



Global Taiwan Institute

**Taiwan's Disaster Preparedness and Response:
Strengths, Shortfalls, and Paths to Improvement**



Leo Bosner and I-wei Jennifer Chang
October 2020



About the Global Taiwan Institute

GTI is a 501(c)(3) non-profit policy incubator dedicated to insightful, cutting-edge, and inclusive research on policy issues regarding Taiwan and the world. Our mission is to enhance the relationship between Taiwan and other countries, especially the United States, through policy research and programs that promote better public understanding about Taiwan and its people. www.globaltaiwan.org

GTI Taiwan Scholarship Program

GTI Taiwan Scholarship program enables outstanding researchers from the United States to perform valuable Taiwan policy research based on field visit to the country.

About the Authors

Leo Bosner was with the Federal Emergency Management Agency from 1979 until 2008, where he helped plan and manage the Federal response to disasters. He studied Japan's disaster response system as a Mike Mansfield Fellow, and Taiwan's system under a scholarship from the Global Taiwan Institute. Since his retirement from FEMA, he has continued his disaster research and lecturing, and has spoken at the National Taiwan University Hospital in Taipei, the Brookings Institution in Washington, the Third U.N. World Conference on Disaster Risk Reduction in Sendai, and similar venues. His lectures are given in Japanese and in English. Leo is a graduate of the State University of New York and of Carleton University in Ottawa, Canada. Leo and his wife live in Washington, D.C. Leo can be reached at Leobosner@hotmail.com.



I-wei Jennifer Chang is a research fellow at the Global Taiwan Institute. Prior to GTI, Ms. Chang was senior program specialist in the China Program at the United States Institute of Peace and a researcher at the Embassy of India in Washington, D.C., and the United States Commission on International Religious Freedom. She also covered Taiwanese politics and society as a reporter for The China Post in Taipei. Ms. Chang has also published widely on Chinese foreign and security policy, Asia-Middle East relations, civil wars, ethnic conflict, and religious freedom. Ms. Chang holds two Master's degrees in International Relations and Journalism from the University of Maryland and a Bachelor's degree in Asian Studies from Georgetown University's School of Foreign Service.



***Special thanks to GTI Summer 2020 intern Amy Bodner for her research assistance.**

Board of Directors

Wen-yen Chen
(Chairperson)

John Huang

Stephanie Hu

Patrick Huang

Hong-tien Lai

Fred Wang

Minly Sung

Chieh-Ting Yeh
(Vice Chairperson)

Keelung Hong

Hertz Huang

Victor Huang

Arthur Tu

Sarah Wei

Sunshene Tsou

Jennifer Hu
(Vice Chairperson)

Aki Hsu

Howard Huang

Anthony Kang

KF Lin

Charles Pan

Advisory Council

Wen-yen Chen

James Wang

Peter Chow

David Tsai

Advisory Board

Joseph Bosco
Former China Country Desk Officer in the Office of the Secretary of Defense

June Teufel Dreyer
Professor,
University of Miami

Wallace Gregson
Former Assistant Secretary of Defense for Asian and Pacific Security Affairs

Michael Reilly
Former British Representative to Taiwan

William Stanton
Vice President, National Yang Ming University (Taiwan); Former AIT Director (2009-2012)

Gerrit van der Wees
Professor at George Mason University; formerly editor of Taiwan Communiqué

Robert Wang
Senior Associate
Center for Strategic and International Studies; former AIT Deputy Director (2006-2009)

Lanhee J. Chen
David and Diane Steffy Fellow in American Public Policy Studies, Hoover Institute, Stanford Uni.

Gordon Chang
Columnist for The Daily Beast, author of *The Coming Collapse of China*

Dafydd Fell
Reader in Comparative Politics
Department of Politics and International Studies;
Director, Centre of Taiwan Studies, School of Oriental and African Studies

Thomas Hughes
Consultant, Hughes And Company

Matt Salmon
Vice President for Government Affairs, Arizona State University; Former Member of Congress from Arizona

Mark Stokes
Executive Director,
Project 2049 Institute

Masahiro Wakabayashi
Emeritus Professor of Political Science and Economics, Waseda University in Japan

Toshi Yoshihara
Senior Fellow,
Center for Strategic and Budgetary Assessments

Hsin-Huang Michael Hsiao
Chairman of the Taiwan-Asia Exchange Foundation; Adjunct Research Fellow at Academia Sinica

Ralph Cossa
Former President of the Pacific Forum

Richard Fisher
Senior Fellow, Asian Military Affairs International Assessment and Strategy Center

Shirley Kan
Independent Specialist in Asian Security Affairs who worked for Congress at CRS

Fang-long Shih
Co-director, Taiwan Research Programme, London School of Economics and Political Science

John Tkacik
Senior Fellow and Director,
Senior Fellow and Director, Future Asia Project International Assessment and Strategy Center

Arthur Waldron
Lauder Professor of International Relations
Department of History, University of Pennsylvania

Stephen M. Young
Former AIT Director (2006-2009); Former US Consul General to Hong Kong (2010-2013)

Shelley Rigger
Brown Professor of East Asian Politics at Davidson College

Table of Contents

Introduction: Taiwan’s Risks.....5

Recommendation 1: Function-Based All-Hazards Approach.....7

Recommendation 2: Nationally Standardized Incident Management System.....13

Recommendation 3: Disaster Exercise Program.....15

Recommendation 4: National Educational Curriculum and Disaster Training.....16

Recommendation 5: Extend Emergency Management Response System Beyond the Fire Service....17

Recommendation 6: Enhanced Cooperation with the United States.....19

Conclusion.....21

Introduction - Taiwan's Risks

Taiwan is a country that is at risk from various natural disasters such as floods, typhoons, and earthquakes as well as health disasters such as pandemics, and human-caused disasters such as airplane crashes and industrial accidents, including nuclear power plant accidents. And unfortunately, in today's world, Taiwan like any other country may be vulnerable to terrorist attacks, including cyber-attacks. To make matters worse, Taiwan is under constant threat of military attack by China, whose leadership has made no secret of their desire to extend their rule over the smaller country.

From a humanitarian point of view, it is imperative that the government of Taiwan be prepared to utilize its available resources as effectively as possible to protect life, health, and property following a major incident of any kind. Moreover, public confidence in government may be weakened if government is unable to respond effectively to a disaster, for example, Hurricane Katrina in the United States, the Sewol Ferry Disaster in South Korea, and others. Government at all levels, as well as the private and the non-government sectors and private citizens, need to be well-prepared.

Like most modern industrialized countries, Taiwan generally has sufficient resources for managing the consequences of large disasters. Moreover, Taiwan has highly dedicated emergency responders who are ready and willing to do their jobs. Thus, any gaps that may occur in disaster management in Taiwan are likely to be related not primarily to a lack of resources, but rather to the effective use of those resources. Issues such as staff organization, responder training, damage assessment, communication, interagency coordination, intergovernmental cooperation, and similar management issues are likely to be especially challenging.

Given the high quality of its material resources as well as its human resources, Taiwan is capable of having a first-class system for handling large-scale disasters, potentially a model for other nations to emulate. However, the effectiveness of these strong points is being undercut by five major shortfalls in the country's disaster management system: [1] An unrealistic and impractical national-level approach to disaster response planning; [2] the lack of a standard, nationally-recognized system for incident management; [3] disaster exercises that fail to challenge the system's ability to respond to disasters; [4] lack of emergency management education, training, and guidance; and [5] failure to extend civilian disaster response planning beyond the fire service.

“Given the high quality of its material resources as well as its human resources, Taiwan is capable of having a first-class system for handling large-scale disasters, potentially a model for other nations to emulate.

To remedy these shortfalls, Taiwan's government should initiate several reforms in its national emergency management system. These recommendations are based on field research facilitated by the Global Taiwan Institute's Taiwan Scholarship.

First, Taipei should adopt a function-based, all-hazards approach to disaster management and establish a Cabinet-level organization to lead and coordinate the central government's disaster response. Second, the central government should establish and implement a nationally standardized incident management system such as the Incident Command System. Third, Taiwan's government should develop a disaster exercise program to fully test and strengthen national and local disaster response capabilities. Fourth, Taiwan should develop a national educational curriculum as well as develop and implement disaster training and guidance that is curriculum-based and that is available to all those who may be involved in disaster response. Fifth, central authorities should extend Taiwan's emergency management response system beyond the fire service to fully involve all agencies and organizations whose participation

may be needed in case of disaster, including the NGO sector and the private sector. And finally, given the strong affinity between Taiwan and the United States, and given that both of our countries are at risk from major natural and man-made disasters, it is also strongly recommended that Taiwan and United States undertake a plan to continue and enhance their sharing of ideas and information on emergency management to the benefit of both countries.

Recommendation 1

Recommendation 1: Adopt a function-based, all-hazards approach to disaster management and establish a Cabinet-level organization to lead and coordinate the central government's disaster response.

Taiwan's Disaster Management System

September 1999 Earthquake was a Wake-up Call

On September 21, 1999, a powerful earthquake measuring 7.6 on the Moment magnitude scale (7.3 on the Richter scale) struck central Taiwan.¹ The epicenter of the earthquake was located in a small town of Chi-Chi (集集) in Nantou County (南投縣); thus the 921 Earthquake is also known as the Chi-Chi Earthquake (集集地震). A reported 2,471 people were killed, mostly by building collapses caused by the earthquake.² The majority of emergency medical assistance teams (EMATs) failed to arrive to the scene in the first critical life-saving hours after the earthquake, which led to a surge in casualties.³ Local rescuers who arrived in the early days after the earthquake also lacked the necessary training and equipment to rescue people trapped under collapsed buildings and rubble.⁴

The September 21st earthquake laid bare the key deficiencies in the island's disaster management system.

Findings on Taiwan's national response to the earthquake suggest that the central government's response operations were not coordinated efficiently.⁵

Immediately after the earthquake struck, the Ministry of Interior (內政部) activated the National Emergency Operations Center (NEOC) under the National Fire Agency (消防署), as well as the National Disaster Prevention Center.⁶ Both centers were comprised of high-level government officials holding emergency responsibilities from the police department, fire agency, and other ministries.⁷

“... when the author asked whether these agencies were included in a comprehensive disaster response plan, and whether they regularly participated in local disaster exercises, the answer generally was “no.”

However, there was a gap in critical and timely communication between the central government and local level responses. The central government lacked a centralized dispatch mechanism that could clearly

communicate with local officials and effectively mobilize human and material resources to save lives.⁸ The NEOC was an ineffective coordinator that failed to dispatch EMATs in an efficient and timely manner to the affected regions.⁹ The NEOC also did not fully utilize national military units in the early phase of the disaster; instead, local militaries were mobilized the day after the earthquake.¹⁰ The inefficiencies of the NEOC also hampered the efforts of international rescue teams and other foreign assistance.¹¹

At the time of the Chi-Chi Earthquake, Taiwan's disaster rescue missions were carried out by ordinary fire-

1 “Taiwan News Encyclopedia: The 921 Earthquake,” *Radio Taiwan International*, September 20, 2014, <https://en.rti.org.tw/news/view/id/11755>.

2 Carla Prater and Jie-Ying Wu, “Analysis of Institutional Response to the Taiwan 921 Earthquake,” Hazard Reduction & Recovery Center, Texas A&M University, p.2.

3 Yu-Feng Chan, Kumar Alagappan, Arpita Gandhi, Colleen Donovan, Malti Tewari, and Sergey Zaets, “Disaster Management following the Chi-Chi Earthquake in Taiwan,” *Pre-hospital and Disaster Medicine*, Vol. 21, No. 3, p.201.

4 *Ibid.*, pp.200-201.

5 *Ibid.*, p.197.

6 *Ibid.*

7 *Ibid.*

8 *Ibid.*, p.198.

9 *Ibid.*

10 *Ibid.*

11 *Ibid.*

fighters of the fire brigade (消防分隊消防人員).¹² Domestic fire fighting units responded to the earthquake but were overwhelmed and had to rely heavily on the assistance of foreign search and rescue teams, especially the support of professional fire department search teams from the United States and Japan.¹³ In the aftermath of the Chi-Chi Earthquake, the National Fire Agency established dispatch units in fire departments, the current special search and rescue teams (特種搜救隊), which are responsible for search and rescue services for major disasters in various regions.¹⁴ Similarly, various county and city fire departments have also established special search and rescue teams in local fire departments (地方消防局特種搜救隊). After this change, there was no need to rely on foreign search and rescue teams.¹⁵ For example, domestic special search teams carried out the entire rescue process after an earthquake hit Tainan in 2016.¹⁶

In sum, the Chi-Chi Earthquake highlighted the need to establish a centralized disaster response command within the central government, with the staff, budget, and authority to effectively coordinate and mobilize the national and local rescue responses to natural disasters. It was imperative for Taiwanese central government to improve communication with local officials to obtain timely and accurate information and fix deficiencies in emergency procedures. Furthermore, Taipei needed to address the shortage of trained personnel and adequate equipment that hampered rescue operations following the earthquake.

12 林貝珊, 盧鏡臣, 鄧子正 (Pei-Shan Lin, Jing-Chen Lu, Tzu-Jeng Deng), 台灣近年重大災害及其對防救災體系之影響回顧 (“A Review of Recent Major Disasters and their Impacts on the Disaster Management System in Taiwan”), Graduate School of Disaster Management, Central Police University, <https://dm.cpu.edu.tw/ezfiles/108/1108/img/737/401577629.pdf>, p.20.

13 Ibid.

14 Ibid.

15 Ibid.

16 Ibid.

Disaster Prevention and Protection Act

The central government responded to the experience of the Chi-Chi Earthquake by passing the island's first fundamental disaster management law, the Disaster Prevention and Protection Act (災害防救法). The Act was promulgated and implemented in July 2000, and was amended several times including in 2010, following another deadly disaster, Typhoon Morakot, and more recently in 2019.¹⁷ The Standard Procedures for

Natural Disaster Assistance (SPNDA), created in 1965, and National Hazard Mitigation Program (NHMP), formed in 1994, were suspended after the Disaster Prevention and Protection Act was promulgated.¹⁸ After the

“[Taiwan] should assess and draw upon those innovations, both those in Taiwan and those in the United States and other countries, to identify “best practices” that can be shared nationwide.

Chi-Chi Earthquake, the central government focused on research on disaster prevention technology (防災科技研究) in the prevention and mitigation of disasters.¹⁹ A number of new units, committees, and centers were created in accordance with the Act, but outstanding issues remained, most notably the absence of a single central government-level supervisory organization to lead and manage national disaster management efforts in coordination with local authorities.

Article 7 of the Act stipulated that the Executive Yuan was to set up a disaster prevention and rescue expert advisory committee (災害防救專家諮詢委員會) and a disaster prevention and rescue technology center (災害

17 “Legislative History,” Disaster Prevention and Protection Act, May 22, 2019, Laws & Regulations Database of The Republic of China, <https://law.moj.gov.tw/ENG/LawClass/LawHistory.aspx?pcode=D0120014>.

18 Yi-En Tso and David A. McEntire, “Emergency Management in Taiwan: Learning from Past and Current Experiences,” <https://training.fema.gov/hiedu/downloads/compenmmgmtbookproject/comparative%20em%20book%20-%20em%20in%20taiwan.pdf>, pp.9-10.

19 國家災害防救科技中心 (National Science and Technology Center for Disaster Reduction), <https://www.ncdr.nat.gov.tw/Frontend/AboutCenter/SetUpBackground>.

防救科技中心) to address the perceived shortage of disaster prevention technology.²⁰ These new entities were aimed at providing consultation on disaster prevention and rescue work, as well as accelerating the research and development and implementation of disaster prevention technology.²¹ As a result, the National Science and Technology Center for Disaster Reduction (國家災害防救科技中心) was established in 2003.²² This center is responsible for the operation of disaster prevention national science and technology plans and is in charge of using the technologies on disaster reduction to assist in the work of disaster reduction.²³ However, hazard mitigation technologies cannot solve the more urgent problem stemming from ineffective central government supervision over national and local disaster responses.

In 2000, the Executive Yuan created the Central Disaster Prevention and Protection Council (中央災害防救會報), chaired by the Vice Premier of the Executive Yuan, to draw up general disaster prevention and protection guidelines, authorize emergency responses to national disasters, and supervise the disaster management performance of various levels of government.²⁴ The Council also set up the National Rescue Command Center (國家搜救指揮中心) to command, supervise, and coordinate personnel of functional authorities among related government agencies to carry out disaster rescue missions.²⁵ Meanwhile, the National Fire Agency was in charge of executing disaster prevention

and rescue operations.²⁶

Problems Arise

Despite these advances, Taiwan is still lacking a single lead agency for dealing with disasters, and Taiwan's overall national-level approach to disaster response is unrealistic and impractical. A major flaw in the central government's disaster management system is its "single-hazard" approach. According to Chapter 1, Article 3 of Taiwan's Disaster Prevention and Protection Act (amended date May 22, 2019): "Prevention, response, and recovery for all types of the disasters, the following agencies shall be the central regulating authorities for the disaster prevention and protection:

“A major flaw in the [Taiwanese] central government's disaster management system is its “single-hazard” approach.

“1. Windstorm, earthquake (including soil liquefaction), fire, explosion, and volcanic disaster: Ministry of the Interior;

“2. Flooding, drought, mining disasters, industrial pipeline disaster, public gas, fuel pipeline and power transmission line failure: Ministry of Economic Affairs;

“3. Frost, debris flow, forest fire, animal and plant diseases: Council of Agriculture, Executive Yuan;

“4. Air crash, shipwreck, and land traffic accidents: Ministry of Transportation and Communications;

“5. Toxic Chemical Materials and suspended particulate disaster: Environmental Protection Administration, Executive Yuan;

“6. Biological disaster: Ministry of Health and Welfare

“7. Radiation disaster: Atomic Energy Council

“8. Other disasters: the central regulating authorities of Disaster Prevention and Protection business

20 Ibid.

21 Ibid.

22 Ibid.

23 Ibid.; “Act for the Establishment of the National Science and Technology Center for Disaster Reduction,” Laws & Regulations Database of The Republic of China, January 22, 2014, <https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0000143>.

24 “Disaster Prevention and Protection Act,” May 22, 2019, Laws & Regulations Database of The Republic of China, <https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=D0120014>.

25 Ibid.

26 Ibid.

designated by Central Disasters Prevention and Protection Council.”²⁷

(In addition to the above, Article 34 of the Act states that the Taiwan military shall assist with disaster relief if needed, and the military has frequently done so.²⁸)

But realistically, disasters tend to be complicated events that cannot be counted upon to sort themselves into neatly organized categories. In fact, Taiwan was faced with a complicated situation on the night of July 31, 2014, when underground pipeline failure beneath the streets of Kaohsiung caused major explosions and fireballs, killing 32 people (including six firefighters) and injuring more than 300.²⁹ When the incident occurred, no one was sure which Ministry was responsible in case help was needed from the national level. Was it the Interior Ministry (explosion), the Economic Affairs Ministry (pipeline failure), the Environmental Protection Administration (toxic chemicals)? According to research interviews, senior government officials took several hours trying to determine which office should take the lead at the national level – not a good thing to be doing in the midst of a crisis.³⁰

As it turned out, one ministry that could have been of help was the Ministry of Economic Affairs. The area where the incident occurred was crisscrossed by a number of underground pipelines containing a variety of substances, any of which could be the source of the calamity. Knowing exactly where these pipelines were, what they contained, and how to shut them off would

assist the firefighters in dealing with the incident effectively. The Economic Affairs Ministry had maps of the pipelines.

Unfortunately, as scholar Hsien-Ho Chang points out, these vitally important maps were not available to the firefighters on the scene that night:

“Although pipeline maps were kept for the purposes of disaster preparation and response, these maps were managed by the Ministry of Economics, which could not be reached by either the local fire or environmental protection departments during disaster. As a result, responders were unable to identify which pipeline was which and where to close the pipeline valves.”³¹

“Although the Ministry of Economics manages and maintains maps of underground pipelines, it does not have local branches or representatives who can be reached after working hours, so when a disaster occurs during this time, firefighters are left unable to obtain access to the pipeline maps.”³²

This event highlights two glaring deficiencies in Taiwan’s disaster law: First, the confusion and difficulty of finding the responsible national agency during a complex incident; and second, government agencies that have disaster responsibilities on paper but fail to have 24/7 response capability to fulfill those responsibilities in an emergency situation. It should be obvious to even the casual reader that Taiwan’s national-level strategy for dealing with disasters is prone to failure.

“Taiwan and the United States should continue and enhance their sharing of ideas and information on emergency management to their mutual benefit.”

27 Ibid.

28 Ibid.

29 J.W. Wu and M.H. Cheng, “Disaster and Restoration Governance of the 2014 Kaohsiung Gas Explosion,” *Energy and Sustainability V: Special Contributions*, p.125.

30 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January – September 2018.

31 Hsien-Ho (Ray) Chang, “From Gas Explosions to Earthquakes: Case Studies of Disaster Response in Taiwan” in *Asia-Pacific Security Challenges: Managing Black Swans and Persistent Threats*, edited by Anthony J. Masys and Leo S.F. Lin (Springer International Publishing, 2018), p.231.

32 Ibid.

The US Approach: Centrally Coordinated All-Hazard Emergency Support Functions

One way we have tried to deal with this problem in the United States has been to develop functional-based plans using what are called Emergency Support Functions (ESFs). Simply put, an ESF describes a particular type of job or function that might need to be performed in order to manage the response to a disaster. These ESFs are:

1. Transportation
2. Communications
3. Public Works and Engineering
4. Firefighting
5. Emergency Management Information and Planning
6. Mass Care, Emergency Assistance, Temporary Housing, and Human Services
7. Logistics
8. Public Health and Medical Services
9. Search and Rescue
10. Oil and Hazardous Materials Response
11. Agriculture and Natural Resources
12. Energy
13. Public Safety and Security
14. Long-Term Community Recovery Cross-Sector Business and Infrastructure
15. External Affairs³³

So, while Taiwan attempts to assign disaster responsibility according to the type of disaster that might occur, for example, earthquake, flood, windstorm, and so forth, the US Government assigns responsibility according to the type of response that might be needed. Under the US approach, one government agency is assigned primary responsibility to develop emergency plans for

33 “National Response Framework,” 4th Edition, United States Department of Homeland Security, October 28, 2019, https://www.fema.gov/sites/default/files/2020-04/NRF_FINALApproved_2011028.pdf, pp.39-41.

a particular ESF, and is supported in this by other agencies, including the Department of Defense for military support if needed. For example, the US Department of Health and Human

“Although the CEOC was created with the same mission as FEMA, to be a full-time emergency management agency, it lacks the “standby preparedness” of FEMA, for example, full time employees, on-call reserves, external partnerships, etc.

Services is primarily responsible for ESF-8, and so takes the lead in making plans for dealing with health and medical problems that might occur in any type of disaster. And each ESF agency, whether a primary agency or a support agency, is expected to have a 24/7

response capability, with staff who are trained ahead of time to carry out their duties in a disaster.

All of these ESF plans must be practical, and they must be visible to, and fit together with, all the other ESF plans. They must also be “All-Hazards” plans (全災型規劃); that is, they are not just earthquake plans or flood plans or hurricane plans: they are all-hazards disaster response plans. And to coordinate the entire effort, the US Federal Emergency Management Agency (FEMA) is designated as the lead Federal agency for managing disasters, not to do everything by itself, but to orchestrate and manage a cooperative effort that includes Federal, State, and local government agencies, the military, the private sector, the non-government sector, and private citizens.

Taiwan’s central government established the Central Emergency Operation Center (CEOC, 中央災害應變中心, also known as the National Emergency Operations Center) in 2006 to act as the central coordinator in the event of disasters.³⁴ Although the CEOC was created with the same mission as FEMA, to be a full-time

34 Shuhui Sophy Cheng, “Crisis Communication Failure: A Case Study of Typhoon Morakot,” *Asian Social Science* 9, No. 3, February 2013, p.26; 中央災害應變中心 (Central Emergency Operation Center), <https://www.emic.gov.tw/cht/index.php?>

emergency management agency, it lacks the “standby preparedness” of FEMA, for example, full time employees, on-call reserves, external partnerships, etc.³⁵ In the current disaster management system, different ministries and governmental units are responsible for managing different disasters. Yet, the disaster response is hampered by the insufficient expertise of many governmental units and the lack of integrated response capabilities.³⁶ Therefore, Taiwan’s central government should revise the Disaster Prevention and Protection Act to move from a single-hazard approach to an all-hazards approach to disaster management. It should also promote and support this approach throughout all agencies at all levels of government as well as the private sector and the non-government (NGO) sector. Furthermore, Taiwan’s government should equip its central disaster command center with full-time staff and sufficient resources to effectively coordinate national and local-level disaster responses.

35 Cheng, “Crisis Communication Failure: A Case Study of Typhoon Morakot,” p.26.

36 Lin, et al., “A Review of Recent Major Disasters and their Impacts on the Disaster Management System in Taiwan,” p.21.

Recommendation 2

Recommendation 2: Establish and implement a nationally standardized incident management system such as the Incident Command System.

Disaster response can be a complicated business. In a large and/or high-profile incident, numerous responders from different jurisdictions and different professions may quickly converge on the disaster site. These may include fully-trained and well-equipped professionals as well as organized volunteers, spontaneous volunteers, NGOs, and ordinary citizens. To keep the response from sliding into chaos, it is best to have a well-understood management system into which these many diverse groups can readily fit. In the United States, this is the Incident Command System (ICS, 災害現場指揮體系).

ICS was developed in the 1970s in the United States following a series of catastrophic fires in California which caused millions of dollars in property damage and also caused numerous deaths and injuries.³⁷ It was later determined that many of the incident response failures were not due to a lack of resources but were due to inadequate management of the response. This finding ultimately led to the development of ICS.³⁸

After the Chi-Chi Earthquake, Emergency Operation Centers (EOCs, 災害應變中心) of governments at all levels became responsible for the coordination and integration of major disaster responses of various governmental units.³⁹ The EOCs are generally divided into

three levels - namely, the Central Emergency Operation Center, the county and city EOC, and the township and urban district office EOC.⁴⁰ In the early stage of a disaster, the local EOC usually initiates relevant response actions first, and the central disaster response center is notified for assistance depending on the disaster scale and response needs.⁴¹

“Taiwan does not have the luxury to allow its emergency management system to sit in its present state indefinitely. Improvements are needed before the next major incident occurs.”

The Central Emergency Operation Center follows a grouping mainly based on the US Incident Command System approach.⁴² Its organization is focused on functional grouping, which departs from the previous business grouping method (業務編組方式).⁴³ However, the basic

structure of emergency management at the central level is not replicated at the county and local levels. Except for the Taipei City Government’s EOC, which adopts a functional organization similar to that of the central EOC, the remaining counties and cities mostly retain the original organization of services for each bureau.⁴⁴ This has resulted in great differences in the organization of response centers at each level.⁴⁵

At present, Taiwan lacks a standard, nationally-recognized system for incident management. While the Forestry Bureau of the Council of Agriculture (農委會林務局) adopts the American ICS organization, the other Taiwanese governmental units responding to disasters are not entirely based on ICS.⁴⁶ From the research interviews and the discussions in a number of cities in Taiwan, it is clear that Taiwan does not have a stan-

37 “ICS 100 – Incident Command System,” www.usda.gov/sites/default/files/documents/ICS100.pdf, p.2.

38 Ibid.

39 Lin, et al, “A Review of Recent Major Disasters and their Impacts on the Disaster Management System in Taiwan,” p.17.

40 Ibid.

41 Ibid.

42 Ibid.

43 Ibid.

44 Ibid.

45 Ibid.

46 Ibid., p.21.

standard ICS.⁴⁷ Some fire departments say that they use it, some say they do not, and some appear to use it partially.⁴⁸ Several fire service personnel told one of the authors, “We don’t use ICS, we use CCIO (Command & Control of Incident Operations).”⁴⁹ But when checking with FEMA’s US Fire Administration (USFA), the author learned that there is no such system as “CCIO.” CCIO is just the name of a USFA course that teaches ICS.⁵⁰

And what one city in Taiwan calls “ICS” may very well differ from the system used elsewhere in the country.⁵¹ Moreover, where ICS is employed in Taiwan, it generally includes only the professional firefighters at a scene, and leaves out other groups such as police, medical responders, volunteers, and others who are involved in the response.⁵² This lack of a standard, comprehensive incident management system is an invitation to a chaotic, disorganized, and potentially fatal disaster response.⁵³ Therefore, Taiwan’s central government should establish, train, and implement a nationally standardized incident management system such as ICS.

47 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

48 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

49 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

50 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

51 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

52 Leo Bosner’s interviews with multiple Taiwanese emergency personnel, Taiwan, January-September 2018.

53 Jim Dwyer and Kevin Flynn, “FATAL CONFUSION: A Troubled Emergency Response; 9/11 Exposed Deadly Flaws In Rescue Plan,” *New York Times*, July 7, 2002, <https://www.nytimes.com/2002/07/07/nyregion/fatal-confusion-troubled-emergency-response-9-11-exposed-deadly-flaws-rescue.html>.

Recommendation 3

R*ecommendation 3: Develop a disaster exercise program to fully test and strengthen national and local disaster response capabilities.*

During a visit to Taiwan, the author had the opportunity to observe two fire department disaster response exercises.⁵⁴ In both exercises, the firefighters demonstrated their ability to respond to a wide variety of emergency situations, such as a rooftop rescue, a terrorist bomb, a collapsed building, and others. The firefighters demonstrated a high level of skill and enthusiasm that speaks well of their training and their dedication to duty. These types of exercises (drills really) are a valuable way for rescuers to test and maintain their skills. They also help to foster public awareness of disasters. But they often fail to present emergency personnel with some of the types of challenging scenarios that they might face in a disaster, for example:

- An airplane crash into a river dividing two jurisdictions, placing demands on the two jurisdictions to coordinate on incident management. (1982, Air Florida plane crash into the Potomac River between Washington, D.C. and Virginia; and 2015, TransAsia plane crash into the Keelung River between Taipei and New Taipei City.)
- Large numbers of firefighters from surrounding jurisdictions rapidly converging at the site of major plane crash and fire, with the incident being managed by a small suburban fire department. (2001, terrorist attack at the Pentagon, Arlington, Virginia.)

⁵⁴ Leo Bosner's interviews with Taiwanese emergency personnel and observation of exercises, Taoyuan City, Taiwan, April 24, 2018, and New Taipei City, September 21, 2018.

- Firefighters trying to deal with multiple fires and explosions from underground pipelines, needing to obtain information on the exact contents and locations of the pipelines. (2014, pipeline leak and explosion, Kaohsiung.)

The US Government supports exercises to address complex challenges like this through FEMA's Homeland Security Exercise and Evaluation Program (HSEEP).⁵⁵ More than just paying for drills, the HSEEP offers guidance to States and localities on how to build and implement a multi-year exercise program to strengthen their readiness for all types of disasters. Taiwan has already made a significant financial and staff commitment to disaster exercises, with an annual exercise program that includes funding

from the national government. In the spring of 2018, the national government provided funding support for more than 20 disaster exercises held in cities and counties across Taiwan.⁵⁶ This is a valuable support for local exercises, but the funding does not appear to be accompanied by any standard exercise program comparable to HSEEP.⁵⁷ Taiwan's government should aim to develop, train, and implement a disaster exercise program that enables Taiwanese localities as well as the national government to fully test and strengthen their disaster response capabilities.

⁵⁵ "Homeland Security Exercise and Evaluation Program," FEMA, <https://www.fema.gov/emergency-managers/national-preparedness/exercises/hseep>.

⁵⁶ Taiwan's "2018 Disaster Prevention Drill Program," document provided to author.

⁵⁷ Leo Bosner's interviews, Taiwanese emergency personnel, January - September 2018.

“This event highlights two glaring deficiencies in Taiwan’s disaster law: First, the confusion and difficulty of finding the responsible national agency during a complex incident; and second, government agencies that have disaster responsibilities on paper but fail to have 24/7 response capability to fulfill those responsibilities in an emergency situation.

Recommendation 4

Recommendation 4: Develop a national educational curriculum as well as develop and implement disaster training and guidance that is curriculum-based and that is available to all those who may be involved in disaster response.

Before the Chi-Chi Earthquake struck, Taiwan did not have a professional training institution overseeing national training for firefighting or disaster response. No professional organization was responsible for providing necessary training venues and resources.⁵⁸ The training of firefighters was still handled by the firefighting authorities of each county and city and it lacked professional equipment and facilities.⁵⁹ The National Fire Agency Training Center (NFATC, 中央消防訓練中心) opened in Zhushan Township in Nantou County (南投縣竹山鎮) in January 2010.⁶⁰ To be sure, Taiwanese firefighters receive extensive training at NFATC, but this training seems mainly to be skills training such as fire suppression, water rescue, and so forth, with little or no training focused on the “management” part of disaster management.⁶¹ (The author was told that the NFATC had previously tried teaching ICS, but had discontinued the effort.⁶²) And the training that is given at the NFATC is primarily aimed at firefighters, not at other disaster management personnel.⁶³

And while training and guidance are crucial, there appears to be a deeper problem in Taiwan: The lack of knowledge about the core concepts of emergency management such as Comprehensive Emergency Management, All-Hazards Planning, Incident Command

System, Emergency Support Functions, and so forth.⁶⁴ With no widely-accepted knowledge base of emergency management in Taiwan, and no nationally-accepted emergency management curriculum to draw from, Taiwanese authorities would have a difficult time training anyone on emergency management. To be sure, individual skills and practices such as fire suppression, collapsed building rescue, emergency medicine, and similar may be well-understood in Taiwan, but the overall management of these and other response activities in a crisis is not. This needs to change if Taiwan is to implement any of the recommendations provided in this paper.

58 Lin, et al., “A Review of Recent Major Disasters and their Impacts on the Disaster Management System in Taiwan”), p.20.

59 Ibid.

60 Ibid.

61 Leo Bosner’s interviews and observation, National Fire Agency Training Center, Zhushan, Taiwan, January 17, 2018.

62 Leo Bosner’s interviews, National Fire Agency Training Center, Zhushan, Taiwan, January 17, 2018.

63 Leo Bosner’s interviews and observation, National Fire Agency Training Center, Zhushan, Taiwan, January 17, 2018.

64 Leo Bosner’s interviews with Taiwanese emergency personnel, Taiwan, January - September 2018.

Recommendation 5

R*ecommendation 5: Extend Taiwan’s emergency management response system beyond the fire service to fully involve all agencies and organizations whose participation may be needed in case of disaster, including the NGO sector and the private sector*

By definition, the first duty of a fire department is to deal with fires, for example, preventing fires, conducting fire inspections, suppressing fires, and rescuing people from fires. And because fire departments have developed extensive rescue techniques and skills, the “rescue” operations of fire departments have extended to all varieties of rescue beyond just fires, for example, mountain rescue, water rescue, collapsed building rescue, and so forth. This pattern has been followed in Taiwan as well as in some other countries, including Japan and the United States. But large-scale disaster response has requirements that go well beyond typical fire department rescue operations, for example:

- Shelter management
- Health and medical care
- Emergency food and water
- Emergency fuel supplies
- Emergency road repair
- Wide-area damage assessment
- Aerial surveillance
- Restoration of electric power and communications

Any or all of these can become critical issues in the wake of a disaster; none are likely to be handled by a fire department.

Taiwanese law assigns some responsibilities to vari-

ous non-fire-related ministries on paper, but the actual disaster readiness of these ministries seems to be highly questionable. For example, as occurred in the Kaohsiung incident cited above, the Ministry of Economic Affairs had maps of the underground pipelines, and was the responsible authority in case of a pipeline failure under the Disaster Prevention and Protection Act.⁶⁵ But when the Kaohsiung incident took

“With no widely-accepted knowledge base of emergency management in Taiwan, and no nationally-accepted emergency management curriculum to draw from, Taiwanese authorities would have a difficult time training anyone on emergency management.

place late on the night of July 31, 2014, the Economic Affairs Ministry did not have a 24-hour response capability, and so firefighters on the scene were denied access to vitally needed information.⁶⁶

This lack of disaster readiness appears to extend to other government ministries as well. For ex-

ample, while Taiwan’s Ministry of Health and Welfare has received well-earned praise for its handling of the COVID-19 crisis, the Ministry appears to be far less involved in the broader aspects of disaster preparedness than is its US counterpart. The US Department of Health and Human Services has an entire Office of the Assistant Secretary for Preparedness and Response, whose purpose is to manage health/medical emergency and disaster programs, including a Hospital Preparedness Program, the Medical Reserve Corps, the National Disaster Medical System, and similar.⁶⁷ The author could find no comparable disaster preparedness activity in Taiwan’s Ministry of Health and Welfare.

And although Taiwan’s Emergency Medical Services

⁶⁵ Chang, “From Gas Explosions to Earthquakes: Case Studies of Disaster Response in Taiwan,” p.231.

⁶⁶ Ibid.

⁶⁷ HHS Office of the Assistant Secretary for Preparedness and Response, US Department of Health & Human Services, <http://www.phe.gov/about/aspr/pages/default.aspx>.

Act (緊急醫療救護法) makes several references to the activities of local medical authorities in disasters, the Act does not indicate what sorts of training, guidance, information resources, national coordination, or other types of support are to be provided to these local authorities by the national government for planning or carrying out a health/medical disaster response.⁶⁸

This same issue appears at the local level in Taiwan as well. When the author asked local fire departments which local government agencies would handle the non-fire-related activities, various agencies such as social welfare and economic development were cited.⁶⁹ But when the author asked whether these agencies were included in a comprehensive disaster response plan, and whether they regularly participated in local disaster exercises, the answer generally was “no.”⁷⁰

With regard to non-government organizations and disaster, numerous NGOs such as the Tzu Chi Foundation, the Red Cross, and others participate in disaster exercises and disaster relief, but it was not clear the extent to which they are also involved in an overall disaster response planning process, nor did the author find an organized government outreach effort to include these and other NGOs, or the private business sector, into the disaster response plans.⁷¹ Taiwan's government should extend its national emergency management system, including disaster response plans, beyond the fire service to fully involve all agencies and organizations whose participation may be needed in case of disaster, including the NGO sector and the private sector.

68 “Emergency Medical Services Act,” January 16, 2013, <http://www.rootlaw.com.tw/en/LawArticle.aspx?LawID=A040170030005000-1020116>.

69 Leo Bosner's interviews with Taiwanese emergency personnel, Taiwan, January - September 2018.

70 Leo Bosner's interviews with Taiwanese emergency personnel, Taiwan, January - September 2018.

71 Leo Bosner's interviews with Taiwanese emergency personnel, Taiwan, January - September 2018.

Recommendation 6

Recommendation 6: *Taiwan and the United States should undertake a plan to continue and enhance their sharing of ideas and information on emergency management to the benefit of both countries.*

Given the strong affinity between Taiwan and the United States, and given that both of our countries are at risk from major natural and man-made disasters, Taiwan and the United States should continue and enhance their sharing of ideas and information on emergency management to their mutual benefit.

In this regard, both countries have valuable experience that can benefit the other. For example, Taiwan:

- conducted extensive search/rescue operations following the earthquakes in Tainan (2016) and Hualien (2018),
- has delivered humanitarian assistance in the wake of the Nepal earthquake (2015), Typhoon Haiyan in the Philippines (2013), and severe flooding and landslides in western Japan (2018),
- partnered with the Pan-American Development Foundation to provide disaster and emergency preparedness training in Latin America and the Caribbean,⁷²
- has provided other assistance to other countries during the COVID-19 crisis (2020),
- established the National Science and Technology Center for Disaster Reduction (NCDR) to provide the Taiwan Government with scientific and technical support for disaster reduction and emergency preparedness,
- maintains and operates the internationally-renowned National Fire Agency Training Center (NFATC) in Nantou County, Taiwan, and
- is currently in the process of establishing and refining Disaster Medical Assistance Teams (DMATs) in case of disaster.

⁷² “Taiwan-US GCTF Workshop on Humanitarian Assistance, Disaster Relief Concludes in Nantou,” *Taiwan Today*, December 14, 2018, <https://taiwantoday.tw/news.php?unit=2,6,10,15,18&post=147097>.

On the US side, the United States:

- has established and promulgated an emergency management education and training curriculum that is available nationwide, including on-line courses,
- has supported the development of all-hazards emergency operations plans at state and local levels,
- has developed the National Incident Management System (NIMS) to guide all levels of government, nongovernmental organizations, and the private sector to work together to deal with all types of incidents,⁷³
- has established the Homeland Security Exercise and Evaluation Program (HSEEP) that provides a set of fundamental principles and a common approach to help emergency managers to develop, execute, and evaluate exercises that address their priorities, and
- established the office of Assistant Secretary for Preparedness and Response (ASPR) within the US Department of Health and Human Services (HHS) to improve health and medical disaster readiness and response capabilities nationwide.⁷⁴

Possible venues for discussion of these and other topics might include:

- **Global Cooperation and Training Framework (GCTF) International Workshops.** Since the inception of the Global Cooperation and Training Framework in 2015, the United States and Taiwan have held two workshops on humanitarian assistance and disaster relief in 2017 and 2018.⁷⁵ The most recent 2018 workshop explored opportunities to expand regional and international cooperation on disaster prevention and response.⁷⁶ Future GCTF workshops could

⁷³ “National Incident Management System,” FEMA, <https://www.fema.gov/emergency-managers/nims>.

⁷⁴ “HHS Office of the Assistant Secretary for Preparedness and Response,” US Department of Health & Human Services, <https://www.phe.gov/about/aspr/Pages/default.aspx>.

⁷⁵ “Global Cooperation and Training Framework (GCTF) Programs,” American Institute in Taiwan, <https://www.ait.org.tw/our-relationship/global-cooperation-and-training-framework-programs-gctf>.

⁷⁶ “Taiwan-US GCTF Workshop on Humanitarian Assistance, Disaster Relief Concludes in Nantou.”

expand US-Taiwan-Japan collaboration on emergency preparedness and disaster resilience and include other regional partners.

- **Taiwan Fellowship Program.** Congress is currently considering a bill called the Taiwan Fellowship Act.⁷⁷ If passed into law and implemented, this act will establish the “Taiwan Fellowship Program,” under which selected US Government employees would intensively study the Mandarin language in the United States for one year and then spend one year in Taiwan placed in a Taiwanese government agency or civic institution relevant to their profession. This could provide an opportunity for an emergency management specialist from FEMA or another US Government agency to work closely with comparable Taiwanese staff for in-depth discussions and collaboration on ways to strengthen emergency management capabilities in both countries. This concept is being actively promoted by the Western Pacific Fellowship Project, a non-government organization that promotes practical academic and professional training of civil servants across the Indo-Pacific region.⁷⁸
- **Site visits and in-depth discussions.** Travel restrictions due to COVID-19 make in-person site visits impractical at this time. However, if and when these restrictions are lifted in the future, disaster specialists from both countries could benefit from site visits to each side’s offices and training facilities to conduct in-depth discussions for mutual learning.

77 US Congress, Senate, *To Establish the Taiwan Fellowship Program, and for Other Purposes*, 116th Cong., <https://www.markey.senate.gov/imo/media/doc/Taiwan%20Fellowship%20Act9.pdf>.

78 Western Pacific Fellowship Project, <https://www.western-pacific.org>.

Conclusion

Resistance to change can be found in any organization, in any country. This is especially true in government, where unlike the private sector, there is no need to demonstrate effectiveness by showing a cash profit. If left alone and unchallenged, a bureaucratic organization might continue to exist indefinitely whether it is effective or not.

However, Taiwan is at risk of numerous types of natural and man-made disasters, including military attack. Given these risks, Taiwan does not have the luxury to allow its emergency management system to sit in its present state indefinitely. Improvements are needed before the next major incident occurs.

In recent years, some local agencies in Taiwan have been trying new approaches to disaster management in their jurisdictions, for example, all hazards planning, the Incident Command System, emergency support functions, and the ongoing effort to build and strengthen Disaster Medical Assistance Teams across Taiwan.

If Taiwan's national government decides to move ahead on the recommendations provided in this paper, it should not try to do so by sweeping aside the many innovations that have already been taking place across Taiwan and across the world. Rather, it should assess and draw upon those innovations, both those in Taiwan and those in the United States and other countries, to identify "best practices" that can be shared nationwide, in order to establish a practical system based on front line experience and on established principles and practices of emergency management.