



The Strategies and Post-Disaster Reconstruction of Typhoon Morakot in Taiwan

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Damage by Morakot Typhoon

- ❖ 3day's accumulated rainfall 2,965mm
 - death and missing 699 persons ; seriously injuries 4 persons
 - seriously damaged houses 1,622 units; farm loss 20 billion NT\$
 - more than 112 inhabitant areas found unsafe (53 indigenous tribes and 59 non-indigenous spots)

World Rainfall Record

❖ The highest accumulated rainfall in Taiwan's history , **Alishan (阿里山)** reaches 2,965mm

❖ Compared with World Record

	Morakot	Aurere la Reunion
24 hrs duration	1,623.5mm	1,825mm
48 hrs duration	2,361 mm	2,467mm

A dramatic impact to Tawan !!!

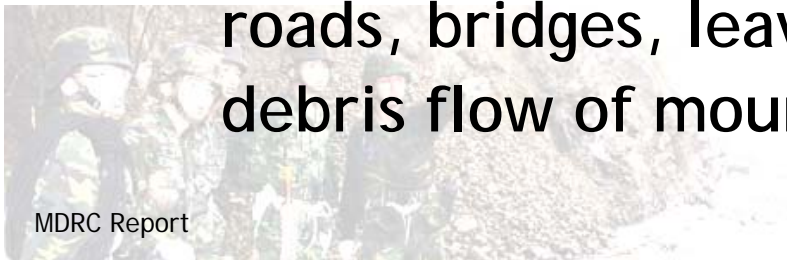
Highest River Flow in Taiwan's History

- ❖ Prof. Tsai C. T. (Hydraulic and Ocean Dept., Nat'l Chengkung Univ.) :

According to the data measured at Kao-Ping River station, the peak water flow reaches 29,100 cms

; **Prof. Tsai estimated the water flow of river is highest in past 200 years of Taiwan history.**

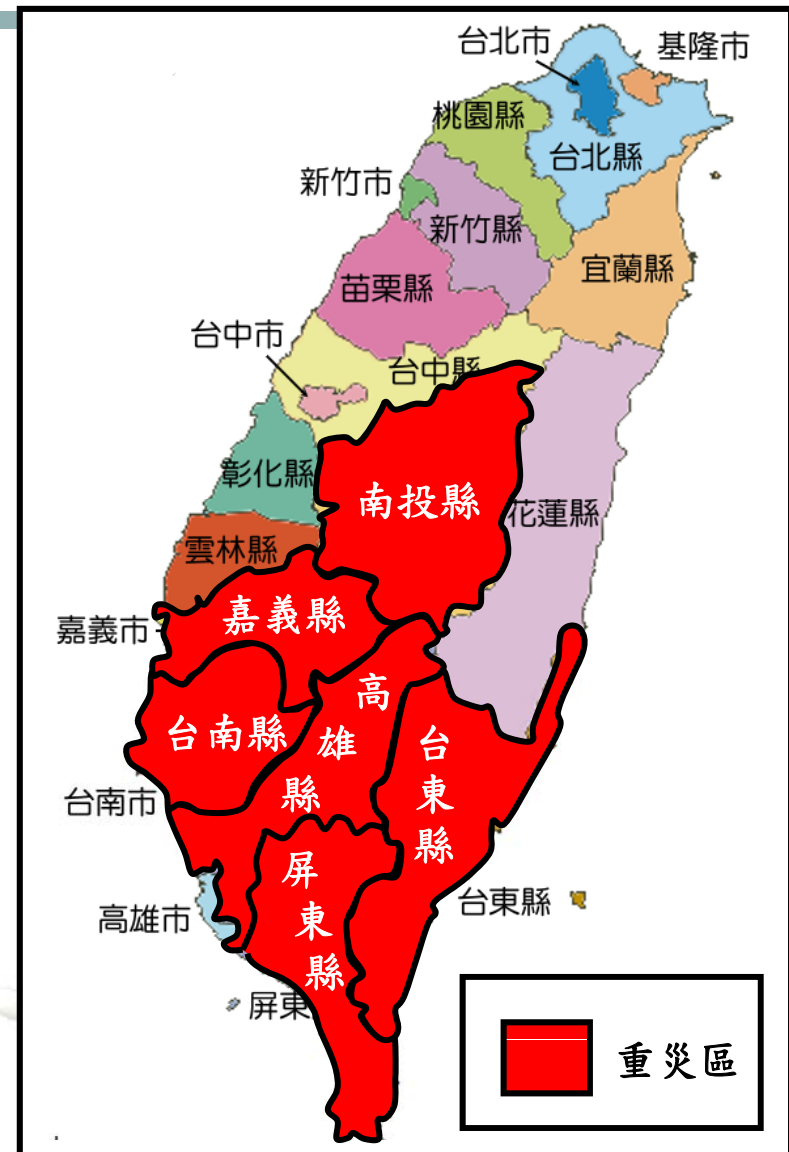
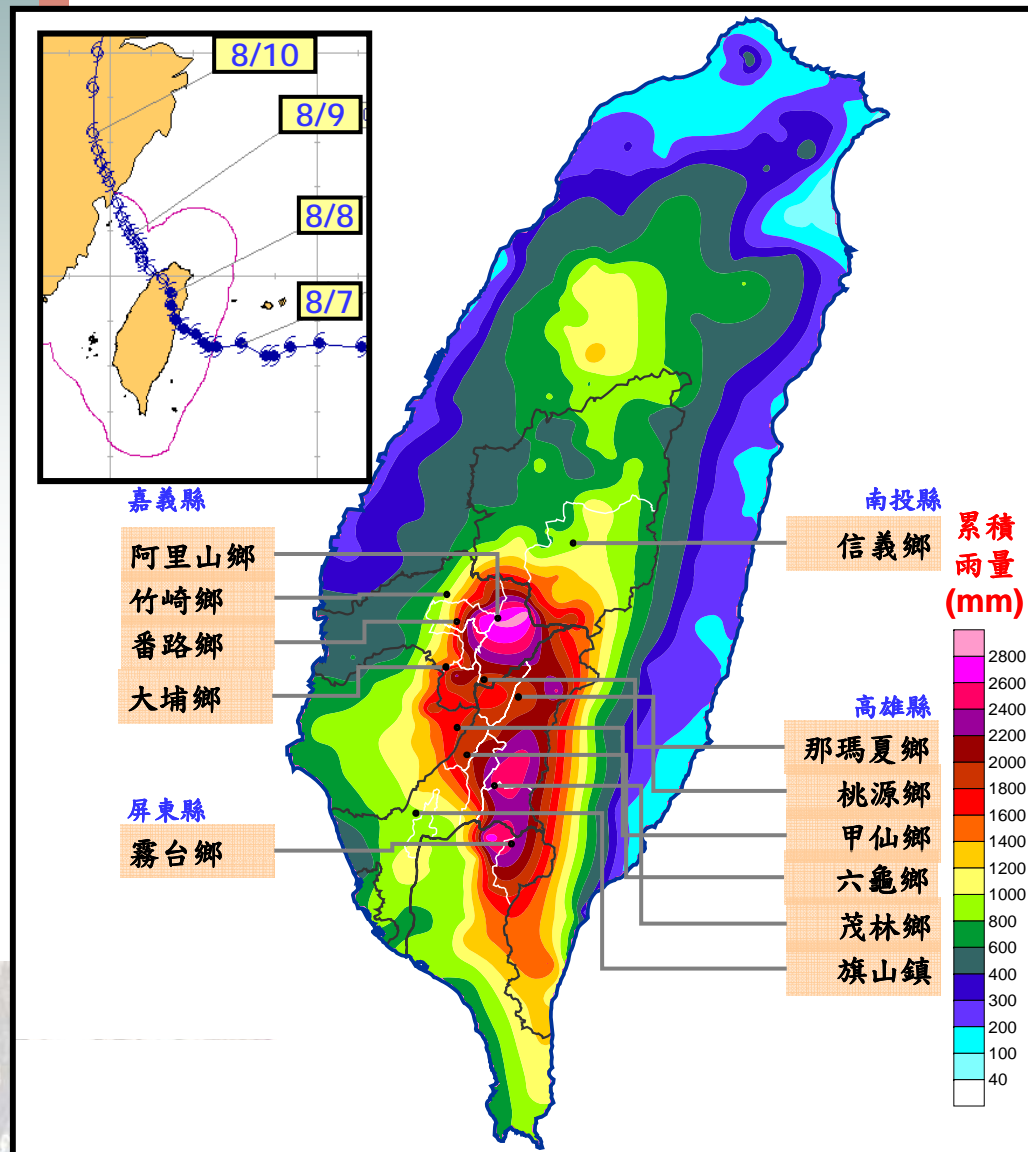
- ❖ The mega amount of water flowing down the valley of steep mountain brings down large aggregates, woods, and high soil density water flow. It destroys almost all roads, bridges, leaves and leads to slope failure and debris flow of mountain.



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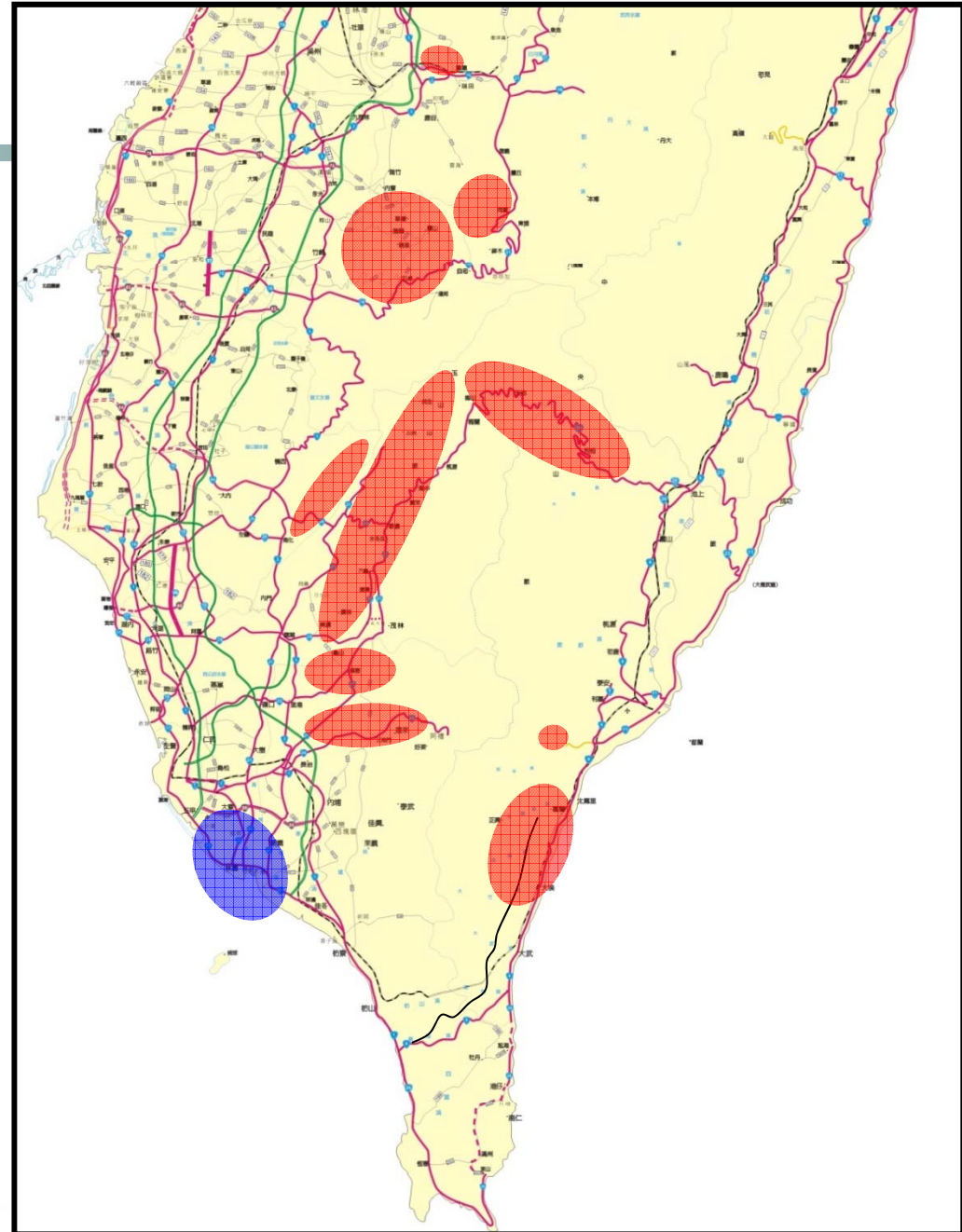


Accumulated Max. Rainfall 2,965mm (阿里山, Alishan)



Seriously Damaged Area

-  Isolated Islands in Mountain Area
-  Coastal Flooded Area



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Flooded Areas

Pingtung County: Linbian, Jiadong, Donggang, Xinyuan townships







八八水災前後小林村景象對照

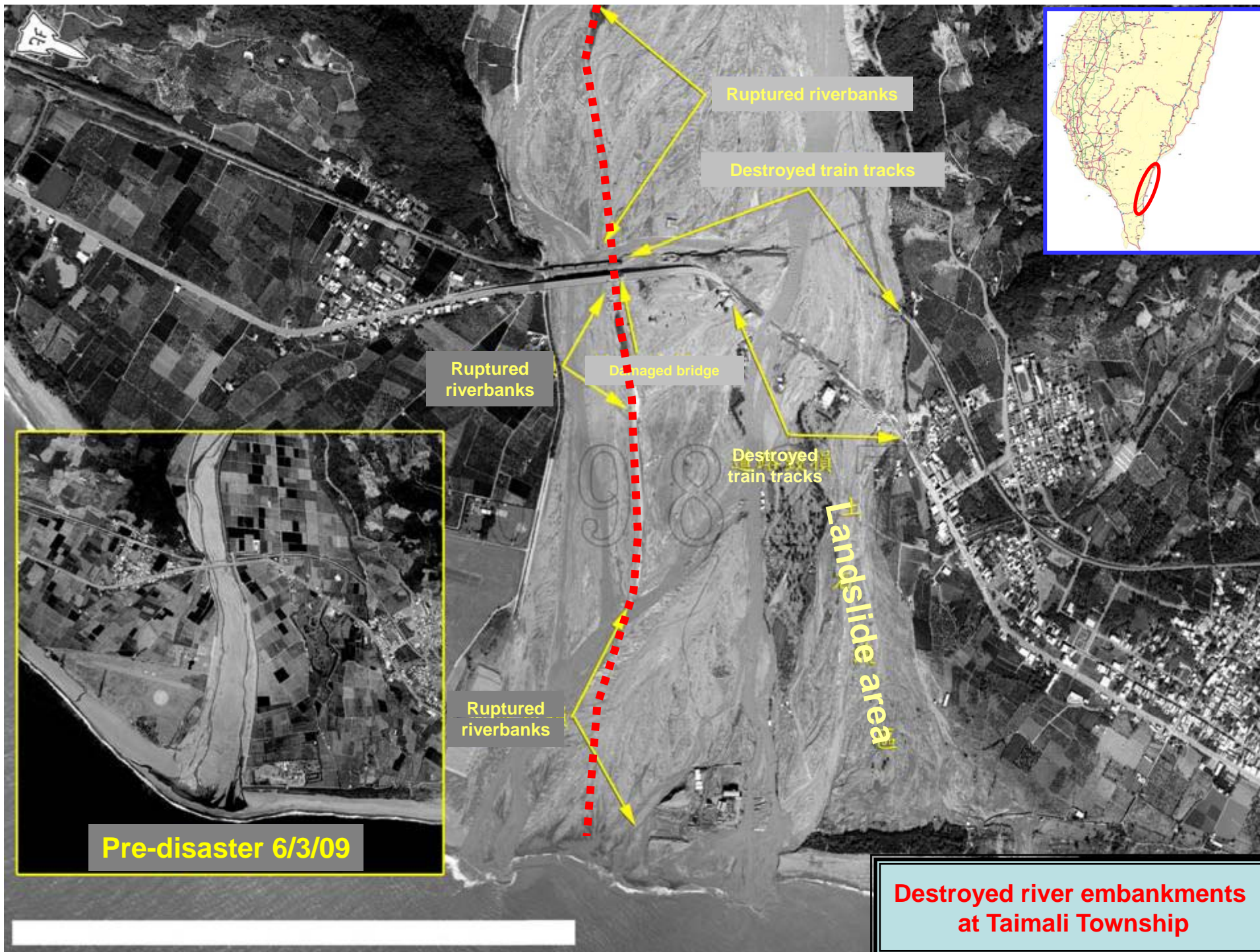
Xiaolin Village

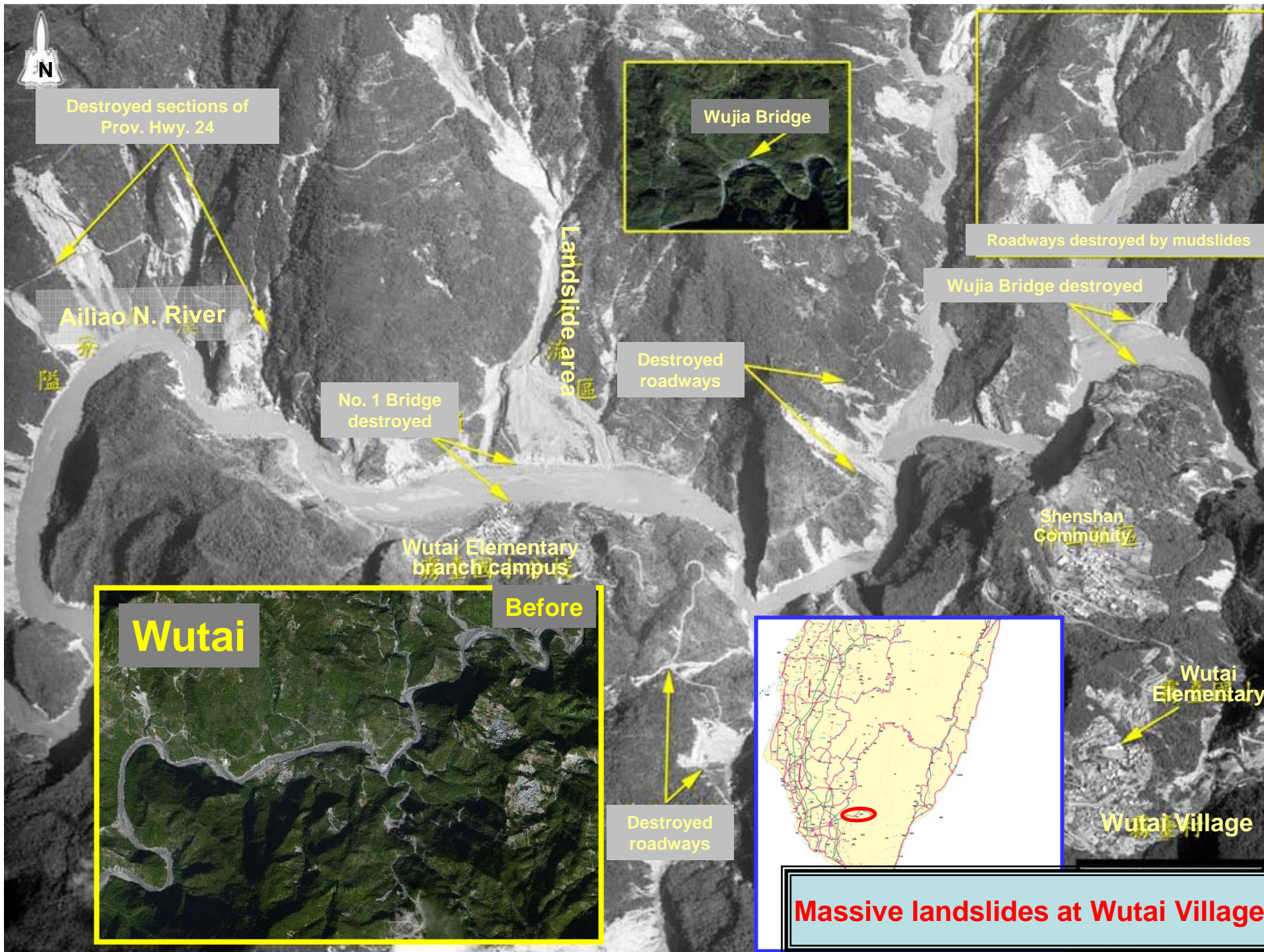


before



after





Upper Stream of Tzeng-Wen Reservoir



Tribes near Highway 20



Highway 20 (台20線)



Highway 20 (台20線)



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Tribes near Highway 21



Highway 21 (台21線)



Tunnel at Highway 21



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Highway 21 (台21線)



Highway 21 (台21線)



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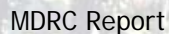
Nansalu Village after Debris Flow



莫拉克颱風災後重建推動委員會

Power of Nature



[illegible]

Tribes along Highway 24



Beautiful Wutei Mountain Township

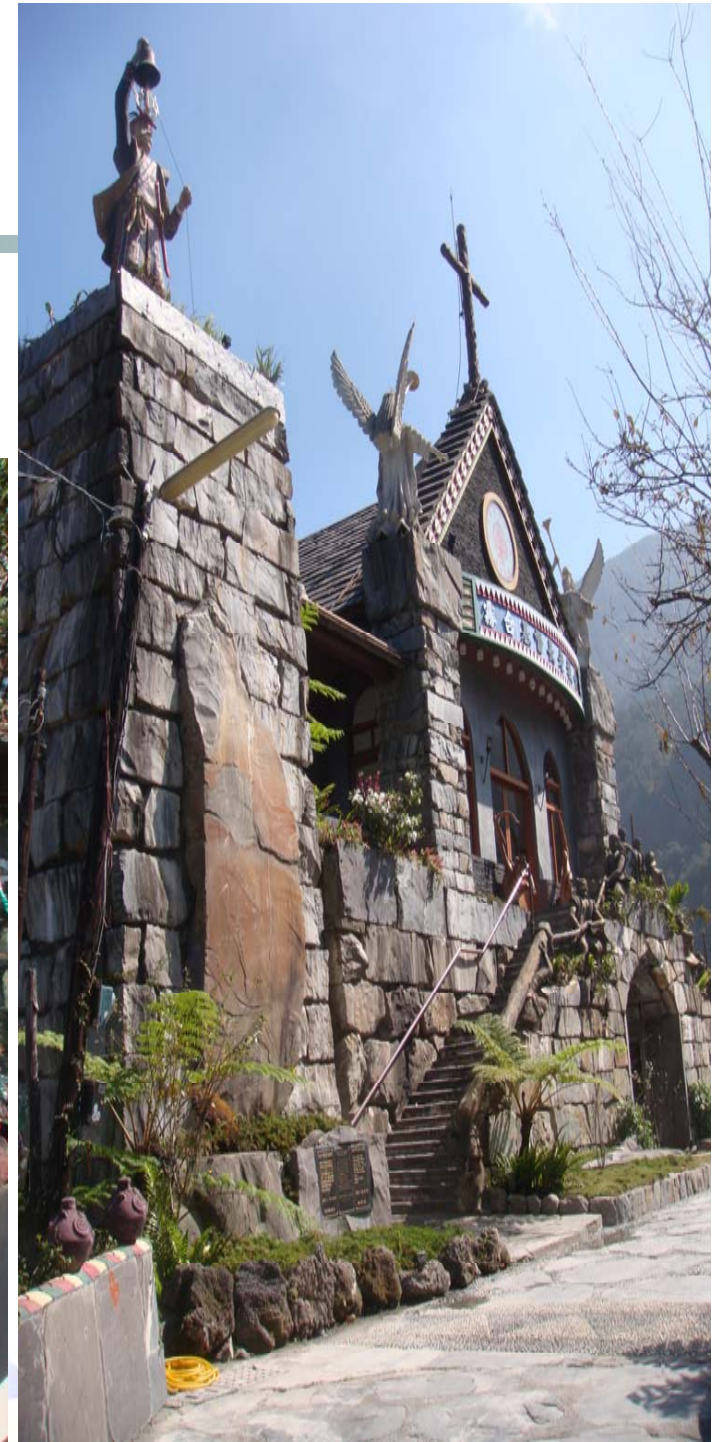


Wutei Township



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Wutei Township - home of Lukai tribe



Highway 24 (台24線)



Branch of Highway 24



Highway 24 (台24線)



Chia-Mu is ranked as dangerous site



Ali Village near Highway 24



Ali Village near Highway 24





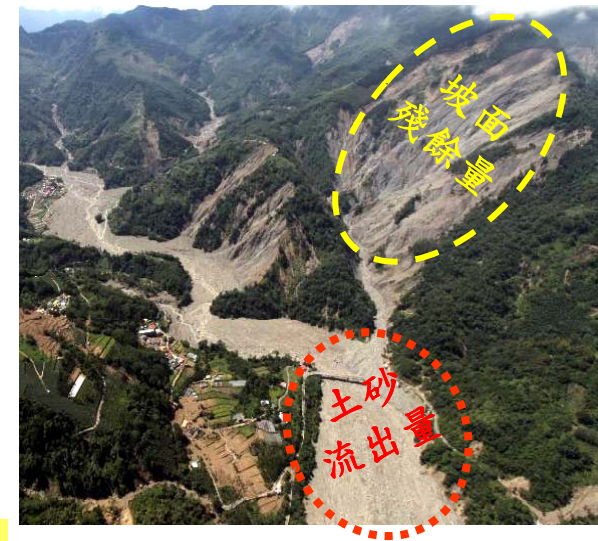
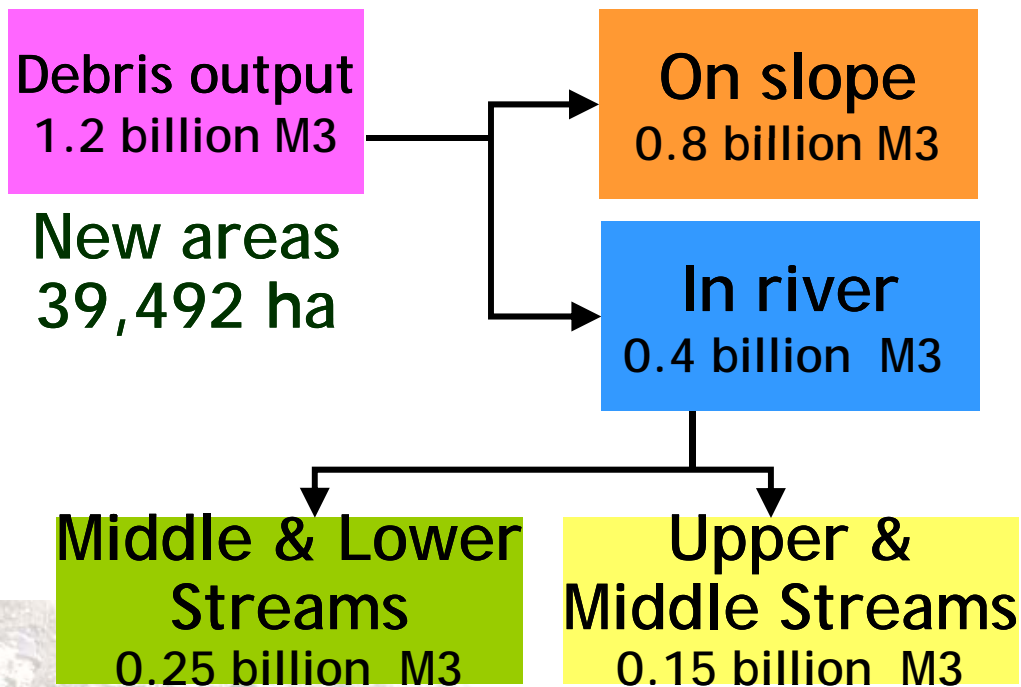
Landslide Investigation of Morakot Typhoon

Morakot Typhoon	Landslide (locations)	Landslide Areas (ha)	Landslide ratio(%)
Before (a)	33,886	51,304	5.52
After (b)	8,705	11,812	1.27
Difference (a)-(b)	25,181	39,492	4.25

Yr	Disaster	Surveyed Areas (ha)	Ratio (%)	Landslide Areas (ha)
1999	921 Earthquake	0.24 Million	4.70	11,280
2001	Toraji Typhoon	0.72 Million	3.13	22,567
2009	Morakot Typhoon	0.99 Million	5.52	51,304

Estimation of Debris Output after Morakot Typhoon

- ❖ Newly developed area is 39,492 ha ; the amount of debris is estimated to be 1.2 billion M³ (**650 volume of Taipei 101**) , 0.8 billion M³ remained on slope and 0.4 billion M³ in river



包含：中央管、縣市管河川、水庫集水區
等淤積量及**出海量**

Change of Environment due to Weather Change

- ❖ Even though the excess development in high mountain area is one reason to the occurrence of disaster, however, the record breaking 1.33 million ton drift woods (containing extra-large trees) and 1.2 billion m3 mountain debris due to massive landslides show that the environmental change due to extreme weather and several earthquakes takes more weight of the disaster.
- ❖ It poses the fact that we are facing great future challenge from the Nature. We need to have a brand new philosophy and attitude toward the Nature.



The manpower & Helicopters devoted to Rescue Efforts

Morakot Typhoon (1.12 million man-trip)

❖ Police and Fire Department	410,000
❖ Military	560,000
❖ Volunteers and NGOs	150,000
Helicopters (trips)	6,000

921 Chi-Chi Earthquake

Military	300,000
Helicopters (trips)	3,200



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Facing Issues

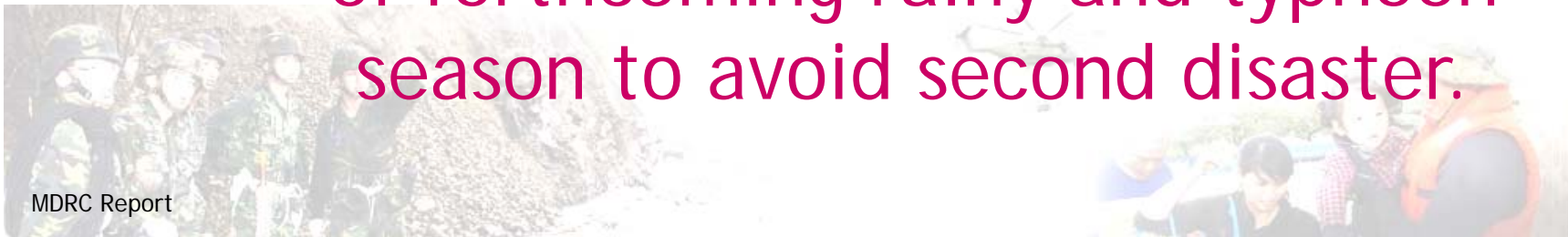
- Weather change; serious landscape variation
- great amount of debris (1.2 billion m³) ; widen river channel; 30-40 m river soil sediment
- bridges failure; road beds lost; slopes sliding; earth lakes formed
- Serious sedimentation of major reservoirs; forest water conservation reduced ; higher drought risk



Challenge of Reconstructions

- large debris amounts, lack of dredging roads
- loosing land (slopes, riverbeds etc.)
- Isolated islands for typhoons and heavy rains)
- High reconstruction budget
- The frequent evacuation and relocation of disaster refugees

The reconstruction speed and relocation of refugees are competing with time of forthcoming rainy and typhoon season to avoid second disaster.

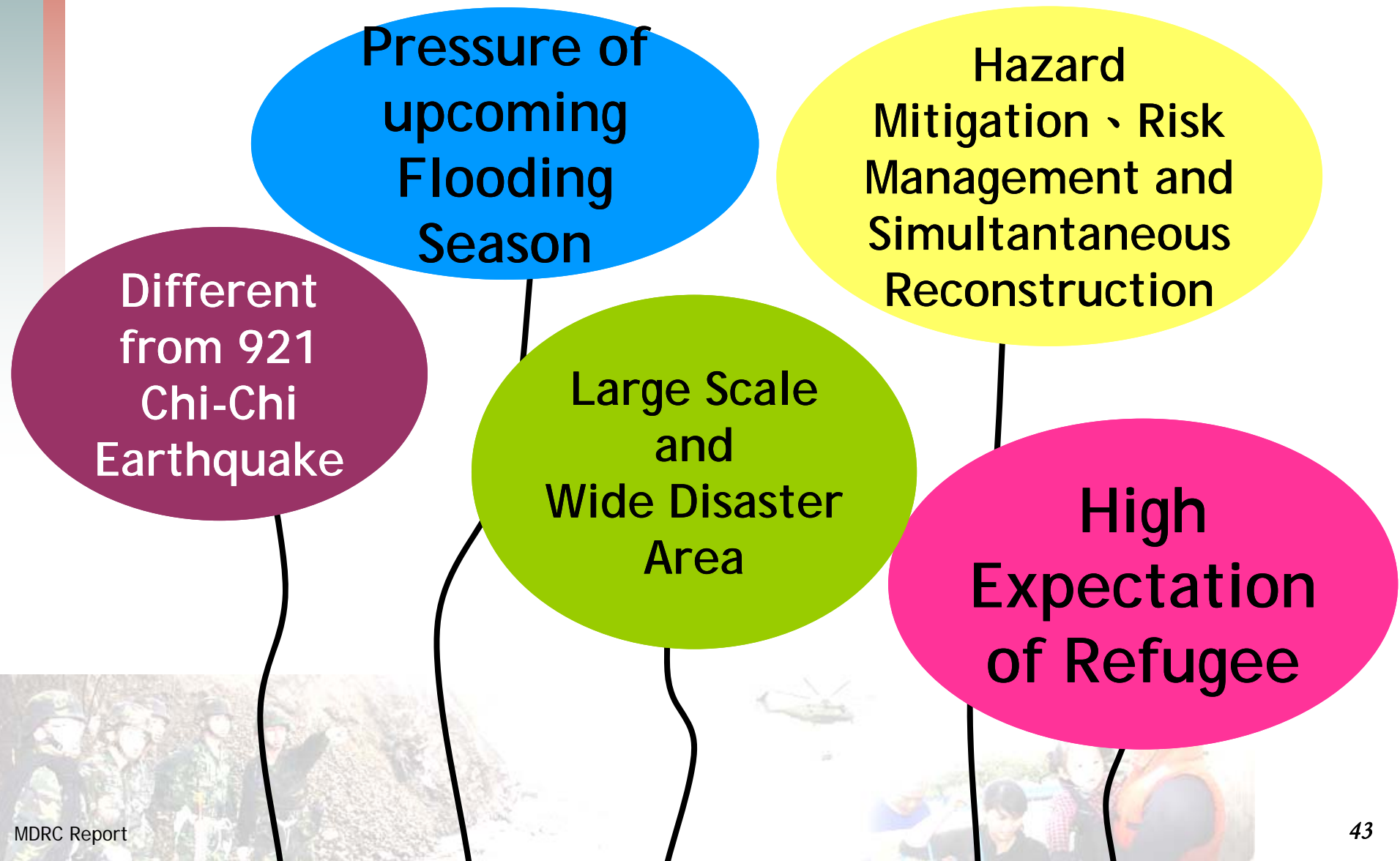


Special Characteristics of Morakot Typhoon and Flood

- ❖ Different characteristics as compared to 921 Chi-Chi Earthquake
- ❖ The reconstruction of 921 earthquake includes hardware (public works、houses、communities) and software (industry、life、culture).
- ❖ In addition to that of 921 earthquake, 「Reconstruction of Communities and Indigenous Tribes」 and 「Safety and Disaster Prevention」 are much more important in the reconstruction.



Fast Track Reconstruction



Special Act for Reconstruction

Morakot Typhoon Post-Disaster Reconstruction Special Act was approved by Congress on August 28 and declared by the President on August 29, 2009. **(20 days after)**

The budget for the reconstruction plan is NT\$ **120 billion** (plus 35 billion from reallocated budget) and was declared by the President on Nov. 20, 2009. **(94 days after)**

The Act is used for the amendment to the **"Disaster Prevention and Protection Law"**.

Respect of Indigenous Peoples and Their Culture

- ❖ 莫拉克颱風災後重建特別條例
(Reconstruction Special Act)
 - Items 1, 2, 4, 15, and 20



Major Works at Different Stages

2009.08.08
Rescue stage

- 辦理各項救災任務
- 消除災區孤島效應
- 規劃搶修補給
- 災後防疫及環保衛生協助
- 災害損失補償估算
- 受災戶安置需求
- 解決災區民眾用水用電
- 漂流木處理

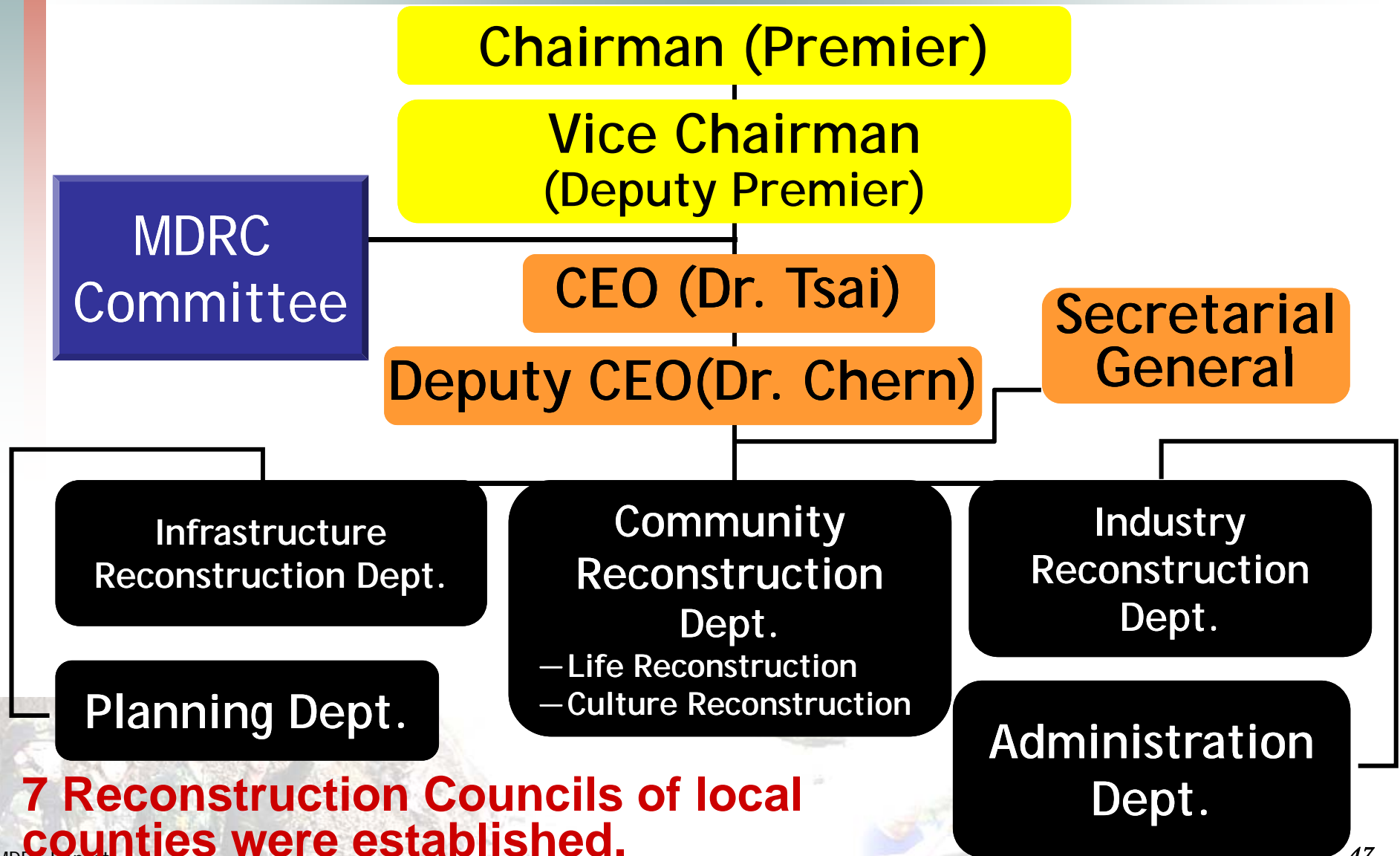
2009.08.15
Relocation stage

- 救(補)助金儘速發放
- 多元安家安置
- 儘速環境清理
- 完成防疫消毒
- 災後心理治療
- 堤防搶修
- 河川清道
- 大體挖掘及安葬
- 災區安全鑑定
- 受災學生就學
- 遷村需求

2009.09.05
Reconstruction stage

- 企業參與重建
- 災後重建區域整體規劃
- 撤離機制及避難處所檢討
- 災後重建條例相關子法研訂
- 區域重建綱要計畫
- 遷村地點安全鑑定
- 永久屋興建地點選址
- 災民就業協助

Current Organization of MDRC



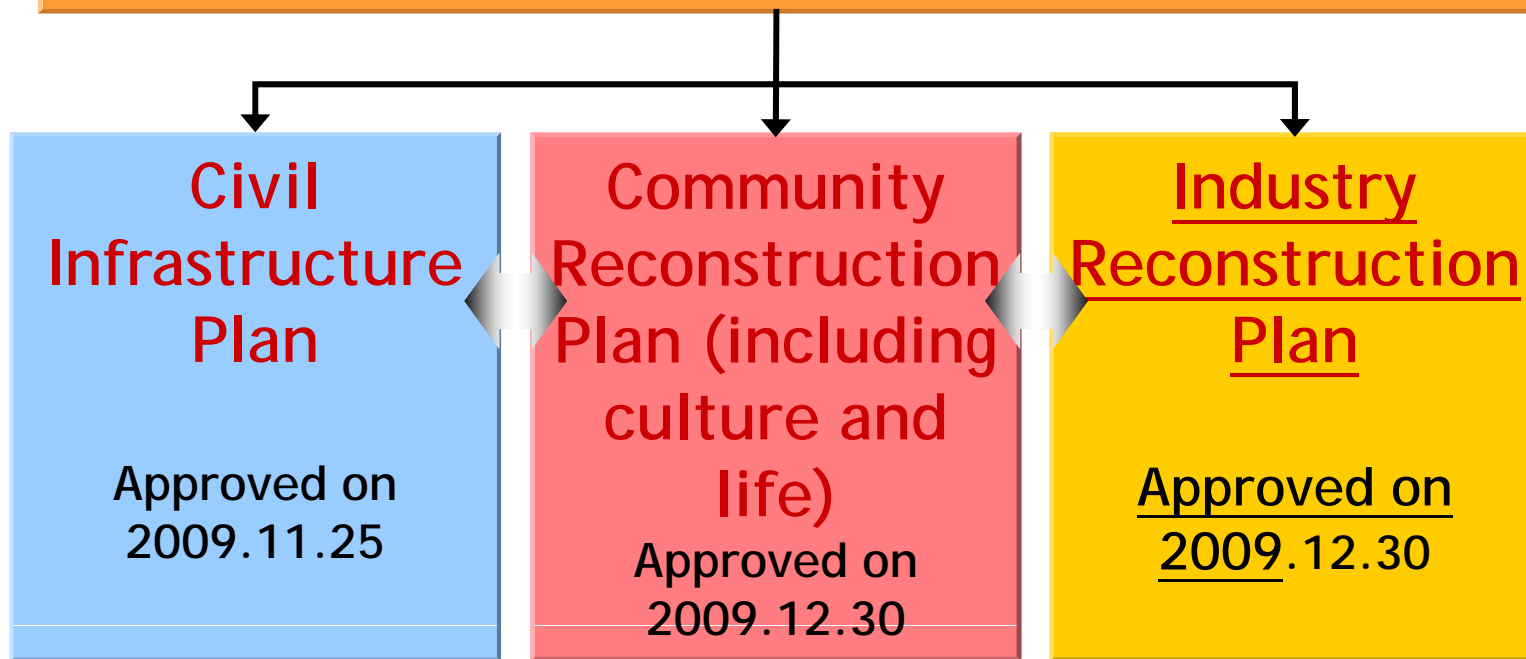


The Development of Post-Disaster Reconstruction Plan — Land Conservation —

Item 4 of Special Act

Frameworks of Reconstruction Plan

Upper Level Guidelines with Land Conservation
(approved by MDRC on Sept. 9, 2009)

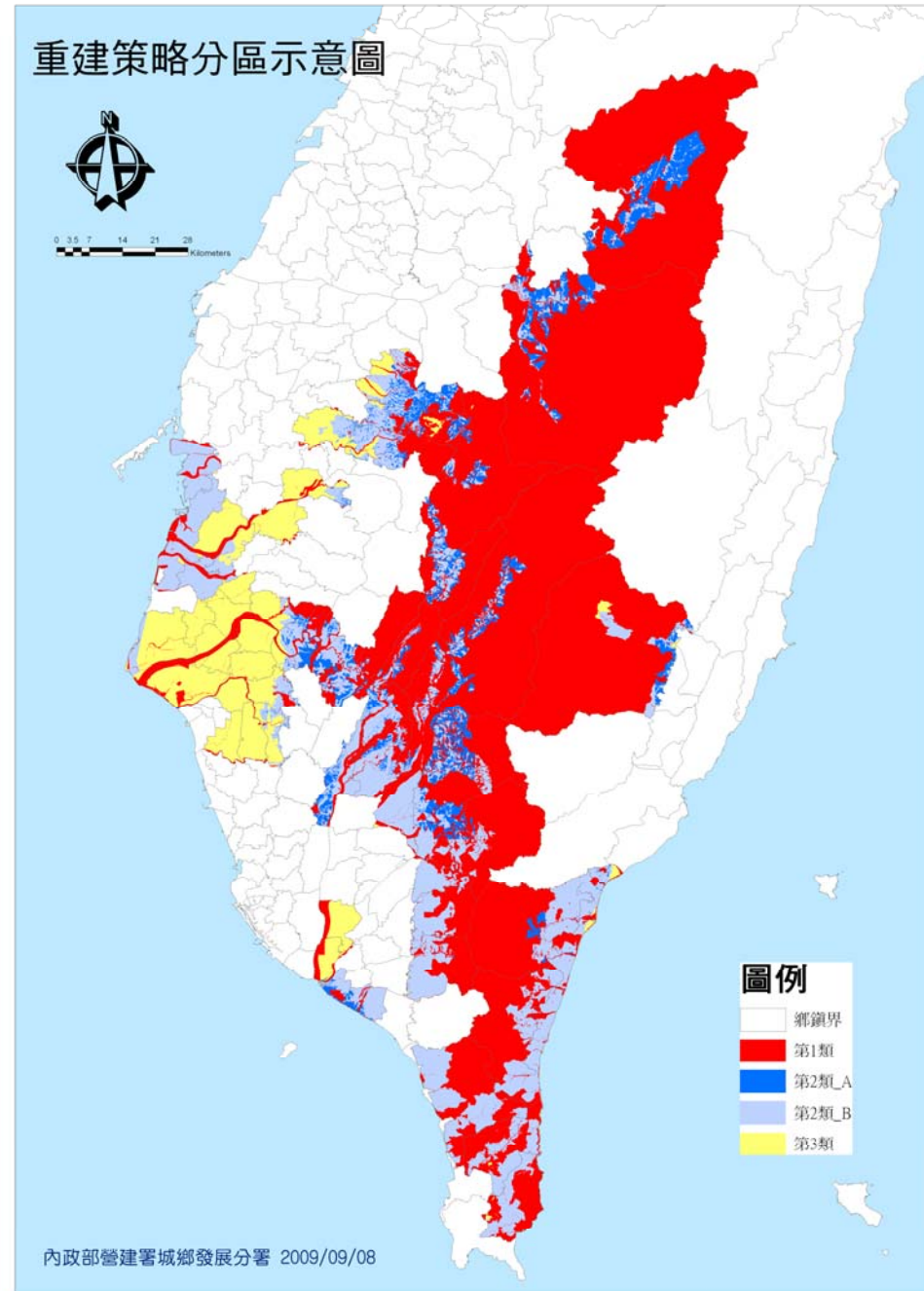


Reconstruction Plans of Local Counties

Reconstruction Planning & Land Safety Assessment

- Reconstruction plan considers the weather change and conforms with the **national land conservation and river basin management**.
- **Damage Conditions of infrastructure and environment** surveyed and assessed by NCDR, academia, professional engineers societies, and consulting firms.
- **Environmental Monitoring, Assessment and Restoration** by professors from universities, local government agencies, and volunteers from NGOs. (Chaired by Prof. P.C. Chiang)

❖ 15處重建規劃分區環境敏感適宜性分析策略分區示意圖 (Sketch of 15 environmental sensitive zones)



Zoning of National Land

❖ 第一類策略分區 (Zone 1)

指已依法劃定之禁止發展地區 (forbidden area)，及本次風災後經勘查並依法公告之危險地區

❖ 第二類策略分區 (Zone 2)

指依現行各目的事業主管機關法令或行政院核定計畫、方案之限制發展地區 (restricted area)。並依發生災害潛勢分為A、B區

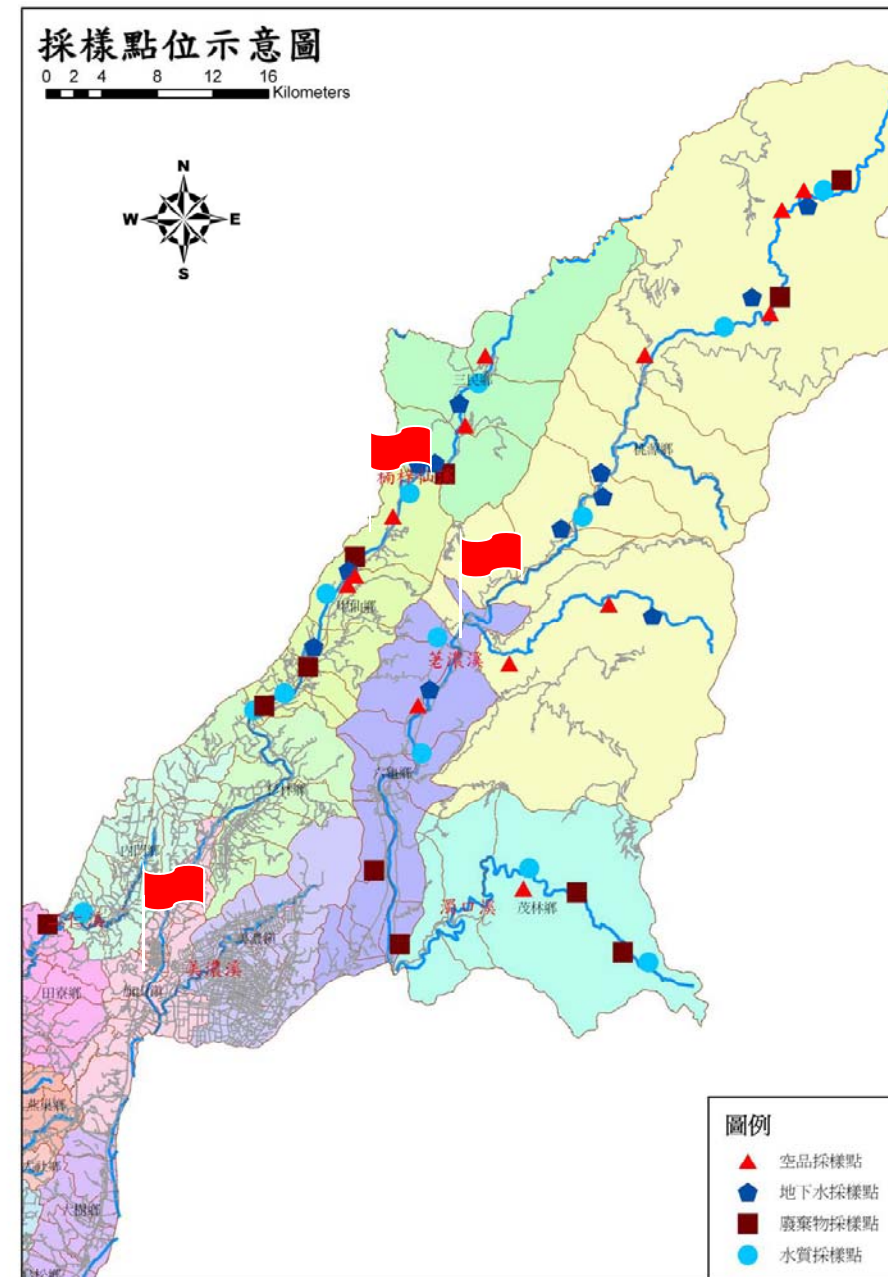
A區：指限制發展地區中，屬山崩高、中潛感地區、土石流高、中潛勢溪流影響範圍、嚴重地層下陷地區（低於海平面地區）、低位河階地、河岸侵蝕等易發生災害地區

B區：非前述之限制發展地區

❖ 第三類策略分區：非第一、二類地區 (Zone 3) (other areas)

Potential Hazard Area Delineation

- Potential pollution areas: Waste landfill Sites and flooded industrial park
- Source water intake area





Re



(1) Community Reconstruction Plan

To meet the community demand, participation, culture, and environmental sustainability

New Schools

Indigenous culture and living content

Strategy & Principles

Integrate CSR and new tech., set up new eco- and smart villages

The revival of agricultural villages (infrastructure, community, industry, and social function)

Strategic of Refugee Relocation

- ❖ **Emergent Relocation**
安置要快，重建要細膩與慎重，安全最重要
- ❖ **Intermediate Relocation (military camps)**
- ❖ **Long Term Arrangement**
 - Rent Subsidy(1274 cases approved)
 - Buy house (350萬內，補助50萬與利息)
 - Provide house for permanent stay永久屋
- ❖ **Reduce the use of shelter houses; providing the permanent ones by non-governmental organizations.**



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Relocation Sites and Villages

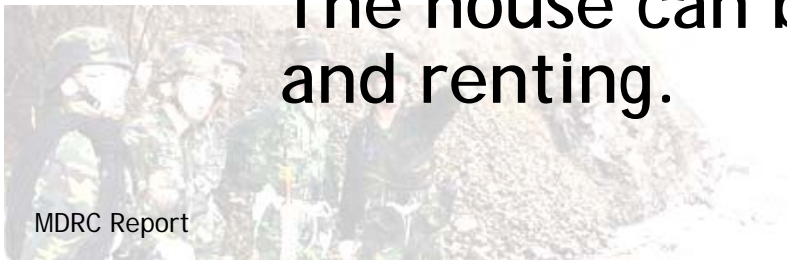
Safety Assessments

- ❖ safety assessment of tribes' area
 - Current Inhabitant Villages (111 sites including 48 IP and 63 NIP) (9/5/09~12/30/09)
 - The intended Dislocating Sites (162 sites; selecting 32 candidate sites) (11/09~3/10)
 - Consultation with Tribes to reach consensus (item 20 of Special Act) (11/18/09~3/11/10)

**** Set up relocation principles and declare the special zones for non-inhabitation**

The Principles of Relocation

- ❖ Safety assessment by experts with the participation of inhabitants; discuss to reach consensus with tribe people; declare the special zone; limit the habitation and select relocation and relief program.
- ❖ The relocation priority:
 - moving within the village 離災不離村
 - moving within the township 離村不離鄉
 - move to the nearest proper location
- ❖ Providing the free house for permanent stay. The house can be inherited but not for selling and renting.



Public Hearing about Special Zone



Step Down! J.C. Chern



Refugee for Relocation

- ❖ Emergent arrangement: 8,319 persons
(2009/8/8)
- ❖ Intermediate housing (military camps):
5 locations、818 persons
- ❖ Intermediate housing : 400 units
- ❖ Free permanent houses: 30 locations, 2,704 units will be provided. (611 units provided before 2010/2/12; 1,887 units by 2010/8/8; and All will be provided by 2010/9/30)



8 Months Refugee Relocation Progress

Relocation Method		Completed (units)	Move in (units)	Benefit No. of People
1. Free Permanent House	Yuemai Village	756	511	2, 244
	Taihoo & Kaosu Villages	10+6	16	
	sum	772	527	
2. House by Loan		34	34	2, 244
SUM		806	561	
3. Intermediate House	Intermediate House	310	255	1, 380
	Family House in Military Camp	90	90	
	sum	400	345	
TOTAL SUM		1, 206	906	3, 624

Intermediate Housing (Fong-Hsiung military camp)



Intermediate Houses (Le-Yeh)



Intermediate Houses (Chia-lan Village)



Private Participation of Providing the Free Housings

- ❖ **Communities:** Providing the permanent houses and communities by private sectors and NGOs)
Tzu-Chi Foundation; Taiwan Red Cross, Taiwan World Vision etc.
- ❖ **Job Opportunities:** Guaranteed by Enterprise
— 鴻海集團 Foxconn Tech. Group
Three in One Package (Ecology, Living, and Production)
— Providing 「Living」、「Job」、「Medicare」、「School」、「Hope」



Cooperation among Central Gov. + Local Gov. + NGOs

Budget NT\$

NGO Donation	Government	China
16.59 billion <ul style="list-style-type: none"> ■ Tzuchi : 4.6 b ■ Red Cross : 3.78 b ■ World Vision : 1.24 b ■ Donation (MOI) : 6.97 b 	151.8 billion <ul style="list-style-type: none"> ■ Special Budget 116.5 b ■ Reallocated Budget 35.3 b 	1.78 b (含直接指定撥至地方政府金額)

Community Reconstruction as an Example

Central Gov.

Policy 、 Law 、 Budget 、
Land Offer 、 Cut Short
Procedure 、 Matching
resources 、 Major
Infrastructure Construction

Local Gov.

Qualification Review 、
Building Administration 、
Community Management

NGO

Fund Raising 、 Buildings
and Local Infrastructure
Construction

Cooperation between Gov. & NGOs

Gov. takes overall responsibility; NGO assists Gov.; Gov. should pay attention to attitude of cooperation and break down of work.

Gov. should take aggressive measures to get rid of NGO's difficulties and to increase effectiveness.

Gov.

Authority; Land Offer;
multiple interface; bureaucracy

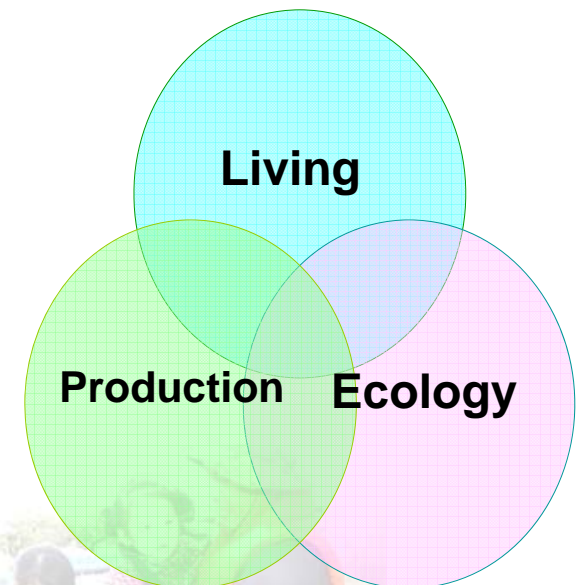
NGO

Flexible; closer to people

Green Reconstruction Plan

❖ Concept

The plan is to integrate the social responsibility of enterprises and the latest technology with the demand of living, household and industrial in redevelopment area. And encourage local and key enterprises assisting reconstruction. It is to rebuild the redevelopment area as an paragon community which combines ecology, living and production in one place.



Goal

- By combining the effects from government, charity institutions and enterprises, regulate the reconstruction. Promote green energy and technologies of ubiquitous, computing and humanity for creating employment opportunities in coordination with high quality agriculture, leisure tourism and industries of local characteristics.



Green Reconstruction ~Ecology

❖ Ecology (Environment)

- The public infrastructures focus on civilian living environment and facilities with the introduction of **green energy facilities**.
- **Green building** (focusing on the demands of ecology, energy saving, waste reduction and health), **solar energy** or wind power generating system, LED lighting, energy saving appliances, environmental friendly transportation vehicles, clean water and rainwater recycling system, waste recycling and reuse etc.



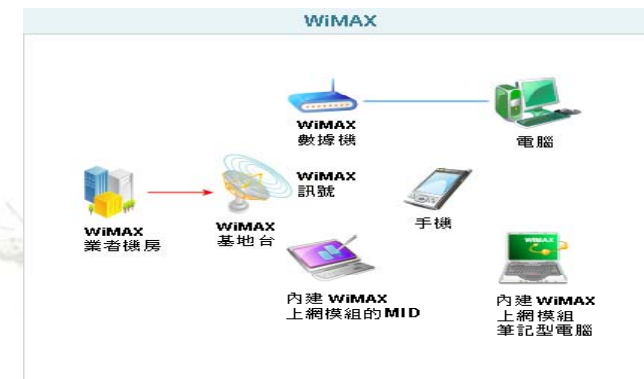
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Green Reconstruction ~Living

❖ Living (Wisdom)

- The plan introduces WiMAX, data communication system and related logistic services (such as remote medical care, safety monitoring, education training tutors etc. To construct wisdom type living community which includes the demands of public safety, medical care, environment monitoring and safety alarm.



Public-Private-Participation Mechanism₂

❖ 以經濟部工業局MOEA為企業與內政部平台



Green Reconstruction

~Production

❖ Production (Industry)

- The plan is to create employment opportunities in coordination with high quality agriculture, leisure activities and industries of local characteristics.



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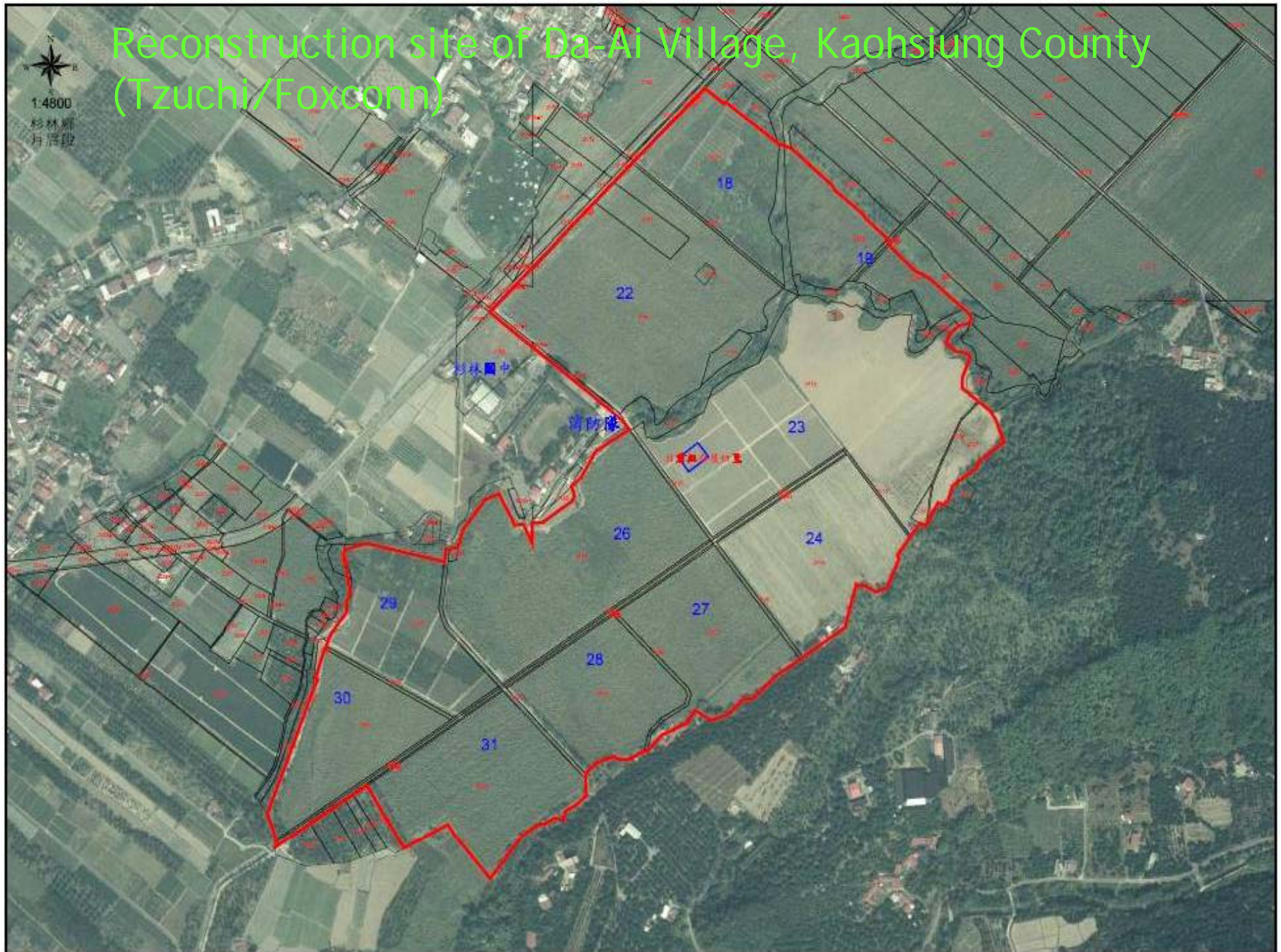
Da-Ai Village by Tzu-Chi Foundation



99.01.28 拍攝

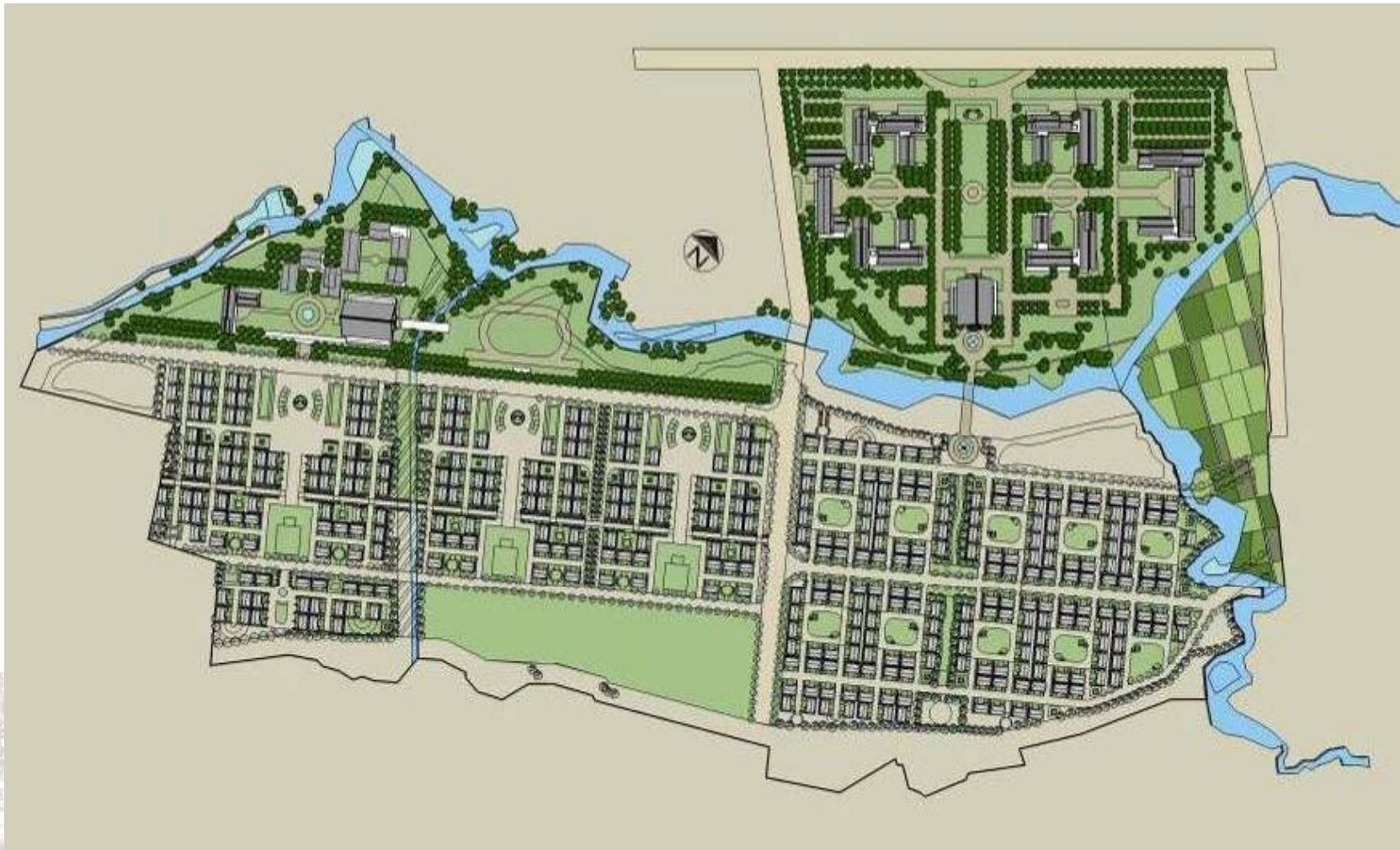


Reconstruction site of Da-Ai Village, Kaohsiung County (Tzuchi/Foxconn)



Case of Planning and Construction

- ❖ San-Lin Township **Da-Ai Village** by Tzu-Chi Foundation



Status of Da-Ai Village

- ❖ Total land area: 59.29 ha , 1,540 house units to be provided.
- ❖ Land and public utilities by government; houses and community constructed by Tzu-Chi foundation
- ❖ Time to obtain construction license: 52 days
- ❖ Break ground: 2009/11/15 (first 628 units)
- ❖ Construction time: 88 days
- ❖ 601 units completed and 510 units (2,000 persons) moved in on 2010/2/9 before Chinese new year.

----- half year after the Typhoon

- ❖ Celebration party was held on 2010/2/11.

Breaking Ground on 2009/11/15



30 M Entrance Road



Entrance Image of the Village



Pavement and Water Way



Brick Pavement by Tzu-Chi Volunteers (5 million bricks)



Wood Art by Indigenous People



High Seismic Resistant Two-story Steel Buildings



Outlook of Houses



Church

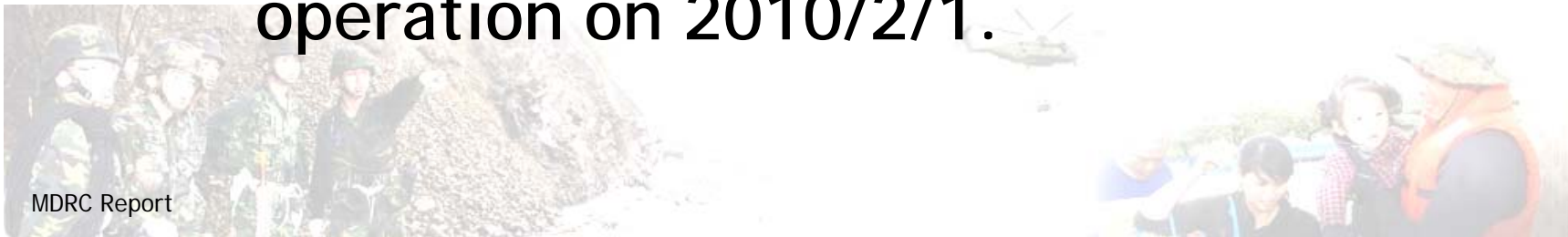


New Year Party on 2010/2/11



Status of You-Lin Organic Farm by Foxconn

- ❖ Land area: 166 ha (rent from government)
- ❖ This farm will provide 500 job opportunities to the inhabitants of Da-Ai Village.
- ❖ Using the BOPT (**built-operate-profit-transfer**), the Foxconn , investing more than 20 million US\$, will transfer the ownership of farm to the villagers after six years of management.
- ❖ Foxconn starts the training classes and operation on 2010/2/1.



You-Lin Organic Farm



Office and Training Classroom



Outlook of the Office



Bird View of You-Lin Organic Farm



Consequent Development of You-Lin Organic Farm

- ❖ Help the neighboring indigenous villages to develop organic agriculture.
- ❖ Set up mass collection, distribution, and door-to-door deliver service
- ❖ Along with Da-Ai Village, this farm established the enterprise by joining ecology, living and production together and developed the tourism business with the neighboring area.
- ❖ Create the international model of Disaster refugee Relocation, job placement, and new enterprise development.



Case of Planning and Construction – Wu-Li-Pu Village

❖ 高雄縣甲仙鄉五里埔社區規劃：Taiwan Red Cross

120 units



全區平面配置圖 S: 1/1500

Case of Planning and Construction – Majia Farm

❖ 屏東縣瑪家農場社區規劃：Taiwan World Vision



Ma-Chia Farm
大社(達瓦蘭)、好茶新家園

新設計道路

大社部落

中介空間

好茶部落

- 1.精神空間：週邊有集會所等公共空間。
祭祀空間面對開闊的景觀
- 2.街道形式：由一主要街道劃分為觀光區
及住宿區。
- 3.耕田配置：耕地置於東北高處，作為外
部和村內的區隔。
- 4.家屋配置：將發展觀光民宿置於景觀
佳處，後方一區與觀光客
分開。住宅沿等高線朝開闊
景觀方向配置。

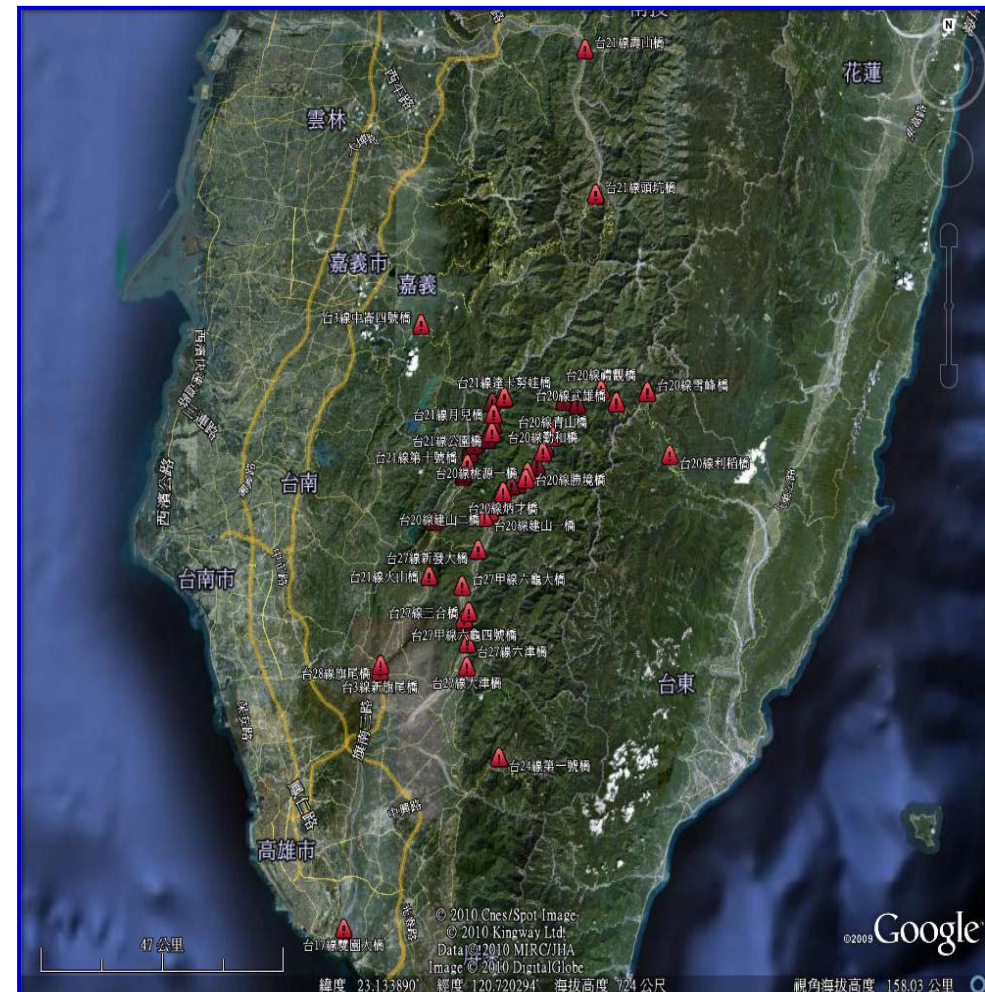


Reconstruction of Civil Infrastructure

The reconstruction of roads & bridges, levees and embankments, flood control and mountain slope stabilization based on the land conservation principles

Destroyed National Highway Bridges

52 national highway bridges were destroyed during the hit of Morakot Typhoon. (plus more than 50 other bridges in local counties)



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Fast Recovery of Highway Bridges

Highway 20 (Lidow bridge)



After
disaster

After
rescue



Highway 21(122.6k):
use containers
strengthen embankment
for fast repair with
13 layers made of 230
20ft containers. Takes
only 18 days to open
the traffic. °



Dredging of rivers (more than 65 million M3 in 5 months)



Fast Restorations of Infrastructures

- ❖ All traffics of six seriously damaged highways were restored on 2009/11/30.
- ❖ Eight damaged island wide railway were repaired for operation on 2009/12/30
- ❖ 118 river embankments were repaired in January of 2010.





Industry Reconstruction

Agricultural , forestry, fishery, pasturage,
and tourism, cultural reconstruction and
development;
culture and heritage of indigenous peoples;
medium and small enterprises loans and
assistance

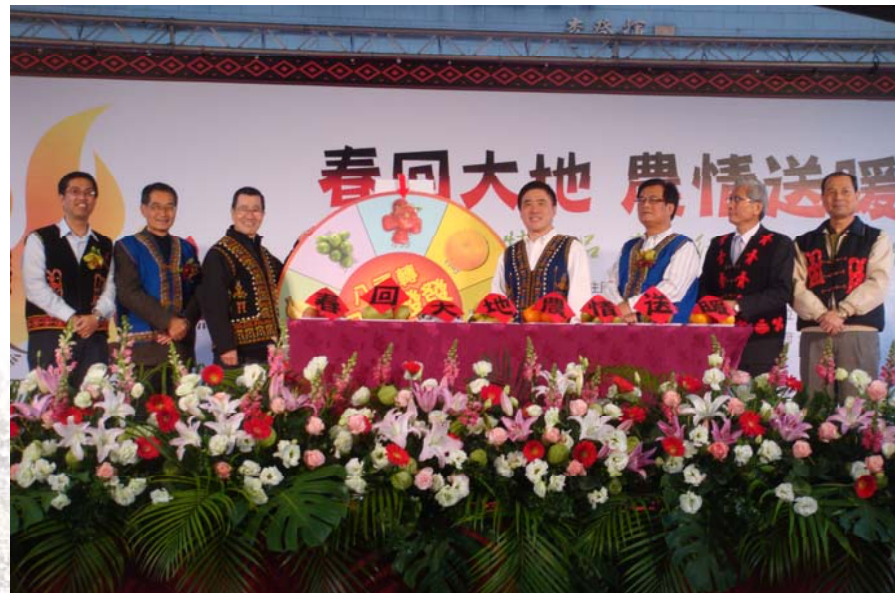
Fast Industry Reconstruction

- ❖ **Orchid Export** (80% recovery) 20% more export than FY 2008
- ❖ **Grouper industry** (damaged 725 ha, recovered 480 ha)



Fast Industry Reconstruction

- ❖ 15 selected demonstrating revival projects
- ❖ **A village a recovery plan** - Indigenous villages (culture, industry, living etc)
- ❖ More than 18 industries have willingness and are participating the industry recovery plan including **Foxconn, TSMC, UMC** etc.



六大新興產業導入產業重建示範點

❖ 高雄縣

那瑪夏鄉

小林村
紀念碑公園

茂林風景區
原民文化、溫泉、美食、生態旅遊

旗山商圈
古蹟保存
老街文化
香蕉美食王國
南台灣樂活鄉鎮行銷

綠色能源
精緻農業
觀光旅遊
文化創意

南橫商圈
(甲仙)
原住民文化
觀光溫泉
農特產品
南橫三星

杉林
永齡有機農場
三生產業
生產、生活、生態

杉林大愛園區
綠建築
太陽能光電

五里埔小林村
平埔文化園區

Outlook

It is not only
Reconstruction...
It is reborn.

Safety、
Innovation...
and
Sustainability



Thanks!!



部(聚)落產業 與文化重建



MDRC Report



挑戰與經驗

- ❖ 缺乏政府、民間合作重建分工經驗
- ❖ 應明確進行分工，並簽訂協議書
- ❖ 政府重視法、理、情，NGO重視情、理、法
- ❖ 各NGO有其組織、文化與作為模式
- ❖ 各NGO和災民互動方式不同，執行標準不同
- ❖ 政府易有不積極作為，而NGO缺乏公權力

相互尊重與合作
以災民及災區重建為優先

