
Kaohsiung	2,000	14.59
Tainan	6,500	89.86
Chiayi	3,000	74.7
Taitung	1,500	3.46

2. Disaster Management and Follow-up

Cleanup equipment and manpower support

- Dispatched equipment from the EPBs in the north and central regions and requested private construction operators to supply equipment to the affected areas. Rented heavy machinery from private operators to help with waste cleanup of the areas that have been seriously damaged.
- As of August 29, EPA had dispatched 5,670 times cleanup equipment and 9,883 times manpower support, including 1,051 times rental of private cleanup equipment.

2. Disaster Management and Follow-up
Disinfection and Mobile Toilet Arrangements

- Rapid deployment of disinfecting agents, equipment and mobile toilets to assist with disinfection work and sanitation requirements in the affected areas. 22,440 liters of disinfectant were supplied.
- 179 mobile toilets were supplied to Kaohsiung and Pingtung counties.

2. Disaster Management and Follow-up
Drinking water quality monitoring and control

- Starting on 8/8, the first day of disaster, the Taiwan Water Corporation (TWC) and environmental agencies had carried out a total of 2,149 drinking water quality tests.
  - Environmental agencies carried out 1103 of the tests, while the TWC carried out the other 1046 tests at tap water supply sites.
  - Water quality tests included E. coli, residual chlorine concentration, pH, and turbidity
  - Only one sample indicated residual chlorine below the acceptable standards while all other samples were within range of acceptable standards.

2. Disaster Management and Follow-up

Procedures for dealing with dead pets and farm animals

-Public announcement on August 11, 2009: "response mechanism regarding dealing with the mass quantity of corps of pets or domesticated animals"

-Coordination was done by the Council of Agriculture as the first priority to be delivered to the rendering plant. The Environmental Administration Protection coordinated with Taiwan Sugar Corporation seeking burial ground nearby.

-Small-sized pets or domesticated animals were cremated, assisted by related environmental departments.

-Large-sized domesticated animals were agreed to be assisted and dealt with in the burial grounds. But local residents protested against such an operation and police forces were sent.

Facts on the Environmental Department's Assistance in Dealing with Dead Animals

County	Cremated	Buried (tones)
Pintung County	729	818
Chiayi County	425	103
Tainan County	1014	800
Tainan City		123
Kaohsiung County	146.5	
Total	2314.5	1844

2. Disaster Management and Follow-up

- **Air quality monitoring and tests were conducted on the prefabricated houses made in China**
  - Tests were done on August 23, with the result of no formaldehyde and the total volatile organic compounds with suggested levels.
- **Shelter disinfection and drinking water test**
  - The principle of conducting drinking water tests is every 3 days. For the less-impacted areas, the tests were done every 7 days.
  - The environmental disinfection procedure was done every 3 days. If the hygiene condition was good, then the disinfection procedure was done every 7 days (such as military bases and places without portable toilets within 150 meters).
- **Financial Aid**
  - The rental machines, manpower, cleaning equipment, environmental cleaning, disinfection and drinking water tests in the disaster areas have received a total of over 117.15 million NTD aiding funds.

2. Disaster Management and Follow-up

●Linbian Township and Jiadong Township Environmental Clearance Operation

- The military carried out the the assignment on August 30.Tthe Environmental Protection Administation set the “Linbian & Jiadong Street Cleaning Project” which was carried out during the period of September 1-7.
- Approximately 1050 workdays of military labor, 339 workdays of labor from the Environmental Protection Administation , 103 ambulances and 56 other vehicles were involved in smoothly completing the cleaning of a 20 km length of roads in both Linbian and Jiadong Townships.

3.Post-typhoon restoration plan(1/4)

- Waste cleanup plan: Sustained household garbage was cleaned up by local governments with different regional demands. Large waste such as furniture, were requested to be removed, transported and disposed of.
- Resource recycling plan: Waste home appliances, computers, and vehicles were collected and removed through existing recycling entities on a constant basis. Local cleanup crews and public administration units carried out collection and removal of waste home appliances and vehicles from affected areas, which would then be sent to recycling operators for recycling and disposal.
- Environmental sanitation information dissemination plan: Reporting on the progress of environmental cleanup and matters that needed public cooperation through the media at the appropriate times.

3. Post-typhoon restoration plan(2/4)

- Drinking water quality testing plan: In addition to strengthening the drinking water quality tests and carrying out post-disaster education of water supply users , EPA set up the “Typhoon Morakot Post-disaster Drinking Water Quality Testing Program." Starting on 8/20, simple drinking water testing at the shelters, schools and remote areas was provided by private operators to provide people with a free inspection to ensure the safety of drinking water.
- Environmental cleanup and disinfection plan: Environmental protection units will determine the disinfection of different areas. The first time disinfection has been done after waste cleanup, the second time disinfection will begin one week after the first time, and a third time disinfection will be carried out if needed.
- Central government financing counties and cities plan. On August 30, the central government, the Executive Yuan, released 100 percent of its flood-related subsidies to city and county governments. With prodding from the central government, the city and county governments have now released 62 percent of their received subsidies to townships under their supervision. The townships, in turn, have released 32.9 percent of the money they received to local residents.

3. Post-typhoon restoration plan(3/4)

- Environmental Advisory Assistance : EPA set up the “Environment Advisory Group for Typhoon Morakot Restoration Plan " on August 20, 2009.
  - ✓ Members of Advisory Group :
    - ✓scholars and professors in colleges and universities in central and southern Taiwan
  - ✓ Functions:
    - ✓to meet the need of environmental restoration and planning after Typhoon Morakot
    - ✓to minimize the damage from future disasters
  - ✓ Mechanism:
    - ✓to provide victims with environmental restoration and reconstruction advice
    - ✓to conduct environmental surveys and studies for future environmental clearance, disaster prevention, and national land planning and estimation
    - ✓ to serve as consultants for future national land planning

Conclusions

- Typhoon Morakot brought heavy rainfall rarely seen in the past hundreds of years.
- This disaster provided people with evidence of the impact of climate change. It also awakened people to confront the challenge of global warming and the adaptation to climate change.
- With climate change increasing in both frequency and severity of disasters, most of the countries in the Pacific area will become vulnerable to natural disasters.
- An effective, comprehensive, science and technology based regional cooperation program should be developed for preparedness, emergency response and restoration related to natural disasters.
- The disaster resilience strategies should include sustainable design such as global biocoal and electricity smart grid as well as low-carbon townships and cities.

End of Report