The Politics of Emergency Response and Recovery: Preliminary Observations on Taiwan's 921 Earthquake

Prater and Wu from the Hazard Reduction & Recovery Center, Texas A&M University reinforce the importance of planning and organisational structure in disaster response and recovery.

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On September 21, 1999 the *921* or *Chi Chi* earthquake struck the centre of Taiwan. The earthquake's magnitude was ML 7.3, and MW 7.7 and the epicentre depth was 8 km. The earthquake hit at 1:47 am, and left about 2,471 dead and 11,305 seriously injured. Over 10,000 buildings collapsed and direct losses were estimated at US$14 billion. This paper describes some of our preliminary findings on a National Science Foundation project conceived in order to study the organisational and institutional response to *921*, concentrating on linkages between organisations and different levels of government. The study area covered the two most affected counties, two smaller towns and Taipei. Data were gathered from interviews, government documents, and media reports. Our research questions centred on the agenda status of earthquake preparedness, the role of the military in disaster response and recovery, the role of the private sector in disaster response and recovery, and the effects of local government capacity on disaster response and recovery.
The authors gratefully acknowledge support from the American National Science Foundation (CMS 0085056) and assume sole responsibility for all statements and conclusions.

Introduction

The *921* earthquake was the strongest to hit Taiwan for a century, with a magnitude of 7.6 on the Richter scale and an epicentre at ChiChi Township, Nantou County. It jolted people awake at 1:47 am on the morning of September 21, 1999. Approximately 2,471 people, out of a population of 22,048,356, were killed by the resulting building collapses. An additional 8,739 were injured; of these, 723 were seriously injured. It is estimated that 51,925 housing units were destroyed, and 54,376 units were partially destroyed. The estimate of total economic losses due to the earthquake is about $14 billion[1], or 3.3% of Taiwan's GDP.

An event of this scale in a small country undergoing rapid social, economic and political changes can have noticeable effects. This paper is based on a study in which data was gathered primarily on emergency response and secondarily on disaster recovery.

Project staff used elite interview methods to gather data on emergency response efforts at the local, county, and central government levels. Interview data were supplemented with documents produced by different responding agencies, media reports, and other reports. Our efforts were centred on the two counties most affected by the earthquake: Nantou and TaiChung. We also studied two townships, one in each county: Puli and TungSi. Some interviews were conducted at the central government level in Taipei. This paper describes some of our preliminary findings, focusing on the relationship between the disaster response effort and the Taiwanese government system. The next section reviews the theoretical questions involved and describes the propositions to be examined. A presentation of the data and an analysis of how it addresses these propositions follows.

Theoretical issues

There is a large and growing body of literature on the importance of agendas in policy change (Schattschneider 1960, Bachrach and Baratz 1962, Kingdon 1995, Cobb and Elder 1972, Baumgartner and Jones 1993). Scholars

1 All monetary amounts are given in US dollars, at the rate of 32NT$ to 1.

have used this literature to help us understand why it is so difficult for decision-makers to concentrate more of society's resources on disaster prevention. It is common for societies to live through a repeated disaster cycle of inadequate mitigation and preparedness leading to high levels of disaster impact and an unsatisfactory emergency response (May and Williams 1986, Birkland 1997, Prater and Lindell 2000, Olson 2000). The *921* earthquake provides a valuable opportunity to examine the generalizability of these ideas by applying them to events outside the United States. From this literature, we derived the expectation that disaster preparedness had low agenda status in Taiwan before the earthquake. This would have had the effect of limiting the resources and influence of the agencies charged with disaster response, thus negatively influencing emergency response at all levels of government.

The other issues addressed in this paper are drawn from the literature on governmental centralization and decentralization. There is a vast literature on the subject, but there is as yet no widely accepted definition of what type of government can be called centralised and what can be called decentralised (Hutchcroft 2001). By most measures of governmental centralization, Taiwan is a relatively centralised system. For example, numerous scholars have used financial indicators of centralization (Pickvance and Preteceille 1991, Smith 1985, Nickson 1995, Manor 1999). In Taiwan, there is a national level law governing the allocation of government revenues and expenditures that gives revenue from the most productive taxes directly to the central government. Some of this revenue is then disbursed to the lower levels of government, but this share is less than half overall, and in some cases local governments only receive 10%. Municipal, county and township governments are allowed to collect taxes on some activities, and 'special' taxes can be enacted by local level governments. Local governments have to share some of this revenue with the central government however, and are often reluctant to enact politically unpopular 'special' taxes. Local government budgets are thus dependent on subsidies from the central level to meet basic payrolls.

Another indicator of centralization is the location of the planning process (Sivanna and Azziz 1996). Taiwan has national legislation covering urban and regional planning. All townships are required to develop urban land use plans and emergency management plans, which are to be checked by the higher levels of government for compliance with national legislation. In some cases, townships do not have the resources to develop their own land use plans, and so must hire consultants to do them, or get help from the central government to develop them.

The location of basic governmental functions and the amount of discretion local government agencies have in managing these functions is another indicator of

Courtesy: Agence France Presse

Agenda status of emergency management was low before the earthquake.

centralization (Page and Goldsmith 1987, Manor 1999). Here, too, Taiwan is quite centralised. For example, there are national standards dictating the number of firefighters, fire trucks, and emergency medical units cities must have per unit of population. All law enforcement is centralised, with policy and staffing decisions made at the national level by the National Police Administration.

There has been little research on the relationship between the levels of governmental centralization and emergency response systems. Two early works explicitly addressed this issue. Anderson (1969) reported that centralised systems tend to produce higher levels of military involvement in emergency response. In centralised systems, local governments are often quite weak. The military is often the best-organised and best-equipped institution in a country, and is called upon to use its resources and personnel in the national crisis provoked by a large-scale disaster. Thus we expected to see an active military presence in Taiwan's response to the *921* earthquake.

McLuckie (1975) found that decentralised systems are associated with an increased role for the private sector in emergency response, reflecting a wider distribution of resources throughout society and greater openness in decisions about resource allocation. He found that specialised resources were often called in from outside the impact area in both types of systems, but such resources were more likely to be under local civilian control in decentralised systems. In addition, he found regions with greater resources were more likely to act in an autonomous fashion than poorer regions in the same country. McLuckie's work led us to expect that the private sector would not be an important actor in the *921* response, and that TaiChung county, the more prosperous county in our study, would be more likely to act quickly and independently of the central government than the poorer county government of Nantou.

Based on this literature review, we have the following propositions to examine:

- Disaster preparedness and emergency management had low agenda status in Taiwan before the earthquake. This low status is expected to limit the resources and influence of the agencies charged with disaster response, negatively affecting emergency response at all levels of government.
- An active military presence in Taiwan's response to the *921* earthquake is expected.
- The private sector is not expected to have an important role in the response to the *921* earthquake.
- TaiChung county is expected to act more quickly and independently of the central government than Nantou county.

Findings

1. *The agenda status of emergency management was low before the earthquake, which had a negative effect on emergency response operations.*

As is often the case, emergency management did not get much attention before the earthquake. Taiwan had adequate building codes, but enforcement was not always strict. During periods of building boom such as the early 1990s there was a tendency by contractors to ignore some construction regulations, and by government agencies to overlook this practice because it allowed the supply of housing and office space to be increased rapidly. The rapid increase in office and residential space led to lower prices, which was a politically popular accomplishment.

Land use planning was another potential mitigation policy that looked better on paper than in practice. There were rules about where construction was allowed, but enforcement was not uniform. Townships varied widely in their levels of capacity, and local officials did not always understand the risks their jurisdictions faced. There was an over-reliance on mitigation coupled with a lack of understanding of disaster vulnerability. One of our informants in Puli, a city badly damaged by the quake, said “Nothing ever happens here. We did not expect such a tragedy.” This in spite of Puli's mountain location, near an earthquake fault and in a landslide zone.

Many emergency management functions in Taiwan were given to the National Fire Administration (NFA) under the Ministry of the Interior (MOI) and to local fire departments. However, other functions were allocated on the basis of hazard, with the Ministry of Economic Affairs (MOE) having responsibility for floods and pipeline explosions, the Ministry of Transportation and Communication (MTC) having responsibility for transportation accidents, and the MOI for fires, earthquakes, and typhoons. In theory, the institution in charge of each type of hazard is to cover all four phases of emergency management (mitigation, preparedness, response, and recovery). In practice however, there has been some specialisation, with the NFA under the MOI concentrating on preparedness and response including search and rescue (SAR) for floods, and the Water Resource Development Administration of the MOE doing flood warnings. The Central Weather Bureau of the MTC provides warnings for typhoons, as well as running the island's network of seismographs. The Planning and Building Administration of the MOI does work on earthquake mitigation, and sheltering is the responsibility of the Ministry of Education.

The basic structure of emergency management in Taiwan revolves around the Central Hazards Mitigation Council (CHMC), and the NFA plays an important role in this

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None of the governments or institutions planned for situations where buildings were damaged.

Council. The CHMC is aided by an Implementation Committee and a Technical Advisory Committee. There are no paid personnel in any of these units, and there is no budget for these units. All administrative work is to be done by the NFA. The missions of the Council are to make hazard mitigation policy, develop and promote a hazard mitigation plan, make and promote an emergency management plan, and approve the establishment of the Central Disaster Emergency Operations Center in case of emergency.

During an emergency, a group is assembled at the national level in the Central Disaster Emergency Operations Center located in the NFA headquarters in Taipei. This group is composed of both the CHMC and the CHMC Implementing Committee. These people are executives from many different ministries and governmental jurisdictions. The Implementing Committee is under the coordination of the head of whatever ministry is in charge of that particular category of events (flood, fire, earthquake, typhoon, etc.). One problem is that many of these members of the CHMC Implementing Committee are themselves Ministers, or rank nearly as high, and are unwilling to 'take orders' from an equal.

Another problem with this organisational structure is that none of the participants in the CHMC are full-time paid professionals in emergency management. Their duties as members of the CHMC or the CHMC's Implementing Committee can therefore conflict with their duties in their fulltime positions. No funds are budgeted to run the CHMC or the CHMC's Implementing Committee because there are no personnel assigned to these units. The NFA has the responsibility of managing the paper work involved in running the CHMC and its Implementing Committee. Its budget during the fiscal year '98–99 was about $30,531,400, or 0.8% of the national budget.

Officials at the central and local levels stated repeatedly that many agencies did not take their disaster-related responsibilities seriously, and were unprepared to respond when needed. This lack of preparedness was evident at all levels. The NFA and its associated local fire departments were the only government agencies that had consistently and systematically worked on disaster preparedness. When the disaster occurred, the fire departments found themselves dealing with the SAR functions for which they were trained, and also issues of supply, sheltering, and organisation for which they were ill-equipped. It took some days for the other agencies involved to learn what was needed and begin to fit into their disaster roles. Most city level agencies had no familiarity with the disaster plans the local fire departments had prepared, even though they had responsibilities under the provisions of the plans.

Legislation passed by the Legislative Yuan in 1995 mandated the development and staffing of an EOC by each county government, but few have done this yet. Many fire departments already have EOCs, and run the emergency call system (119 in Taiwan) already, so local

governments often use their EOCs and rely on their expertise during emergency situations. For example, the fire department in Taichung County has a detailed emergency response plan that is revised twice a year to reflect changes in personnel. Before the earthquake, no other county departments had requested a copy, but afterwards all departments needed one to find out what their responsibilities were. Disaster drills are held annually, but many departments had never participated in one and had little idea of what was involved in emergency response. After the earthquake they relied on advice from the fire department in order to quickly develop their own disaster operation procedures.

The day-to-day operations of most departments have little to do with emergencies and many had ignored their emergency responsibilities, believing that "it's the Fire Department's job." Many agency personnel are only assigned to emergency operations part time, so emergency management functions suffer from a lack of dedicated personnel. The local government executives are theoretically in charge during emergencies, but many know little about emergency management. The lack of an all-hazards approach has limited the understanding of the many common elements of disaster response for any type of event and the bureaucracy's willingness to invest in developing disaster response capacity.

One reason the fire departments in Taiwan do not have a very high status administratively is that until 1998 the National Fire Administration was a division of the National Police Administration. Other departments occupy more central locations in the governmental structure and have better access to the executive and to resources. The fire department in TaiChung County is trying to become directly responsible to the mayor, which will further raise its status.

The consensus among our informants was that the earthquake had changed people's attitudes and habits. There had been some small incidents like typhoons during the interval between the earthquake and our interviews, and the level of response from all local government departments had remained higher than it was before the quake.

Emergency planning for disasters due to natural hazards in general occupied a low position on the public agenda, and earthquakes in particular were not addressed. In both counties that we studied, any emergency planning and drills that had been done were focused on smaller, more common events like typhoons and multi-casualty traffic accidents. No agency we spoke to had done any planning for earthquakes. None of the volunteer SAR teams had any earthquake rescue training. The hospitals' plans were focussed on incidents with 30 or fewer casualties. None of the governments or institutions had done any planning for situations in which their buildings were damaged. Thus, the *921* earthquake caught everyone unprepared. There were problems in the response due to this lack of preparation, although improvised solutions were quickly implemented with some success due to the high capacity of the central government and the prompt arrival of foreign aid.

2. The military is expected to play an important role in emergency response operations.

Taiwan's government has a close relationship with the military because of historical circumstances since the KMT moved to the island in 1949. In addition, all males (with a few exceptions for family reasons) must spend two years in military service. Therefore, it would not be surprising to see the military playing an important part in disaster response.

The military is included in the central government's emergency management planning, but this planning is not nearly so thorough and detailed as, for example, the U.S. Federal Response Plan coordinated by FEMA. The Minister of Defense is a member of the CHMC, together with many other ministers, chairmen, mayors, and other high level officials. Emergency duties of each ministry and agency were not spelled out in any detail before the earthquake.

On the day of the earthquake, President Lee issued instructions for emergency response and disaster relief. The only instruction to deal with the military established a policy allowing men whose families were disaster victims to substitute three months of national service for their regular two year period of military service. That same day, Premier Siew established a set of policies for disaster assistance and relief. The first of these put the MOI in charge of "immediate and on-site relief assistance." The MOI was to be assisted by the Ministry of Defense (MOD) and the Public Construction Commission. More detailed instructions to the MOD were issued five days later (personal interview, Jan 2001). These instructions gave official approval to activities that had, in some instances, already taken place. The armed forces were directed to assist with disaster relief and reconstruction "until all such tasks were completed," and to put their equipment at the disposal of the civil authorities (Information Division, 1999).

In fact, the military had already deployed many men and a great deal of equipment to help out with emergency response. At 2:30 am on the 21 September, the Commander of Hang-Sun base in metropolitan Taipei issued orders for all the military services to begin disaster rescue operations . By 4 am, military units were moving to the impact area. The armed forces set up four Field Command Centres in Nantou County, TaiChung County, Taipei County and the City of Taipei (Urban and Housing Development Department, 2000).

Courtesy: Agence France Presse

The Community Recuperation Centres helped minority communities with their recovery needs, and helped local churches to develop capacity for community service.

According to our interviews, military personnel and supplies arrived in some places as quickly as three hours after the earthquake. In other locations, the military response was a little slower. Few base commanders seemed to wait for orders from the central authorities before acting. The central government order gave official standing to what was already happening in the disaster impact area.

Despite the speed with which the base commanders offered their men and equipment, the soldiers did not always play an active part. This might have been because of a lack of training, but there were reports of soldiers waiting for instructions before digging into piles of rubble to look for victims.

Taiwan's armed forces are located in many small bases scattered throughout the island. This increases their availability for purposes of the State, such as crowd control, suppression of anti-government demonstrations, and disaster relief. They are better supplied than the local civilian governments, and better organised than most civil authorities. These factors contributed to the notable presence of the armed forces in response to the *921* earthquake. By 28 September, they had completed 90,000 supply and evacuation trips, over a thousand flights, and provided thousands of tents, blankets, vehicles, food and water rations, as well as much needed heavy equipment for debris removal (Information Division, 1999).

3. The private sector is not expected to play an important role in emergency response and recovery.

In contrast to many recently democratised countries, Taiwan has a lively and outspoken civil society. In addition, the economy is relatively healthy, with a large and expanding base of privately owned and managed companies, ranging from small shops to fairly large players in the high-tech industry. The private sector contributed in many ways to disaster response, and is maintaining a high level of activity during the recovery phase.

One group that played a prominent role in the response phase was the International Association of Search and Rescue of the Republic of China. This group began in 1981 with 15 members, and now has about 10,000 members. They are organised into local teams of 50–90 people each. There are eight paid staff in the central office, and at most one each in the division offices. Members pay annual dues of about US$60 per year. They also receive subsidies from local businesses and religious groups. This group was very active during the disaster response period. They were one of the few groups that had some experience with rescues from

collapsed buildings because the previous year they had the chance to learn SAR techniques from a North American USAR team during the response to a building collapse in Taipei County.

Other examples of private sector activity include religious organisations like the Tz' Chi Foundation, a Buddhist group founded by a Taiwanese nun in 1966 (Liu 2001 and personal interview Jan. 2001). Tz' Chi has an active disaster relief program under its Mission of Charity, and has participated actively in international disaster relief efforts since 1991. Since it is a decentralised organisation and many members have disaster experience, members were able to organise themselves quickly into teams in their neighbourhoods after the earthquake hit. By 3 am, they had set up four stations near the collapsed hotel building in Taipei, providing direct aid for victims, emotional and psychological support for victims and rescuers, support for rescue teams, and an information office. They immediately set up a vegetarian kitchen in cooperation with other religious groups that were serving non-vegetarian food.

By the second day, officials from the Taipei branch office had arrived in Nantou County with tools and a generator, as well as other supplies. Local members had begun relief efforts as a group immediately after the quake, digging their uniforms out first in order to identify themselves as Tz' Chi members. On the 3rd day after the quake, Tz' Chi founder Master Cheng Yen visited the area and decided that the most immediate need was for emergency housing. Tz' Chi's resources were immediately focused on acquiring large numbers of tents, and then small, quickly built temporary housing units. They also gave immediate cash gifts of $625 to the families of the deceased and $156 to the injured, over and above the cash benefits from the government.

The next need Tz' Chi addressed was rebuilding the schools. Over 20% of the school and university buildings in Taiwan were damaged. In the non-urban areas of TaiChung and Nantou counties alone, 140 schools were damaged (Soong, Yao and Lin, 2000). The MOE appealed for help from non-governmental organisations (NGOs) with the task of rebuilding the schools. Private organisations were allowed to choose which schools they would rebuild, and the government took on the rest. Many school principals came to Tz' Chi to request help in building new schools because the private sector had a reputation for faster action than government recovery programs. Tz' Chi has created Project Hope to oversee the school construction and has undertaken the reconstruction of 53 schools.

Architects were asked to develop a unique design for each of the schools, using local materials and taking the physical site and local culture into account during the design process. These schools are being built of steel-reinforced concrete, and the use of air conditioning is avoided to minimise energy consumption. The architects were asked to use natural ventilation and design features to keep the schools comfortable.

Other religious groups also participated in the relief effort. The Presbyterian Church in Taiwan adopted a social services approach. They have developed a network of Community Recuperation Centres (CRCs) in the hope of making “the best use of donations from church members as well as the general public” and extending support for reconstruction up to four years (Huang and Chen 2001). The CRCs had two missions: to help minority communities with their recovery needs and to help local churches develop their capacity for community service. The CRCs offered the same type of counseling and emotional support services as Tz' Chi, plus day care for children and senior citizen home care, help with navigating the bureaucratic maze for acquiring government assistance to rebuild, and economic development projects. These centres have filled a critical role in Nantou County, where there were only six professional social workers to serve a population of 544,762, approximately one for every 90 thousand people. TaiChung County was somewhat better off with 32 social workers for a population of 1,479,105 (approximately one per 50,000 persons).

The CRCs acted as coordinating centres, helping victims gain access to needed governmental services and services provided by NGOs. Many of the workers were hired locally, and had little or no professional training. Some problems arose in the implementation of the CRC plan because it had not taken sufficient account of the role local churches and pastors play in governing church activities. The program's structure has been revamped to include more input from the local pastors and congregations, which is hoped to increase the system's effectiveness.

Local businesses were very active in responding to the disaster as well. Although the potential contributions of businesses were overlooked in emergency planning before the earthquake, many donated food, water, heavy equipment, tools, and other materials to the relief effort without waiting to be asked. EVA Air heard that refrigerated containers were needed to serve as temporary morgues and donated several containers to Taichung County (Personal interview, Jan. 2001). The government did not provide emergency acquisition procedures until the Emergency Decree published by the President four days after the earthquake. In spite of this, every local government we interviewed reported excellent cooperation from local businesses, and few instances of price gouging.

Important evidence of the strength of civil society in Taiwan is the level of donations to the special fund for earthquake relief. This fund, which was set up by the government on September 23rd to accept donations from overseas and from inside Taiwan received more

than $431,500,000 from Taiwan and overseas (*921* Foundation, 2000). There were many other private accounts collecting money for earthquake relief as well, and total donations have been estimated at $903 million (Chen 2001). Political appointees of the Executive Yuan were required by the Prime Minister to donate one month of their salaries to this fund, but we found no other evidence of coercion. The amount raised for this fund showed that Taiwan is not a poor country, relatively speaking, and that the people felt a great deal of solidarity with the earthquake's victims.

The vibrancy of Taiwan's civil society stems at least in part from historical factors. While certainly authoritarian, the Republic of China under Chiang Kai Shek and his son Chiang Ching Kuo was more open than many authoritarian societies. The government, for geopolitical reasons, found it necessary to present a façade of democracy, and over time this generated the expectation of democracy among the masses. In the end, the authoritarian regime had to allow for political expression of dissent, which further emboldened the opposition and empowered the citizenry (Rigger 1999).

In addition to the political reasons for a strong civil society, there are institutional factors involved as well. Many government agencies rely to a large extent on volunteers to fill out their ranks and perform needed services. This is especially notable among two first-responder agencies: police and fire. The volunteer fire fighters and police serve regular shifts and in many cases are as well trained as the professionals. Other agencies also rely on volunteer assistance, as is the case with the understaffed Ministry of Social Work office in Nantou County and its collaboration with the Presbyterian Church in Taiwan. Thus, Taiwan's inhabitants are accustomed to collaborating closely with their government on service delivery, although they are very politicised and do not hesitate to criticise government policy.

For these reasons, the third proposition does not hold true for Taiwan. The private sector has contributed significantly to the response and recovery efforts. In addition, many of the private sector resources involved remained under the control of local governments, NPOs, and the owners of businesses. A special committee called the *921* Earthquake Post Disaster Recovery Commission was set up by the Executive Yuan on 27 September. The Commission was reorganised in June of 2000 by the new administration as a full-time organisation based in Tsong Shin Village in Nantou County (seat of the former Provincial Government). While this Commission disbursed government funds, another group, the *921* Earthquake Recovery Foundation was set up to manage the donation fund. Business and academic leaders were appointed to this foundation by the central government. The new administration changed some personnel and has tried to make the awards process more transparent so that people would have confidence that their donations were being spent wisely. There are thus multiple sources of aid for victims, and those who are not assisted by one group can go to another.

4. TaiChung County is expected to respond independently of the central government and more quickly than Nantou County.

Central government planning and control of finances has not served to even out disparities in the capacities of the different local governments in Taiwan. The many differences between the two counties in this study include differences in economic base, topography, settlement patterns, local government capacity and characteristics of the earthquake itself.

First, the two counties have very different economic bases (see Table 1). Nantou's economy is based on tea, fruit, and tourism. There is little industry, and what little there is tends to be based on the local agricultural products, such as the breweries that make wine from locally grown plums. Before the earthquake, there was a thriving tourist industry centred on the picturesque Sun Moon Lake, a favourite honeymoon spot. Other cities and villages were popular destinations for Taiwanese seeking a bit of outdoor activity. One interesting result of this is the large number of volunteer SAR teams active in the county, specialising in mountain rescue. Some villages like *Chi Chi* have drawn increasing numbers of tourists because of local landmarks and historic buildings, especially temples, that were damaged in the earthquake.

TaiChung county has a more diversified economy, relying on farming to some extent, but with more manufacturing than Nantou and an active seaport. There is an extensive small business sector that is dominated by manufacturers of mechanical equipment.

Topography has a strong influence on the settlement patterns of both counties. 83% of Nantou's land is

Table 1: TaiChung and Nantou county economies

County	Agriculture	Industry	Service	Annual Household Income
Nantou County	23.6%	30.7%	45.8%	$26,837
Taichung County	7.0%	48.9%	44.1%	$27,350
National Average	8.3%	37.2%	54.5%	$27,783

Table 2: Numbers of County Employees

County	Population	# of County Employees	Employees per 1,000
San Bernadino, CA	1,418,380	14,218	10.02
Samta Clara, CA	1,497,577	17,626	11.77
Bexar. TX	1,185,394	6,607	5.57
Dallas, TX	1,852,810	11,087	5.98
Taichung, Taiwan	1,481,407	4,280	2.89
Kern, CA	543,477	8,103	14.91
San Joaquin, CA	480,628	7,067	14.70
El Paso, TX	591,610	3,466	5.86
Travis, TX	576,407	2,948	5.11
Nantou, Taiwan	544,038	2,426	7.87

mountainous, and only 17% is arable and suitable for occupation (Personal interview, Jan. 2001). Villages are scattered along the rivers that flow through narrow, lush valleys crowded with small farm plots. The population is low (544,762), as is the population density compared to the rest of the country, and Nantou is the only county in Taiwan that does not border the sea. Like rural areas in many countries, Nantou county is losing its young adult population as the young people leave to find education and work in the cities.

TaiChung County extends a long finger into the island's central mountain chain, and the land slopes quickly into the broad coastal plain of the island's western coast where the bulk of Taiwan's population lives. The population density is very high, and townships and villages are frequently not separated by any noticeable open space. Farms are small and intensely cultivated, with up to three crops a year from each field. Even in the small towns, any open space not devoted to city parks is cultivated, and buildings of several stories line the narrow streets, with commercial uses on the ground floor and residences above. Only a small part of the county is as picturesque as Nantou, but sections of two national parks fall within the county's eastern border. This section of the county supports a small tourist industry.

The level of staffing in Taiwan's county governments depends on two factors: the target figures set by the central government and the reality of local budgets. Staffing levels of police, fire, health and environmental protection departments are determined by centralised bureaucracies, although consultation with local magistrates is increasingly important because of the emphasis on democratisation. Elementary and secondary school teachers are county employees. About 70% of all tax revenue goes to the central government and the remaining 30% returns to the local governments (counties, townships, villages) through a complex formula of tax collection and disbursement. Local governments formerly received large subsidies from the provincial government, but these were eliminated when the provincial level of government was dissolved in June 1999. The subsidy from the central government does not make up the shortfall, so counties frequently have to rely on bank loans to meet payroll, and most have cut staff and other expenses. Some counties have not been able to meet their loan obligations, and are not yet out of fiscal trouble.

The two county governments differed substantially in their capacity to handle a disaster. Nantou was understaffed and underfunded to a much greater degree than TaiChung. It is difficult to make direct comparisons to the United States, because the local government system in Taiwan is very different from that of the U.S. For instance, many functions such as education, police and fire that in the U.S. are controlled by the cities or other administrative units are controlled by the county or central government in Taiwan. Table 2 compares the level of county employment in a high services state with a large population (California), and a low services state with a large population (Texas), to the two Taiwanese counties we studied. The California counties have much larger staffs, and even in Texas, the more populous counties have larger staffs than their counterparts in Taiwan. Given the fact that county governments are given greater responsibilities in Taiwan than in the US, it is readily apparent that the county governments are understaffed.

Indeed, neither county government we studied was prepared to handle a disaster as big as the *921* earthquake. There was evidence of emergency response planning, but only in the fire departments, which were supposed to coordinate with other departments. Other departments ignored their disaster management responsibilities until after the *921* event. As one informant said: “Before the earthquake, nobody read the plan. After the earthquake, all the departments wanted a copy.” Many departments had not participated in the

annual drills, so they had no familiarity with disaster operations or their role in disaster response. In no case was there any recovery planning, or planning for damage assessment of any kind. Disaster response planning had concentrated on typhoons, which are fairly frequent (on average 2.5 per year). These give plenty of time for warning the population, although evacuation is generally not attempted. No one had planned to respond to a large earthquake in spite of the numerous known fault lines (52) and frequent earthquakes (over 80 significant quakes during the past century). It was felt that the issue was adequately addressed by mitigation practices such as land use planning and building codes. None of the many volunteer and professional SAR groups had trained for earthquake rescues, concentrating instead on training for mountain, landslide, or water rescues.

In some ways, the experiences of Nantou and TaiChung counties during and after the *921* earthquake were very different. For one thing, the epicentre of the quake was in Nantou, the poorer of the two counties. In fact, aid to TaiChung County was slow in arriving because the extent of damage there was not understood at first. As in many disasters, clear information on damages did not come in to the central government's EOC quickly enough to provide data for efficient resource allocation. The flow of information to the central government EOC was hampered by systemic problems (lack of prior coordination among responding agencies) and by physical damage to communications systems, roads, and bridges.

The network of seismic sensors quickly pinpointed the earthquake's epicentre near ChiChi Township in Nantou County, so aid was immediately routed there. Unfortunately, it took two to three days for the central government to realise the extent of damage and casualties in TaiChung County. This led to problems with resource allocation, and townships that were hit hard in TaiChung County felt that they were neglected. In fact, aid reached both areas at about the same time, and both areas had some isolated villages that were hard to reach until the roads were re-opened. For the first few days, what aid came in was ferried in on helicopters that were also used to transport the injured out to hospitals outside the damage zone.

All respondents described the classic problems with disaster response (Dynes 1974): poor assessment of needs, misallocation of personnel or resources, convergence of outside resources, and poor communications due to earthquake damage. In addition, they suffered from confused lines of authority due to poor planning at the central level that was transferred down to the local governments, and an almost total lack of urban search and rescue training and equipment.

Differences in local government capacity began to show up as recovery tasks were initiated. Some of these problems are related not only to differences in government capacity, but also to differences in the counties' economic bases. There are several reasons Nantou is having more difficulty recovering than TaiChung. First, TaiChung had less damage proportionately. In Nantou County, almost 40% of the housing stock was destroyed or damaged, while in TaiChung County, only about 10% was destroyed or damaged.

Courtesy: Agence France Presse

Before the earthquake there was a thriving tourist industry in Nantou.

Second, TaiChung is a wealthier county with a more diversified economy. The damage to Nantou's tourist attractions was serious, and well publicised. For some time, visitors stayed away not only because of the damage they saw on television broadcasts, but also because they feared aftershocks. Third, Nantou's county government building was destroyed. The county government was struggling to serve higher than normal demands while in temporary quarters that were not designed for government functions. Their offices were still located in a stadium two years after the disaster.

Fourth, Nantou's county magistrate was not as effective, and has been under investigation for corruption. He was in custody while we were in the county for interviews. We heard two perspectives on this. The local government people defended him, saying he had only tried to help move things along faster by doing away with some of the red tape. Central government personnel said that he was in trouble because he had only allocated 13% of the aid sent to him for distribution by the end of the first year after the disaster. In contrast, the TaiChung County government organised its Recovery Committee before the Executive Yuan established the *921* Earthquake Post-Disaster Recovery Commission in the former seat of the provincial government, Tsong Shin Village in TaiChung County on October 29th. The TaiChung County Recovery Committee has had a fairly good working relationship

Courtesy: Agence France Presse

Both of the countries studied had serious difficulties with emergency response because the magnitude of the event was larger than anyone had envisaged.

with the townships, because the County magistrate is considered to be a good manager who can delegate responsibility as needed.

Fifth, some of the most intractable recovery problems affect Nantou much more than they do TaiChung. For instance, ground displacement, up to 11 meters horizontally and 10 meters vertically (Loh and Lee 2000) has resulted in one of the most serious recovery issues in the agricultural areas, especially in Nantou County. Much of the agricultural land has shifted to a significant degree and must be resurveyed. There were not enough people qualified to do this large amount of surveying quickly so outside help was needed.
To compound the difficulties, land ownership is not clear in many cases. There are two reasons for this. The first involves the aboriginal people who have occupied Taiwan for hundreds of years. With the arrival of the Han and Hakka Chinese, the aboriginies were pushed up into the mountainous interior but have never been granted clear title to lands that they have occupied for generations. The second problem results from inheritance issues. Some land has been informally subdivided among heirs without clear title to any parcel ever being established. Now both these groups of people have problems establishing their ownership of land. This has affected their ability to receive government benefits for damages or loans to rebuild their houses and replace crops damaged by earthquake-triggered landslides (Urban and Housing Development Department 2000, personal interview Jan. 2001).

Summary and conclusions

We began this paper with four propositions for examination:

- Disaster preparedness had low agenda status in Taiwan before the earthquake. This low status was expected to limit the resources and influence of the agencies charged with disaster response, negatively affecting emergency response at all levels of government.
- An active military presence in Taiwan's response to the 921 earthquake was expected.
- The private sector was not expected to have an important role in the response to the 921 earthquake.
- TaiChung county was expected to act more quickly and independently of the central government than the Nantou county government.

The first and second propositions were supported by the evidence in this case. Low agenda status had negative effects on disaster response at all levels of government. From the national level to the smallest township we studied, everyone we interviewed stated that no agency other than the fire departments had done any serious planning for disaster response, let alone the other phases of emergency management. Emergency management functions ended up in the domain of a minor administration, the NFA, that had only recently gained independence from the National Police Administration. Disaster response suffered because of the NFA's low bureaucratic status. This finding suggests that disaster research, much of which has been conducted on North American communities, may also apply to other countries.

As was expected in a highly centralised system, the military played a large part in disaster response. This was not seen as a negative by most of our informants, who appreciated the high level of skill the military brought to key issues of transport and housing in the immediate aftermath of the earthquake. Military base commanders did not wait for orders from the central command to intervene, but responded immediately, based on their relationships to the communities where they were located.

The third proposition was not supported in the case of Taiwan's *921* earthquake. The private sector in Taiwan did have a key role in disaster response that continued into the recovery period. The private sector includes businesses and non-profit organisations such as churches or volunteer SAR teams. These organisations were prominent in both the disaster response and recovery phases after the *921* earthquake. This result may be related to the social mobilisation and tremendous growth of civil society that occurred all over the world in the 1980s and 1990s. Taiwanese society was affected by this wave of social mobilisation, especially after the legalisation of opposition parties in 1989. The relationship between centralization of government and a weak private sector may have weakened since McLuckie's seminal research was completed in the 1970s.

The fourth proposition was partially supported. Both of the counties we studied had serious difficulties with emergency response because the magnitude of the event was larger than anyone had envisioned. Moreover, as

noted in connection with the first proposition, disaster preparedness was chronically low throughout Taiwan. This minimised the initial differences between the counties. However, differences in local government capacity and in the scope of damage have affected the long-term recovery processes.

In summary, this research has reinforced what we know about the importance of planning and organisational structure in disaster response and recovery. Without adequate structures in place and intensive planning for all hazards, disaster response is bound to be confused and appear chaotic to the affected populations. This perceived inadequacy may have had some bearing on the results of the March 2000 elections, in which the KMT lost the presidency. Recent scholarship has addressed the issue of disasters and regime change (Olson 2000). This case illustrates political effects short of regime change that can follow a disaster.

Although some of our informants stated that they did not believe the problems with earthquake response caused the KMT's defeat, the party understood the danger. This is illustrated by changes in the amount of the benefits for victims' families, which was increased by the president from $ 6,250 to $ 31,250 for the dead and from $ 3,125 to $ 6,250 for those seriously injured. Another instance of policy change in response to political pressure was in the relaxation of the rules for declaring a residence 'totally collapsed' as opposed to 'partially collapsed.' Many benefits hung on this distinction: a reduction of military service, access to temporary government employment, extra points for anyone taking the college entrance examination, access to the health care system without the normal copayments, low interest loans for rebuilding or buying a new house, and a reduced income tax rate (interviews Jan. 2001). It is not surprising that the process of damage assessment became highly politicised and vulnerable to the influence of guanxi (relationships).

Whether the government's response to the *921* earthquake cost the KMT the presidency is uncertain, although the evidence is suggestive. This project has clarified the ways in which existing political and governmental institutions can affect disaster response and recovery. Future research will compare disaster response in Taiwan to cases in Japan (1995) and Mexico (1985).

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