



# **Asia-Pacific Economic Cooperation**

## **CADASTRE OF MEASURES ASSOCIATED WITH TECHNOLOGIES AND TELECOMMUNICATIONS IN THE APEC REGION FOR THE PREVENTION AND ATTENTION OF EMERGENCIES AND DISASTERS**

TELWG - Telecommunications and Information Working  
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## Foreword

Since the establishment of Asia-Pacific Economic Cooperation APEC, the economies that are part of it have considered a priority to reduce human and material losses in the event of natural disasters and emergencies. In this context, they have organized themselves to take active measures to prevent them in order to reduce the negative consequences that these events cause in the different member states.

This cadastre has been developed in accordance with the efforts made by APEC in the use of measures associated with technologies and telecommunications for the prevention and reduction of human and material losses in cases of natural disasters and emergencies and in accordance to the priority "Digital Society" that Chile has promoted for the APEC Chile 2019, which contemplates the realization of a workshop to evaluate successful experiences related to the use of telecommunications and other technologies in case of emergencies and disasters.

## Abbreviations

**AADMER:** Agreement of Disaster Management and Emergency Response  
**ADPC:** Asian Disaster Preparedness Centre  
**APEC:** Asia-Pacific Economic Cooperation Forum  
**ASEAN:** Association of Southeast Asian Nations  
**ATIS:** Alliance for Telecommunications Industry Solutions  
**AWS:** Automatic Weather Station  
**BMKG:** Agency for Meteorology, Climatology and Geophysics  
**BNPB:** Badan Nasional Penanggulangan Bencana  
**BPBDs:** Badan Penanggulangan Bencana Daerah  
**CAP:** Common Alerting Protocol  
**CAT:** Centro de Alerta Temprana [Early Warning Center]  
**CBDRM:** Community Based Disaster Risk Management Program  
**CBS:** Cell Broadcasting Service  
**CBE:** Cell Broadcast Entity  
**CCTV:** Closed Circuit Television  
**CDPR:** Central Disaster Prevention and Response Office  
**CEPA:** Conservation and Environment Protection Authority  
**CRTC:** Canadian Radio-Television and Communications Commission  
**CONAF:** Corporación Nacional Forestal [National Forestry Corporation]  
**DART:** Disaster Assistance and Rescue Team  
**DCC:** Disaster Command Center  
**DDPM:** Department of Disaster Prevention and Mitigation  
**DGPC-SEGOB:** Dirección General de Protección Civil de la Secretaría de Gobernación  
[Directorate-General for Civil Protection of the Secretary of the Interior]  
**DHS S&T:** Department of Homeland Security Science and Technology Directorate  
**DIMS:** Disaster Information Management System  
**DMO:** Disaster Management Order  
**EAS:** Emergency Alert System  
**EMA:** Emergency Management Australia  
**EMERCOM:** Emergencies and Elimination of Consequences of Natural Disasters  
**FCC:** Federal Communications Commission  
**FDMA:** Fire and Disaster Management Agency  
**FEMA:** Federal Emergency Management Agency  
**FEWS:** Flood Early Warning System  
**GIRN:** Government Integrated Radio Network  
**HCEG:** Home front Crisis Executive Group  
**HCMC:** Home front Crisis Ministerial Committee

**HCMS:** Home front Crisis Management System  
**HFA:** Hyogo Framework for Action  
**HKO:** Hong Kong Observatory  
**HOT:** Humanitarian OpenStreetMap Team  
**ICS:** Incident Command System  
**ICT:** Information and Communication Technology  
**IFT:** Instituto Federal de Telecomunicaciones [Federal Telecommunications Institute]  
**InaTEWS:** Indonesia Tsunami Early Warning System  
**INDECI:** Instituto Nacional de Defensa Civil [National Institute of Civil Defense]  
**IOC:** Intergovernmental Oceanographic Commission  
**IPAWS:** Integrated Public Alert and Warning System  
**JMA:** Japan Meteorological Agency  
**J-ALERT:** Japanese Emergency Broadcast System  
**JPS:** Joint Planning Staff  
**LTE:** Long Term Evolution  
**MCDEM:** Ministry of Civil Defense and Emergency Management  
**MHA:** Ministry of Home Affairs  
**MIT:** Massachusetts Institute of Technology  
**MoH:** Ministry of Health  
**MOOTW:** Military operations other than war  
**MOPAS:** Ministry of Public Administration and Security  
**MPSS:** Ministry of Public Safety and Security  
**NAAD:** National Alert Aggregation and Dissemination  
**NADMA:** National Disaster Management Agency  
**NaSOP:** National Standard Operation Procedures  
**NAWAS:** National Warning System  
**NCC:** National Communications Commission  
**NCDR:** National Science and Technology Center for Disaster Reduction  
**NDC:** National Disaster Council  
**NDMC:** National Disaster Management Centre  
**NDPMC:** National Disaster Prevention and Mitigation Committee  
**NDRRMC:** National Disaster Risk Reduction and Management Council  
**NEA:** National Environment Agency  
**NEMA:** National Emergency Management Agency  
**NIWA:** National Institute of Water and Atmospheric Research  
**NOAA:** National Oceanic and Atmospheric Administration  
**OKSION:** Russian emergency alert system  
**ONEMI:** Oficina Nacional de Emergencia del Ministerio del Interior  
**Ops CE:** Operations Civil Emergency  
**PAGASA:** Philippine Atmospheric, Geophysical and Astronomical Services Administration

**PCU:** Plataforma Central Unificada [Unified Central Platform]  
**PDC-Morobe:** Morobe Provincial Disaster Centre  
**PDC:** Pacific Disaster Center  
**PHIVOLCS:** Philippine Institute of Volcanology and Seismology  
**PNG-NWS:** Papua New Guinea's National Weather Service  
**POLRI:** Kepolisian Negara Republik Indonesia  
**PPDR:** Public Protection and Disaster Recovery  
**READICall:** Emergency Responsive Alert and Dissemination of Information Call System  
**RNAT:** Red Nacional de Alerta Temprana [National Early Warning Network]  
**SAE:** Sistema de Alerta de Emergencia [Emergency Alert System]  
**SAT:** Sistema de Alerta Temprana [Early Warning System]  
**SERNAGEOMIN:** Servicio Nacional de Geología y Minería [National Geology and Mining Service]  
**SCDF:** Singapore Civil Defence Force  
**Sendai Framework:** Sendai Framework for Disaster Risk Reduction 2015-2030  
**SINAGERD:** Sistema Nacional de Gestión de Riesgos y Desastres [National Disaster Risk Management System]  
**SMS:** Short Message Service  
**SNAP:** Strategic National Action Plan  
**TEWS:** Tsunami Early Warning System  
**TIA:** Telecommunications Industry Association  
**TNI:** Tentara Nasional Indonesia  
**UN:** United Nations  
**UNDP:** United Nations Development Programme  
**UNESCO:** United Nations Educational, Scientific and Cultural Organization  
**USAID:** United States Agency for International Development  
**WCARR:** UN World Conference on Disaster Risk Reduction  
**WEA:** Wireless Emergency Alert  
**WHO:** World Health Organization  
**WOG-IRM:** Whole-of-Government Integrated Risk Management  
**WPAS:** Wireless Public Alert



## Introduction

The present cadastre consists of a survey of the measures and practices associated with the use of technologies and telecommunications in cases of disasters or catastrophes in the 21 Economies of the Asia-Pacific Economic Cooperation Forum (APEC).

A disaster is a sudden calamitous event bringing great damage, loss, or destruction. This concept is divided into natural and human-made disasters. The natural disasters are naturally occurring physical phenomena, which can be geophysical (like earthquakes, landslides, tsunamis, and volcanic activity); hydrological, climatological, meteorological (cyclones, typhoons, and storms surges) or biological (pandemics).

The technological or human-made disasters are events that are caused by humans or human activity, and occur in or close to human settlements, this type of disaster include pollution, nuclear accidents and terrorism.

All the APEC economies have different classification for the disasters and hazards, giving more or less importance according to the damage that they can cause in their territories or the affectation of the populations. In this work, the reader can observe the differences between economies and how this reflected in their disaster management or emergency alerts.

In accordance with the latter, the content of the evaluation and survey consists of identifying the legal framework, practices and techniques that regulate or allow the implementation of technological and telecommunications measures in cases of disasters or catastrophes in the 21 Economies that are part of the Economic Cooperation Forum of the Asia-Pacific (APEC).

In this way, the methodology used is to identify the technology or telecommunications systems or measures implemented in the APEC member countries, the state institutions responsible for (or) administering those systems, the legal regulations that govern them, practical characteristics, and types of disasters or emergencies addressed by them.

For the collection of information, several public sources of information have been used, such as web pages of the services in charge of emergencies, laws and regulations, in order to present a register of the public information available.

An information matrix will be prepared with the following content:

- APEC Economies
- Disaster Management System
- Legal Framework
- Responsible Organizations or Administrators
- Function or attribution
- Type of catastrophes or emergencies
- Technological measure or prevention practice
- Technological measure or attention

# 1. Australia

**Disasters:** Floods, cyclones, hailstorms, bushfires, earthquakes, droughts, volcanic eruptions.

Until 2018, there was a federally responsible emergency management agency in Australia, known as 'Emergency Management Australia' (EMA), which was eventually absorbed by the Department of Internal Affairs. There is no law that explicitly regulates the operation of Australian emergency agencies (except for some state-level laws, such as the *Disaster and Emergency Management Act 2001*, in force in the territory of Norfolk Islands), but the Australian Commonwealth Constitution imposes on the State and territorial authorities the responsibility to protect life, property, and environment within their territories<sup>1</sup>.

In light of this mandate, and in response to the 2009 bushfires (known in Australia as *Black Saturday bushfires*), the Australian Commonwealth government adopted a system of SMS and prerecorded messages that are known such as *Emergency Alert Australia*.

This system, although funded in its primary state by the Australian Commonwealth government, is currently maintained and permanently funded by every state and territory part of the Commonwealth<sup>2</sup>. It can be activated only by authorized emergency services personnel, such as the police or firefighters; and the decision whether or not to send an emergency alert through the system depends entirely on the nature of the incident<sup>3</sup>.

Regarding the functioning of the Australian system, it is the member economy government that coordinates the identification and response to an emergency, develops an appropriate message for the alert and the area of interest where it should spread, delivering the message in each mobile network operator, who in turn identifies all subscribers within that area using the mobile network and sends the message as an SMS using a unique telephone number (0444 444 444).

However, this system has been the target of criticism: Because of its technical operation, citizens may block calls and messages from the system number by simply adding it to a blacklist. On the other hand, in January 2019, the alert system was hacked, and a small portion number of the phone numbers registered in the EA database were stolen,<sup>4</sup> and also thousands of SMS were sent to the listed numbers.

In any case, some Australian states have developed their particular emergency alert systems, which respond to local emergencies in a similar way it does the national emergency alert system. For example, the South Australia territory has its own emergency warning system to "issue warnings to inform and keep the community safe during significant incidents that threaten lives and property. Incidents include bushfire, flood, extreme weather, earthquake, hazardous chemical spills and public safety emergencies"<sup>5</sup>, those warning are issued by emergency services and government agencies

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<sup>1</sup> Mentioned in the Emergency Management section of the Department of Home Affairs of the Australian Government website. Available at: <<https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/emergency-response-plans>>.

<sup>2</sup> Mentioned in the Emergency Alert website of the Australian Government in the Frequently asked questions section Who founded the development of Emergency Alert? Available at: <<http://www.emergencyalert.gov.au/frequently-asked-questions/what-is-emergency-alert.html>>

<sup>3</sup> Mentioned in the Emergency Alert website of the Australian Government in the Frequently asked questions section Who issues warning messages sent with Emergency Alert? [online]. Available at: <<http://www.emergencyalert.gov.au/frequently-asked-questions/what-is-emergency-alert.html>>

<sup>4</sup> Loomes, Phoebe (2019) 'Emergency Warning System Hacked', [online] The Queensland Times, 7 January 2019. Available at: <<https://www.qt.com.au/news/emergency-warning-system-compromised-as-hackers-se/3616457/>>

<sup>5</sup> Mentioned in the website of the Government of South Australia in About emergency warnings in the section During an Emergency. Available at: <<https://www.sa.gov.au/topics/emergencies-and-safety/during-an-emergency/emergency-warnings>>.

and are broadcasted to the public “through websites, smartphone apps, television and radio broadcasts, mobile phone SMS messages and posts on social media, e.g. Facebook and Twitter”<sup>6</sup>; a similar system is used in the city of Sydney, known as SydneyALERT<sup>7</sup>. On the other hand, Tasmania use a website-based alert and emergency warning system<sup>8</sup>, showing in a map of the territory the threats and emergencies currently taken place, signaling their exact location with icons which can display information about the emergency. The same system is used by the Victoria Government<sup>9</sup>. A special highlight deserves the Northern Territory, which use social media profiles (both Facebook and Twitter) to spread information and alerts to the public<sup>10</sup>.

## 2. Brunei Darussalam

**Disasters:** Landslides, Floods, Forest fires.

In the year 2006, the Government of Brunei Darussalam issued the Disaster Management Order (DMO) which according to article 83.3 of the Constitution of Brunei Darussalam has the status of law. In this sense, the DMO is the one that establishes the legal framework for the handling of emergencies and catastrophes.

Concerning the institutions created by this law, the central creation is the National Disaster Council (NDC), which according to Part III article 9 of the DMO, have the main task to develop a strategic policy framework in responding to and managing disasters<sup>11</sup>.

The DMO, on the other hand, established the legal bases for the National Disaster Management Center (NDMC), which is under the administration of the Ministry of Home Affairs. The NDMC is the lead government agency for disaster management in Brunei Darussalam, and its role is to ensure the safety and well-being of the people by encompassing all aspects of disaster management<sup>12</sup>. This last includes prevention, mitigation, preparedness, response and recovery through policies, strategies and practices, which are guided by the international, regional and national drivers<sup>13</sup>.

About the strategies and plans for Disaster Management, the NDMC has formulated the Strategic National Action Plan (SNAP) for Disaster Risk Reduction for the 2012-2025, which is a comprehensive plan of action aimed at building the capacity of both government and non-government institutions in promoting disaster risk reduction<sup>14</sup>. In addition, the NDMC has formulated the National

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<sup>6</sup> Ibid.

<sup>7</sup> For more information please visit the SydneyALERT website. Available at: <<https://www.emergency.nsw.gov.au/Pages/for-the-community/alert-NSW/sydneyALERT.aspx>>.

<sup>8</sup> For more information please visit the TAS Alert website of the Government of Tasmania. Available at: <<http://alert.tas.gov.au/Pages/Home.aspx>>.

<sup>9</sup> For more information please visit the Emergency website of the Government of Victoria. Available at: <<http://www.emergency.vic.gov.au/respond/>>.

<sup>10</sup> Northern Territory Government. SecureNT. [on line]. Available at: <<https://securent.nt.gov.au/alerts>>.

<sup>11</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>12</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.10 Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>13</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.10 Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>14</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

Standard Operation Procedures (NaSOP), which outlines the agreed procedures that must be followed by all the agencies involved in a disaster operation<sup>15</sup>.

In relation to its regional commitments, Brunei has committed to the Association of Southeastern Asian Nations (ASEAN) Agreement of Disaster Management and Emergency Response (AADMER), in this sense the government affirmed that Brunei Darussalam Strategic National Action Plan is based on the five priorities of the Hyogo Framework for Action (HFA). In other words, Preparedness activities, disaster response programs, and risk mitigation projects are the basis of their SNAP Framework. Being the reason why the member economy attaches importance on implementing the AADMER and manifesting the region's commitment to the implementation of the post 2015 HFA<sup>16</sup>. Regarding other frameworks, Brunei Darussalam is working toward the goals established by the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework),<sup>17</sup> endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR).

It is also important to mention that the NDMC has education and training activities, which are part of the efforts to increase the readiness and preparedness of the communities for disasters.<sup>18</sup> Regarding this concerning the SNAP the member economy government launched in 2010 a Community Based Disaster Risk Management Program (CBDRM), which has the following goals<sup>19</sup>:

- Create a Disaster Resilient Community;
- Develop community awareness in disaster risks and building up their capacity in managing emergencies and disaster situations;
- Increase the readiness and preparedness of the community for disaster by identifying hazards and reducing risks associated with them; and
- Collaborate with relevant government agencies.

To strengthen the capabilities for disaster response management, Brunei Darussalam adopted the Incident Command System (ICS), which is a systematic tool for the command, control and coordination of emergency response in the United States. It standardizes coordination among different government agencies and ensures that the designated responders are adequately trained and capable in different types of emergencies and disaster response. The ICS was implemented in Brunei Darussalam with the cooperation of the United States Forestry Department.<sup>20</sup>

About the Disaster Management Communications, the NDMC has the responsibility to alert the public in a disaster event, and also manages, coordinates and mobilizes any disaster that happens in the member economy. However, other government agencies such as: Ministry of Home Affairs, Disaster Command Center (DCC), Brunei Darussalam Meteorological Department, and the Ministry of Communications, are sources of hazards and risks information, providing early warning to the system.

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<sup>15</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>16</sup> UN World Conference (2015), Official National Statement by Brunei Darussalam to UN. Available at <[https://www.preventionweb.net/files/44397\\_wcdrrstatementbruneidarussalam.pdf](https://www.preventionweb.net/files/44397_wcdrrstatementbruneidarussalam.pdf)>.

<sup>17</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) Brunei Disaster Management Reference Handbook 2018: p.24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>18</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>19</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p.25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>20</sup> National Institute of Disaster Management [NIDM] (2014). 'Brunei Darussalam', East Asia Summit, New Delhi: National Institute of Disaster Management: p. 11. Available at <[https://nidm.gov.in/easindia2014/err/pdf/country\\_profile/brunei\\_darussalam.pdf](https://nidm.gov.in/easindia2014/err/pdf/country_profile/brunei_darussalam.pdf)>.

These early warnings are undertaken by the Meteorological Services of the Department of Civil Aviation, Ministry of Health, Department of Agriculture and Agrifood, Marine Department, Fisheries Department, Department of Environmental and Recreation and others, have policies and strategic planning to improve the management of disasters through effective early warning systems<sup>21</sup>. The Flood and Storm Warning System Brunei Meteorological Service is responsible for meteorological observation and weather forecast, including flood warning<sup>22</sup>.

### 3. Canada

**Disasters:** Earthquakes, Floods, Hail Icebergs, Sea Ice, Sea Fog, Landslides, Snow Avalanches, Tornadoes, Tsunamis, Storm Surges, Volcanic eruptions, Winter Storms.

In 2005, the “Department of Public Safety and Emergency Preparedness Act” was enacted, which created the Department of Public Safety and Emergency Preparedness (better known as *Public Safety Canada*), part of the Canadian Federal Government responsible for the protection of Canadians and to keep society peaceful and secure. It’s headed by a Minister whose legal functions and obligations are:

“(a) initiate, recommend, coordinate, implement or promote policies, programs or projects relating to public safety and emergency preparedness;  
(b) cooperate with any province, foreign state, international organization or any other entity;  
(c) make grants or contributions; and  
(d) facilitate the sharing of information, where authorized, to promote public safety objectives”.<sup>23</sup>

Since 2010, the Department, in cooperation (and under the regulations) of the Canadian Radio Television and Communications Commission (CRTC), as well as other agencies at Federal, Provincial and Territorial levels, and also with the private sector, officially adopted the *National Public Alert System*, better known as *Alert Ready*, launched in 2015. This system consists of infrastructure and standards for the presentation and distribution of public alerts issued by government authorities, such as weather emergencies, AMBER Alerts, and other emergency notifications by all broadcasters and last mile distributors in the affected region. The broadcast include television stations, radio stations, cable and satellite providers, and LTE mobile networks, and is designed “to deliver critical alerts and possibly lifesavers to Canadians through TV, radio and compatible mobile devices<sup>24</sup>”.

The system, at a technical level, is managed by Pelmorex Corp., a Canadian company that owns the private weather networks and weather information, and the forecast channels *The Weather Network* (English-speaking) and *MétéoMédia* (French-speaking). This company designed what is known as the National Alert Aggregation and Dissemination (NAAD) System, a system approved by the CRTC and then began working with federal, provincial and territorial authorities to make the NAAD

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<sup>21</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: pp.25-26. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>22</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018c) Brunei Disaster Management Reference Handbook, November 2018: p. 26. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>.

<sup>23</sup> Department of Public Safety and Emergency Preparedness Act, S.C. 2005, c. 10. [online]. Available at: <<https://laws-lois.justice.gc.ca/eng/acts/P-31.55/page-1.html>>.

<sup>24</sup> As published in the frequently asked question section of the Alert Ready webpage, in particularly in the FAQ ‘What is Alert Ready?’ Available at: <<https://www.alertready.ca/#faq>>.

operational. It began operating in 2010 and became the technical platform on which Alert Ready operates<sup>25</sup>.

In 2014, the CRTC adopted regulatory amendments that require television and radio stations, including satellite or cable television companies, to distribute alert messages to the public. In the same year, the Wireless Public Alerts (WPAS) started its development, which ended with its implementation in 2017. In April 2018, the CRTC adopted regulatory measures that forced LTE companies to implement alert systems on their wireless networks<sup>26</sup>.

Concerning the operation of the system, only authorized government authorities can issue alerts, regardless of whether they're federal, provincial or territorial authorities; and are required to broadcast such alerts to TV and radio stations, satellite or cable operators, and LTE companies. The government authority that can issue an alert, will be selected by each provincial or territorial government<sup>27</sup>.

The government authority that can issue alerts will do it through the technical channel adopted by the NAAD system, owned by Pelmorex Corp.; the system in turn, will spread the message on radio and TV stations, satellite and cable distributors, LTE companies, social media companies, and on internet based applications, who will deliver the alert to the public<sup>28</sup>.

The types of alerts that can be propagated by the system are classified as follows:

- Fire alerts: Report fires in urban or industrial areas, and wildfires.
- Natural alerts: Warns about tornadoes, flash floods, earthquakes, hurricanes, tsunamis, thunderstorms, storm surge, landslide, dam overflow, magnetic storm, meteorite, lahar, pyroclastic flow, pyroclastic surge, and volcanic ash.
- Biological alerts: Warns the public about biological, chemical or radiological threats, and about drinking water contamination.
- Hazardous alerts: Warns the public about an explosive threat.
- Environmental alerts: Notifies to the public about the air quality or falling objects.
- Terrorist alert: Warns the public about a terrorist threat that can affect civilians or infrastructure.
- Civil alert: Report civil emergencies, animal danger, AMBER alerts, and alerts about 911 communications interruptions.
- Admin alert: They do not report any danger, and have purely a test intent.

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<sup>25</sup> As published in the Canadian Government website Public Safety Canada, in the section Chronology: National Public Alerting in Canada. Available at: <<https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/mrgnc-prprdss/ntnl-pblc-lrtng-sstm-chr-en.aspx>>.

<sup>26</sup> As published in the Canadian Government website Public Safety Canada, in the section 'Chronology: National Public Alerting in Canada'. Available at: <<https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/mrgnc-prprdss/ntnl-pblc-lrtng-sstm-chr-en.aspx>>

<sup>27</sup> As published in the Alert Ready webpage, frequently asked question section Who emergency sends alerts? Available at: <<https://www.alertready.ca/#faq>>

<sup>28</sup> As published in the Canadian Government website Public Safety Canada, in the section 'National Public Alerting System'. Available at: <<https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/mrgnc-prprdss/ntnl-pblc-lrtng-sstm-en.aspx>>

## 4. Chile

**Disasters:** Earthquakes, Floods, Forest Fires, Volcanic Eruptions and Tsunamis.

After the 2010 earthquake, Chile suffered a massive failure on its telecommunications services, which led to the adoption of Law No. 20,478, in December 2010, which amended Law No. 18,168, Telecommunications General Law. The amend made the Law to recognize the «critical telecommunications infrastructure» and established new obligations for the Ministry of Telecommunications in this area.

Following these new obligations, the Ministry issued the Decree No. 60 of 2012, which created the Emergency Alert System (Sistema de Alerta de Emergencia, SAE). This technology, only to be use on smartphones, is defined as a system, with three parts: the “Plataforma Central Unificada (PCU)” or Unified Central Platform, the “Medios de Detección de alertas” or Alert Detection Media, and by the “Medios de Difusión de los mensajes georreferenciados de alerta” or Broadcast Media. This media only broadcast the alert messages in the specific area decided by the ONEMI<sup>29</sup>. The “Oficina Nacional de Emergencia del Ministerio del Interior y Seguridad Pública” (ONEMI) is the National Office of Emergencies of the Ministry of Interior and Public Safety.<sup>30</sup>

The Emergency Alert System SAE, already implemented in Chile, enables ONEMI to send alerts to the public in a timely manner, maintain a system of alerts that is not affected by the congestion of public networks, send messages to specific geographical areas, and develop different alert messages to the same affected area, etc.<sup>31</sup>

To implement the system, different obligations were established for the private sector such as: All smartphones that are sold in Chile should be able to receive the messages from SAE, having to go through an approval process to ensure that they are suitable for all company bands; a company stamp should be placed on each phone sold, indicating if they are compatible with 2G, 3G and 4G; among others<sup>32</sup>.

On the other hand, we must highlight the work carried out by the National Seismological Center of the University of Chile. Since December of 2012, and after an agreement between the ONEMI and the University of Chile, the National Seismological Center has been implemented and developed, hosted by the Faculty of Physical and Mathematical Sciences, which meant a primary investment of circa 3 million USD; which in 2014 was increased to more than 5 million USD. All this investment brought the creation of a National Network of Accelerators, composed of 297 stations of accelerometers destined mainly to gather data for the update of the norms of seismic construction; and for the complete upgrade of the telecommunications platform of the National Seismological

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<sup>29</sup> Article 2 letter A of the Decree No. 60 on Regulations for the Interoperation and Dissemination of Messaging of Alert, Declaration and Safeguarding of Critical Telecommunications Infrastructure and Information on Significant Failures in Telecommunications Systems, issued by the Ministry of Transport and Telecommunications, 4 April 2012. Available at: <<https://www.leychile.cl/Navegar?idNorma=1039988>>.

<sup>30</sup> Article 2 letter C of the Decree No. 60 on Regulations for the Interoperation and Dissemination of Messaging of Alert, Declaration and Safeguarding of Critical Telecommunications Infrastructure and Information on Significant Failures in Telecommunications Systems, issued by the Ministry of Transport and Telecommunications, 4 April 2012. Available at: <<https://www.leychile.cl/Navegar?idNorma=1039988>>.

<sup>31</sup> Federal Institute of Communications [IFT](2018). *Uso de las Tecnologías de la Información en situaciones de emergencia: Experiencia Internacional*, in[PDF], Office of Commissioner Javier Juárez Mojica, August 2018: p.3 Available at: <<http://www.ift.org.mx/sites/default/files/conocenos/pleno/otrosdocumentos/javier-juarez-mojica/vf-ticsensituacionesdeemergencia300718.pdf>>.

<sup>32</sup> Federal Institute of Communications [IFT](2018). *Use of Information Technologies in Emergency Situations: International Experience*, in[PDF], Office of Commissioner Javier Juárez Mojica, August 2018: pp.3-4. Available at: <<http://www.ift.org.mx/sites/default/files/conocenos/pleno/otrosdocumentos/javier-juarez-mojica/vf-ticsensituacionesdeemergencia300718.pdf>>.

Center to a satellite link that ensures the flow of information in real time, even in the case of a major earthquake. Also brought the expansion of the number of stations of the National Seismological Network, reaching more than 500 monitoring stations in addition to the global positioning stations that allows to develop an Early Seismic Alert<sup>33</sup>.

The National Seismological Center works within the Early Warning Center (Centro de Alerta Temprana, CAT), a unity of the ONEMI responsible for the constant monitoring of the different risk factors that exist throughout the national territory. To do this, it coordinates the work of the Chilean Navy's Hydrographic and Oceanographic Service, the National Seismological Center, SERNAGEOMIN's Volcanological Observatory of the Southern Andes and Volcanic Surveillance Network, the CONAF, and the Maritime Territory Directorate of the Chilean Navy<sup>34</sup>.

Finally, about the Early Warning System, the leaders and academics of the National Seismological Center have begun to highlight the urgency for the member economy to adopt an early warning system for earthquakes, already implemented in other countries<sup>35</sup>. Since May of 2018, they have started adopting the Geodetic First Approximation of Size and Time (G-FAST) Early Warning System in their monitoring bases, consisting in algorithms models based on the early P-waves detection<sup>36</sup>.

## 5. Chinese, Taipei

**Disasters:** Earthquakes, Landslides, Typhoons, Floods, Debris flows, Storm surges, Pollution.

Chinese Taipei is a state island in the southeastern coast of mainland China. The East China Sea lies to its north, the Philippine Sea to its east, the Luzon Strait by the south and the South China Sea to its southwest. As Chinese Taipei is in the Ring of Fire of the Pacific, this member is propense to earthquakes and typhoons, and also have other natural or human-made disasters like flood, landslide, debris flow, storm surges and pollution.

After the Big Chi-Chi Earthquake hit in 1999, Taipei realizes the tremendous destruction and severe casualties these disasters can cause and "clearly indicated importance of introducing science and technology into disaster management. In January 2001, the Sixth National Science and Technology Conference proposed to establish a national-level center designed for upgrading the capacity of disaster risk reduction through practical "implementations of science and technology. The recommendation was a solid response to Article 7 of the Disaster Prevention and Protection Act which was enforced in July of 2000."<sup>37</sup>

The Article 1 of the Disaster Prevention and Protection Act establish the purpose of this legislation as "For making a sound disaster prevention and protection system, enhancing its functions, in order to protect the safety of people's lives, bodies, properties and conserve the homeland, the Act was

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<sup>33</sup> Mentioned in the National Office of Emergencies website in the section of the Centro de Alerta Temprana (CAT).. Available at: <<https://www.onemi.gov.cl/cat/>>.

<sup>34</sup> Mentioned in the National Office of Emergencies. website in the section of State of Advance of the National Seismological Network. Available at: <<https://www.onemi.gov.cl/red-sismologica/>>.

<sup>35</sup> Centro Sismológico Nacional de la Universidad de Chile. (2018). Director del CSN: "Sería conveniente analizar las ventajas de la implementación de un sistema de alerta temprana". [online]. Available at: <<http://www.csn.uchile.cl/director-del-csn-seria-conveniente-analizar-las-ventajas-de-la-implementacion-de-un-sistema-de-alerta-temprana/>>.

<sup>36</sup> National Seismological Center of the University of Chile. Earthquake early warning software to be implemented at the CSN CSN. Official Site. Available at: <<http://www.csn.uchile.cl/software-de-alerta-temprana-de-terremotos-sera-implementado-en-el-csn/>>.

<sup>37</sup> Mentioned in the National Science and Technology Center for Disaster Reduction website in the section Background,. Available at: <<https://www.ncdr.nat.gov.tw/Introduction.aspx?WebSiteID=873f5b27-b86d-4d5c-a356-c369768bffe9&id=43&subid=48&PageID=6>>



enacted especially.”<sup>38</sup>. This Act is the principal directive for the Disaster Management in Taipei, and set the standards for the investigation, prevention, plan and regulate the following Agencies and Center that come later.

The National Science and Technology Center for Disaster Reduction (NCDR) was established in July 2003 and serves as a technical advisor to the Executive Yuan on disaster prevention and reduction affairs. This Center conducts investigations, specialized in disaster surveys and updates operations for investigating disaster-prone regions, performs general assessments for major disasters domestically and internationally, and conducts elementary studies for establishing environmental disaster-vulnerability indicators. The NCDR project “will combine and produce various data of potential natural disasters through visualization to provide references for local inquiries and usage. The work items are as follows:

1. Producing of disaster potential map
2. Establishing disaster environmental vulnerability indicators
3. Investigation and comprehensive assessment of major natural disasters
4. Disaster event inquiry performing system”<sup>39</sup>

In 2006, Taipei established the Disaster Management Society of Taiwan, a government-NGO alliance to study, prevent and react to natural disasters, and mark one of the essential characteristics of the disaster management of Chinese Taipei what is the constant collaboration of social society in the development of this issue. It worked until 2010 along with 14 NGO and Universities, and 9 government<sup>40</sup>.

It wasn't until the Great Earthquake and Tsunami devastated the north of Japan in 2011, the government of Chinese Taipei decides that a national alert for disaster was needed, adopting the Common Alerting Protocol (CAP), "The Central Disaster Prevention and Response Office (CDPR) is designated under the Executive Yuan to implement the policy for public warning system in Taiwan. Also, CDPR is supposedly to work closely with the partners, both National Communications Commission (NCC) and National Science and Technology Center for Disaster Reduction (NCDR)". The disaster alert is launched by an Agency, transmitted via Cell Broadcast Entity (CBE) to a Cell Broadcast Center (CBC), and then broadcast to the citizen's phones as an SMS or push notification.

Following the restructured framework of Executive Yuan, NCDR received a new identity in 2014 and was transformed in "administrative entity", operated under the supervision of the Ministry of Science and Technology, and work with seven public agencies for issuing disaster alert messages:

1. Central Weather Bureau: Weather and Earthquake alerts.
2. Directorate General of Highways.
3. Water Resources Agency: Reservoir discharge.
4. Soil and Water Conservation Administration: landslide.
5. Directorate General of Personnel Administration.
6. Center of Disease Control.

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<sup>38</sup> English Translation available in: <<https://law.moj.gov.tw/Eng/LawClass/LawAll.aspx?PCode=D0120014>>

<sup>39</sup> Mentioned in the National Science and Technology Center for Disaster Reduction website in the section Disaster Environment Investigation and Disaster Experience Learning Network"... Available at: <[https://www.ncdr.nat.gov.tw/R\\_D\\_Content.aspx?WebSiteID=873f5b27-b86d-4d5c-a356-c369768bffe9&id=189&subid=200&ItemID=23](https://www.ncdr.nat.gov.tw/R_D_Content.aspx?WebSiteID=873f5b27-b86d-4d5c-a356-c369768bffe9&id=189&subid=200&ItemID=23)>

<sup>40</sup> Wu, Wei-Ning and Ssu-Ming Chang (2018) "Collaboration Mechanisms of Taiwan Nonprofit Organizations in Disaster Relief Efforts: Drawing Lessons from the Wenchuan Earthquake and Typhoon Morakot" in "Sustainability" 10 (11): 4328. Available at: <[https://www.researchgate.net/publication/329146142\\_Collaboration\\_Mechanisms\\_of\\_Taiwan\\_Nonprofit\\_Organizations\\_in\\_Disaster\\_Relief\\_Efforts\\_Drawing\\_Lessons\\_from\\_the\\_Wenchuan\\_Earthquake\\_and\\_Typhoon\\_Morakot](https://www.researchgate.net/publication/329146142_Collaboration_Mechanisms_of_Taiwan_Nonprofit_Organizations_in_Disaster_Relief_Efforts_Drawing_Lessons_from_the_Wenchuan_Earthquake_and_Typhoon_Morakot)>

## 7. Civil Defense Command and Control Center.<sup>41</sup>

After the Typhoon Nepartak affected Taiwan in 2016, the alert was revised because the system has a considerable “blind zone”, caused by the large density of mountain terrain, and has been updated and extending the range<sup>42</sup>.

## 6. Hong Kong, China

**Disasters:** Heavy rain, Storm surges, Thunderstorms and Tropical cyclones.

The member economy government institution responsible for disaster prevention and management is the Security Bureau of the Hong Kong Special Administrative Region, which “is responsible for security-related policies, from the maintenance of law and order, exercising immigration and customs control, rehabilitating offenders and drug abusers, and providing emergency fire and rescue services”<sup>43</sup>. The Security Bureau is organized in several divisions, being one of those the “Emergency Support Unit”, which is responsible for the emergency response management, government security ante matters relating to the auxiliary medical service and the civil aid service<sup>44</sup>.

Disaster Management and Relief is a difficult matter for the Hong Kong, China authorities, especially since this region “faces various natural hazards every year. The types of natural disasters in Hong Kong include exceptionally heavy rainfall, storm surges, thunderstorms and tropical cyclones. These events cause floods, landslides, and other incidents, with the potential of severe casualties and the devastation of transportation and other critical infrastructures. Hong Kong has been ranked as the city with the highest natural disaster risk in Asia”<sup>45</sup>; and to the natural disaster risk must be added the likelihood of a terrorist attack in the city<sup>46</sup>.

With those risks present “the Hong Kong government pursues an emergency response management system. It establishes policies, principles and emergency response operations for crises arising from natural disasters and terrorist attacks. Since 1996, Hong Kong has developed and instituted a ‘Three Tier’ emergency response system in order to ensure timely and appropriate responses”<sup>47</sup>:

1. Tier 1 Response: Ensures that emergency services (such as the Police and Fire Services) operate entirely under the direction, monitoring, and support of their commands.
2. Tier 2 Response: Triggered by an event requiring the attention of the Government Secretariat, such as those that threaten life, property, and security, and that may require a more complex response.
3. Tier 3 Response: Activated in the event of serious and widespread threats to life, property, and security that may require a more significant governmental response.

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<sup>41</sup> Ssu-Ming Chang, (2018), ‘Disaster Public Warning System in Taiwan: The Development of Cell Broadcast Services’ p.9

Available at: <<https://www.aspanet.org/ASPADocs/Annual%20Conference/2018/Papers/ChangSsuMing.pdf>>

<sup>42</sup> Ibid, p. 10. Ssu-Ming Chang (2018), ‘Disaster Public Warning System in Taiwan: The Development of Cell Broadcast Services’ p.10

Available at: <<https://www.aspanet.org/ASPADocs/Annual%20Conference/2018/Papers/ChangSsuMing.pdf>>

<sup>43</sup> As mentioned in the Security Bureau of the Government of the Hong Kong Special Administrative Region website, in the section ‘About Us’. Available at: <<https://www.sb.gov.hk/eng/about/welcome.htm>>.

<sup>44</sup> As mentioned in the Security Bureau of the Government of the Hong Kong Special Administrative Region website, in the section ‘List of Records by Category’. Available at: <<https://www.sb.gov.hk/eng/access/listCategory.htm#ESU>>.

<sup>45</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, Sustainability 2018, 1011, 37: p. 2. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>.

<sup>46</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, Sustainability 2018, 1011, 37: p. 3. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>

<sup>47</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, Sustainability 2018, 1011, 37: p. 3. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>

“In tandem with this emergency response system, there are currently six contingency plans for dealing with the following events: (a) natural disasters, (b) aircraft crashes, (c) the salvage of crashed aircraft, (d) maritime and aeronautical search and rescue, (e) emergencies at the Daya Bay nuclear power stations, and (f) the coordination of emergency response operations by the Hong Kong Special Administrative Region”<sup>48</sup>. To those, we need to add that the Government of Hong Kong made available simple guidelines in the event of major disasters and emergency telephone, on the Security Bureau website. “These guidelines provide basic information, simple precautions on how to avoid panic and to protect oneself from a mishap”<sup>49</sup>.

However, even with this structure on emergency and disaster management, “the Hong Kong authority has yet to build up an organizational structure with clearly identified processes that are necessary for reducing disaster-related exposure, effects, and vulnerabilities in Hong Kong”<sup>50</sup>.

The surveillance of weather-related emergencies is responsibility of the Hong Kong Observatory (HKO), which mission is “to provide people-oriented quality services in meteorology and related fields, and to enhance the society’s capability in natural disaster prevention and response, through science, innovations and partnership”<sup>51</sup>. And since the member faces mainly meteorological risks, is the HKO the government institution responsible for issuing warnings and alerts about meteorological-based risks<sup>52 53 54</sup>, and about earthquakes and tsunamis<sup>55</sup>. The mechanism for the issue of alerts and their dissemination to the public is made through the Informations Services Department, which will transmit the warnings to the media and Government departments<sup>56</sup>, and then those alerts and warnings are broadcasted through radio and television to the public<sup>57</sup>.

## 7. Indonesia

**Disasters:** Earthquakes, Tsunamis, Volcanic Eruptions, Floods, Droughts, Landslides.

Indonesia has several laws related to Disaster Management, for example:

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<sup>48</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, *Sustainability* 2018, 1011, 37: p. 3. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>

<sup>49</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, *Sustainability* 2018, 1011, 37: p. 3. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>

<sup>50</sup> Sim, Timothy; Wang, Dongming; Han, Ziqiang. (2018). Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, *Sustainability* 2018, 1011, 37: p. 10. Available at: <<https://www.mdpi.com/2071-1050/10/4/1137/pdf>>

<sup>51</sup> Information available at the Hong Kong Observatory. (2018). *Vision and Mission*. [online]. Available at: <[http://www.hko.gov.hk/about/hko/hkovmv\\_e.htm](http://www.hko.gov.hk/about/hko/hkovmv_e.htm)>.

<sup>52</sup> Hong Kong Observatory. (2016). *Warnings for Severe Weather*. [online]. Available at: <<http://www.hko.gov.hk/wservice/severe.htm>>.

<sup>53</sup> Hong Kong Observatory. (2012). *The Tropical Cyclone Warning Service*. [online]. Available at: <<http://www.hko.gov.hk/wservice/tsheet/tcwarn.htm>>.

<sup>54 54</sup> Hong Kong Observatory. (2016). *Thunderstorm, Rainstorm, Flood and Landslip Warning Services in Hong Kong*. [online]. Available at: <<http://www.hko.gov.hk/wservice/tsheet/tsflwarn.htm>>.

<sup>55</sup> Information available at the Hong Kong Observatory website in section Seismological Measurements in Hong Kong. Available at: <<http://www.hko.gov.hk/wservice/tsheet/seismo.htm>>.

<sup>56</sup> Emergency Support Unit of the Security Bureau. (2015). Security Bureau Circular No. 2/2015. Contingency plan for natural disasters. Security Bureau of the Hong Kong Government: p. 6 Available at: <<https://www.sb.gov.hk/eng/emergency/ndisaster/CPND%20with%20Tamar%20Address.pdf>>.

<sup>57</sup> Emergency Support Unit of the Security Bureau. (2015). Security Bureau Circular No. 2/2015. Contingency plan for natural disasters. Security Bureau of the Hong Kong Government: p. 64 Available at: <<https://www.sb.gov.hk/eng/emergency/ndisaster/CPND%20with%20Tamar%20Address.pdf>>.

- Law of the Republic of Indonesia N° 3 of 2002 on National Defence: This law outlines the role of Indonesian National Armed Forces (Tentara Nasional Indonesia or TNI) in military operations other than war (MOOTW)<sup>58</sup>.
- Law of the Republic of Indonesia N° 34 of 2004 Concerning the National Armed Forces: This law delineates the main tasks of TNI in MOOTW, including supporting disaster response through facilitating humanitarian relief, and management of internally displaced persons<sup>59</sup>.
- Law of the Republic of Indonesia, N° 24 of 2007 Concerning Disaster Management: This law is the main legal document guiding disaster response in Indonesia, and it contains provisions for the responsibilities and authority of the government, disaster response and relief, emergency status, and disaster aid financing and management<sup>60</sup>.
- Government Regulation N° 23 of 2008 Concerning Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management: This regulation outlines provisions that govern the involvement of international organizations in disaster management in Indonesia. This law includes stipulations on the authority for determining participation, planning and reporting processes, and is intended to outline roles and responsibilities for managing international involvement in all phases of disaster management<sup>61</sup>.

Concerning the national policies for disaster management, the member economy has the Disaster Management Strategic Policy (2015- 2019), which focuses on natural disaster mitigation and management. The three strategic objectives are:

1. Disaster risk reduction
2. Reduction of disaster vulnerability
3. Increased disaster management capacity<sup>62</sup>.

In plans on disaster management Indonesia counts with the National Disaster Management Plan (2010- 2014), that outlines key disaster management planning priorities and activities, including guidelines for development of strategic plans for government agencies and ministries<sup>63</sup>. It stipulates that the National Agency for Disaster Management (BNPB) and TNI work closely in disaster management<sup>64</sup>. The BNPB Guideline N° 22 of 2010 “on the Role of the International Organizations and Foreign Non-Government Organizations during Emergency Response”, provides guidance on managing international assistance. This guideline outlines specific responsibilities for TNI in the

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<sup>58</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>59</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>60</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>61</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>62</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>63</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>64</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018b) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

management of disaster response, including coordinating mechanisms for the entry of foreign military personnel and capabilities<sup>65</sup>.

In the organization structure for Disaster Management in the member economy, the following institutions are found:

- The National Disaster Management Agency, known as the Badan Nasional Penanggulangan Bencana (BNPB), which is the primary agency responsible for coordinating preparedness, response, prevention and mitigation, and rehabilitation and recovery.<sup>66</sup> The BNPB consists of a Disaster Management Steering Committee and a Disaster Management Executive Committee. It is also important to mention that the BNPB is run by the BNPB Chief and it has the Deputy for Prevention and Preparedness, the Deputy for Emergency Response, the Deputy for Rehabilitation and Reconstruction, and the Deputy for Logistics and Equipment<sup>67</sup>.
- The Indonesian National Armed Forces (Tentara Nasional Indonesia) (TNI) and Indonesian National Police (Kepolisian Negara Republik Indonesia) (POLRI): both represented during a disaster response on the Disaster Management Steering Committee. The BNPB can request human resources, equipment, and logistics from TNI and POLRI<sup>68</sup>. The TNI has an important role in disaster response in Indonesia. since it is the primary response agency and it is also responsible for reducing the vulnerability and exposure of communities and to build community capacity to reduce risk and cope with the impact of disasters<sup>69</sup>.
- Regional and Provincial Agencies (Badan Penanggulangan Bencana Daerah) (BPBDs): In Indonesia the disaster management agencies are structured to be decentralized to the district, municipal, and provincial government levels, while being supported by the BNPB. Thus, BPBDs are a system of regional disaster management agencies, and they have a similar composition to the national agency. They are convened at the provincial and district or municipality levels<sup>70</sup>.
- The Ministry of Social Welfare: it supports the BNPB during a disaster response by having central warehouses where relief supplies, such as preserved food and tents, are kept in case of emergency. When there is an emergency, the Ministry of Social Welfare establishes temporary distribution points for areas affected by the disaster<sup>71</sup>.
- The Ministry of Health: it provides health and medical services in the aftermath of a disaster. It has a strong response capacity and tends to be the first organization on the ground. It has nine regional crisis centers coordinated by a national crisis center in Jakarta. Is important to

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<sup>65</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>66</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>67</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 24. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>68</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>69</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>70</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>71</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

mentioned that the Ministry of Health and the World Health Organization (WHO) have established a joint warehouse that has capacity to rapidly supply materials to disaster zones<sup>72</sup>.

- The Ministry of Defence: The Ministry of Defence has a key role in coordinating international humanitarian and military assistance. Member States providing international military assistance must obtain written approval from the Ministry of Defence and TNI in coordination with BNPB<sup>73</sup>.

The use of the Incident Command System (ICS) in Disaster Response by the economy, facilitates interoperability between disaster response personnel and other agencies in different jurisdictions<sup>74</sup>. In Indonesia an Incident Commander is a representative from TNI, which are appointed by the Head of the District or the relevant BPBD as the On-Site Coordinator, and report to the head of local government<sup>75</sup>. The Incident Commander has the authority to deploy all the available resources and is responsible for the mobilization of human resources, equipment, logistics, and the rescue operations<sup>76</sup>.

Regarding the Disaster Management Communications, the member economy created the Indonesia Tsunami Early Warning System (InaTEWS), an early tsunami warning system completed in 2008 that is disseminated by the Agency for Meteorology, Climatology and Geophysics (BMKG). This institution is a tsunami alert provider under the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), and is responsible of providing tsunami threat notification to the Indian Ocean member states<sup>77</sup>. Thus, the InaTEWS provides meteorology, climatology, and geophysics service including public information, early warning, and other information<sup>78</sup>. In addition, the United Nations Development Program (UNDP), UNESCO, United States, Germany, China, and Japan assisted in the operationalization of the Tsunami Early Warning System (TEWS)<sup>79</sup>. Currently an end-to-end EWS for meteorology and climatology program is being implemented by BMKG following the successful program on TEWS<sup>80</sup>.

In the case of Flood and Storm Warning, the *Kemen Pu Pera* is the primary agency responsible for the implementation of flood early warning systems in risk areas, and BNPB is the secondary agency responsible<sup>81</sup>. *Kemen Pu Pera* is also responsible for the implementation of flash flood early warning

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<sup>72</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>73</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 25. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>74</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>75</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>76</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>77</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>78</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>79</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>80</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>81</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

systems in risk areas<sup>82</sup>. The Bandung Institute of Technology's Centre for Disaster Management, the Asian Disaster Preparedness Centre (ADPC), and the Jakarta Provincial Government initiated a comprehensive upgrade and integration of the Jakarta Flood Early Warning System (FEWS)<sup>83</sup>.

DKI Jakarta Regional Disaster Management Agency known as the Badan Penanggulangan Bencana Daerah (BPBD DKI Jakarta) is the disaster management agency established under the Regional Governor's Authority, and it is the responsible for determining guidelines and directives for fair and equal relief efforts, that include: disaster prevention, emergency response, rehabilitation and reconstruction<sup>84</sup>. The BPBD uses the Disaster Information Management System (DIMS) application, a software that manages damage and shelter information, a digital map of the zone, and allows to send messages to staff and other disaster management agencies<sup>85</sup>. This application plays a vital role in the time and dissemination of information during the flood mitigation process by establishing a quick early warning system, allowing the BPBD to collect information and make key decisions<sup>86</sup>.

In 2015, Fujitsu Indonesia built a disaster information-sharing system for BPBD allowing the Jakarta residents to share disaster information via a smartphone app, some of the features of this app are<sup>87</sup>:

- Send pictures and comments, and based on their smartphone GPS location
- The system collects rainfall amounts and river levels onto a map
- The system is linked to DIMS and it allows the BPBD to issue a flood warning in DIMS, these alerts are automatically sent to smartphones that have the app installed.

In October 2017 the BNPB launched PetaBencana.id a free, open-source platform in collaboration with the Massachusetts Institute of Technology (MIT) Urban Risk Lab to deal with the potential threat of flooding during the rainy season<sup>88</sup>. This is project part of the InAWARE Disaster Management Early Warning and Decision Support Capacity Enhancement within Indonesia's Regional Disaster Management Agencies (BNPB and BPBDs)<sup>89</sup>. Some of the features of PetaBencana.id are<sup>90</sup>:

- Users can visit the website to access the latest information on flooding in areas of Indonesia including Greater Jakarta, Surabaya and Bandung<sup>91</sup>.

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<sup>82</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>83</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 31. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>84</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>85</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>86</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>87</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>88</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>89</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>90</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>91</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

- Users can also actively provide real-time reports and maps on the flood situation using social media and instant messaging applications (crowdsourcing). This last are supported by United States Agency for International Development (USAID), the Pacific Disaster Center (PDC) and the Humanitarian OpenStreetMap Team (HOT)<sup>92</sup>.
- The platform collects reports from crowdsourcing from social media and also disaster-related information infrastructure<sup>93</sup>.

## 8. Japan

**Disasters:** Tsunamis, Floods, Typhoons, Earthquakes, Cyclones, Volcanic Eruptions, Hailstorms, Tornadoes, Thunderstorms.

According to Lloyd's City Risk Index of Cambridge University, "Tokyo is the second highest risk city in the world (after Taipei) with respect to natural disasters, due in no small part to Japan's high risk of earthquakes, typhoons, and tsunamis"<sup>94</sup>. The geological formation of the islands makes Japan an earthquake-prone economy; and also because of its geographical, topographical, and meteorological conditions, it is subject to other frequent natural disasters such as typhoons, torrential rains, and heavy snow<sup>95</sup>.

Japan has a long history of natural disasters, but it wasn't until the hit of the Typhoon Ise-wan in 1959 and the immense damage caused, the government reaches a "turning point for disaster management, giving rise to a movement to plan and prepare a comprehensive disaster management system"<sup>96</sup>. The next year the Forest Conservation and Flood Control Urgent Measures Law was enacted, and two years later in 1961 the **Disaster Countermeasures Basic Act**<sup>97</sup> passed improving forever the response of the government in the occurrence of significant natural disasters and accidents, becoming the essential law in terms of natural disasters in Japan. The objectives of this law are established in the first article of the Act that declares "The purpose of this Act is to protect the national land and the lives, bodies and properties of citizens from disasters", and defined:

1. Responsibilities for disaster management
2. Disaster management organization and planning system
3. Disaster prevention and preparedness
4. Disaster emergency response
5. Disaster recovery and rehabilitation
6. Financial measures
7. A special state of disaster emergency

This Act creates the National Disaster Management Council whose chairman is the Minister of State for Disaster Management and established in the Cabinet Office (the executive branch of the government of Japan). This Council is responsible for elaborate the Basic Disaster Management Plan

<sup>92</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>93</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Indonesia Disaster Management Reference Handbook*, June 2018: p. 32. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-brunei.pdf>>

<sup>94</sup> The Centre for Public Impact (2016) J-Alert: disaster warning technology in Japan, [online], BGG Foundation: (w/p) Available in: <<https://www.centreforpublicimpact.org/case-study/disaster-technology-japan/>>

<sup>95</sup> Lkhamjav, Chinbaatar (2013) Earthquake early warning systems, in [PDF], Asian Disaster Reduction Center: p. 12. Available in: <[https://www.adrc.asia/aboutus/vrdata/finalreport/2013A\\_MNG\\_fr.pdf](https://www.adrc.asia/aboutus/vrdata/finalreport/2013A_MNG_fr.pdf)>

<sup>96</sup> Global Standards Collaboration (2013) Draft report of the Global Standards Collaboration (GSC) Task Force on Emergency Communications, in [PDF], International Telecommunication Union (ITU), United Nations, 2013: p. 29. Available at: <[https://www.3gpp.org/IMG/pdf/gsc17-plen-14a1\\_emergency\\_communications\\_report.pdf](https://www.3gpp.org/IMG/pdf/gsc17-plen-14a1_emergency_communications_report.pdf)>

<sup>97</sup> English Translation available in: <<http://www.japaneselawtranslation.go.jp/law/detail/?id=3322&vm=04&re=02>>



that applies nationwide, controls the response of the national forces and the government and, establish the measures to adopt after the disasters of any kind.

Within the Disaster Countermeasures Basic Act, the Japanese government started to enact a series of Acts on Special Measures concerning disaster prevention in areas frequently struck by Typhoons (1958) or Heavy Snow (1962), then in the seventies started to establish Acts on Special Measures concerning countermeasures for: Active Volcanoes (1973), Large-Scale Earthquakes (1973) and Earthquake Disaster (1980).

The **Civil Protection Law** or "the Law concerning the Measures for Protection of the People in Armed Attack Situations etc." was enacted on June 2004, and "stipulates the responsibilities of the national and local governments and measures, such as evacuation, relief, and response to armed attack disaster in order to protect the lives, bodies, and property of the people from armed attacks and minimize the adverse effects inflicted upon people's livelihoods etc. in armed attack situations, etc."<sup>98</sup>. This law has a direct relation to the Act on Special Measures for Nuclear Disasters of 1999 and the Armed Attack Situation Response Law of 2003.

In 2007, the government's Fire and Disaster Management Agency (part of the Ministry of Internal Affairs and Communications) launched the **Japanese Emergency Broadcast system** (*Zenkoku Shunji Keihō Shisutemu* in Japanese), known as J-Alert, a satellite-based system that enables local authorities to transmit warning messages directly to local media and citizens, and regulated by the Chapter V, Section 2, of the Disaster Countermeasures Basic Act.

Fire and Disaster Management Agency (FDMA) receives information about a natural emergency like an earthquake, tsunami, heavy weather (like heavy rain or snow), storm surges, volcanic activity, and typhoons, and the transmit emergency information to J-ALERT receiver equipment via satellite and backup terrestrial circuits. The Cabinet Office of Disaster Management informs about military threats such as ballistic missiles, airstrikes, and terrorism. In less of a second, the alert is sent to the local officers, and then it takes between 4 to 20 seconds to broadcast the message to citizens. All warnings, except for severe weather warnings, are send in five languages Japanese, English, Mandarin, Korean and Portuguese, and transmitted through wide variety of media like: television, radio, internet, loudspeakers vans, disaster management radio communication network, CCTV in public transport, push notifications in mobile phones, announcements on speakers mounted on towers and buildings. The objective is the all the population can receive the information the fastest and most complete way possible so that the citizens can take emergency actions before the disaster hits.<sup>99</sup>

After the Great East Japan Earthquake, Tsunami and Nuclear Accident of 2011, the central government enacted two laws referring to the reconstruction: Basic Act on Reconstruction in Response to the Great East Japan Earthquake<sup>100</sup> also, the Special Zones for Reconstruction in Response to the Great East Japan Earthquake Act<sup>101</sup>. Both laws follow **new and essential principles**:

- 1) "Human life is most important"<sup>102</sup>: Reconstruction should aim to build new communities, with a vision of Japan which is appropriate for the mid-twenty-first century, based on the understanding and cooperation of the people, by promoting dramatic measures for the revitalization, as well as

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<sup>98</sup> As mentioned in the Cabinet Secretariat Situations Response and Crisis Management website under the section 'What is the Civil Protection Law?' Available in: <<http://www.kokuminhogo.go.jp/en/about/law.html>>

<sup>99</sup> As mentioned in the Temple University website that describe the J-Alert System (Nationwide Warning System) Including North Korean Missile Threat. Available in: <<https://www.tuj.ac.jp/emergency/disaster/j-alert.html>>

<sup>100</sup> English Translation available in: <<http://www.japaneselawtranslation.go.jp/law/detail/?id=2434&vm=02&re=02&new=1>>

<sup>101</sup> English Translation available in: <<http://www.japaneselawtranslation.go.jp/law/detail/?id=2514&vm=04&re=2&new=1>>

<sup>102</sup> Koshimura Shunichi, Shuto Nobuo, (2015) 'Response to the 2011 Great East Japan Earthquake and Tsunami disaster', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 373: p.10 Available at <<https://royalsocietypublishing.org/doi/pdf/10.1098/rsta.2014.0373>>

reconstruction measures which aim to facilitate every individual to overcome the disaster and lead a prosperous life.

- 2) Mutual collaboration between national and local government
- 3) Consideration of the opinion of all the people of Japan.
- 4) Solidarity and cooperation among the people of Japan.
- 5) Innovative measures should be implemented to contribute to the resolution of the challenges that Japan is facing as well as to the resolution of global challenges common to all humankind.
  - a) Innovative measures to create safe communities where preventive measures against damage due to earthquakes and other natural disasters.
  - b) Innovative measures to create employment opportunities.
  - c) Innovative measures to promote regional culture, to maintain and strengthen bonds in communities.

The J-Alert was ultimately deployed nationwide by May 2013 when the “99.6% of municipalities nationwide had “received the J-Alert receiver and 78% had the device that automatically sends out warning systems that relay emergency information messages”<sup>103</sup>. Posterior analysis of the effect of the Alert in the recent disaster, discover that the majority of the population received it through the Cell Broadcasting Service (CBS) or phone disaster notification broadcasting system. This technology works as follows:

- “- The mobile communication technology that broadcast disaster message to mobile-phone users at base station transceiver subsystem, who have special receivable ID.
- Disaster message transmission to nationwide or specific area resident users simultaneously at once.”<sup>104</sup>

About the standards for the utilization of the J-Alert, according to the Asian Disaster Reduction Center, they change radically after 2011. After this disaster, the Japan Meteorological Agency decides to modify the classification of automatic warnings and in 2013 finally launches a new “classification of Emergency Warnings for high-risk conditions. These include Major Tsunami Warnings, Volcanic Warnings (Level 4 or more) and Earthquake Early Warnings (incorporating prediction of tremors measuring 6-lower or more on JMA's seismic intensity scale)”<sup>105</sup>. These kinds of warnings are characterized as “Emergency warnings” therefore send automatically to the authorities and people to alert “the significant likelihood of catastrophes in association with natural phenomena of extraordinary magnitude”.<sup>106</sup>

## 9. Malaysia

**Disasters:** Floods, Landslides, Forest fires, Haze, Tsunamis, Earthquakes, Cyclonic Storms, Droughts.

On an institutional level, the official member economy government institution in charge of emergency and disaster management is the National Disaster Management Agency (NADMA), which “falls under the Prime Minister’s department and takes over disaster management from the National Security

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<sup>103</sup> The Centre for Public Impact (2016) J-Alert: disaster warning technology in Japan, [online], BGG Foundation: (w/p) Available in: <<https://www.centreforpublicimpact.org/case-study/disaster-technology-japan/>>

<sup>104</sup> Lkhamjav, Chinbaatar (2013) Earthquake early warning systems, in [PDF], Asian Disaster Reduction Center: p. 37. Available in: <[https://www.adrc.asia/aboutus/vrdata/finalreport/2013A\\_MNG\\_fr.pdf](https://www.adrc.asia/aboutus/vrdata/finalreport/2013A_MNG_fr.pdf)>

<sup>105</sup> Lkhamjav, op cit. Lkhamjav, Chinbaatar (2013) Earthquake early warning systems, in [PDF], Asian Disaster Reduction Center: p. 37. Available in: <[https://www.adrc.asia/aboutus/vrdata/finalreport/2013A\\_MNG\\_fr.pdf](https://www.adrc.asia/aboutus/vrdata/finalreport/2013A_MNG_fr.pdf)>

<sup>106</sup> Lkhamjav, Chinbaatar (2013) Earthquake early warning systems, in [PDF], Asian Disaster Reduction Center: p. 37. Available in: <[https://www.adrc.asia/aboutus/vrdata/finalreport/2013A\\_MNG\\_fr.pdf](https://www.adrc.asia/aboutus/vrdata/finalreport/2013A_MNG_fr.pdf)>

Council”<sup>107</sup>. This agency has decentralized through the creation of small agency units at community or village level<sup>108</sup>. The NADMA is headed by senior government officials, while the local disaster management units are headed by the local Civil Defense Department<sup>109</sup>.

Even though NADMA is a relatively recent institution, disaster preparedness and management in Malaysia has its origin in the creation of the Natural Disaster Management and Relief Committee in 1972, due to the flooding hazards in this member economy. The committee received the task of “coordinating flood relief operations at every state of national, state and district levels with the combined aims of reducing flood damage and preventing loss of human life”<sup>110</sup>; and operated “based on the NSC Directive No. 20 and Fixed Operating Regulations. These documents outline the aims of Policy and Mechanism on Disaster and Relief Management on Land. The Directive also describes the purpose of responsibilities and determining how the various agencies should be involved in disaster management”<sup>111</sup>. Nevertheless, all other government agencies are responsible for different aspects of disaster risk reduction while maintaining their core capabilities<sup>112</sup>.

In matter of disaster communications, Malaysia has adopted an Early Warning System against floods (a constant risk on this APEC economy). It is defined as “an integrated system that comprises hundreds of rainfall and water level stations, manual stick gauges, boards and sirens installed at strategic locations all over the country”<sup>113</sup>.

The Malaysian Meteorological Department had developed a National Tsunami Early Warning System. “With this system, the government is able to forewarn the public of the possible occurrence of tsunamis over the Indian Ocean, South China Sea or the Pacific Ocean. Early warnings are disseminated through sirens, short messaging systems, telephone, telefax, webpage, mass media broadcasting system and public announcements. Malaysia uses Information and Communication Technology (ICT) to promote awareness and disseminate early warnings to the public via a Fixed-Line Disaster Alert System.”<sup>114</sup>.

There is also another emergency communication system known as the Government Integrated Radio Network (GIRN), which “provides radio communication between responders during emergencies or disasters”<sup>115</sup>; and “to fully capitalize on the potential of using mass media as an effective platform to

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<sup>107</sup>Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>108</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>109</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>110</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>111</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>112</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 30. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>113</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 46. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>114</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 46. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>115</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 46. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

disseminate disaster preparedness information, the Ministry of Information, Communication and Culture has established a Disaster Unit in the Department of Broadcasting Malaysia”<sup>116</sup>.

## 10. México

**Disasters:** Floods, Earthquakes, Hurricanes, Volcanic Eruptions.

At the Federal level in communication laws, there are three acts that regulate the matter: The General Roads of Communication Act, the General Law on Social Communications, and the Federal Telecommunications and Broadcasting Act. The last one after a constitutional reform in 2013, the Federal Institute of Communications (Instituto Federal de Telecomunicaciones, IFT) was created and it's responsible for “the regulation, promotion and supervision of the use and exploitation of radio spectrum, networks and provision of broadcasting and telecommunications services, as well as access to active and passive infrastructure, and other special supplies for telecommunication services”<sup>117</sup>. Likewise, the same law obliges telecommunications providers “in the terms defined by the Institute in coordination with the competent institutions and authorities, to give priority to communications in relation to emergencies”<sup>118</sup>, obligations that find similar definition within the same normative piece<sup>119</sup>.

The General Law on Social Communication establishes the possibility for social media to disseminate social communication campaigns in emergencies arising from health situations, natural disasters or civil protection<sup>120</sup>.

Consequently, the IFT developed a *Communications Reaction Plan in Emergency Situations*, in order to “guide the work of the Institute (...) before the National Emergency Committee, to coordinate actions between telecommunications and broadcasting service dealers and the Civil Protection authorities during the presence of a disruptive phenomenon that threatens or put the public in an emergency situation”<sup>121</sup>.

The disasters that affect Mexico have been identified as both natural (which, in turn, may be geological, hydrometeorological or astronomical) or anthropological (which may also be chemical-technological or sanitary-ecological)<sup>122</sup>. In the face of recognized threats, an early warning system and continuity of operations plan have been established; the EWS is operated and administered by state entities in order to monitor the behavior of threats and issue preventive warnings for the

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<sup>116</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2016) *Malaysia Disaster Management Reference Handbook*: p. 46. Available at <<https://reliefweb.int/sites/reliefweb.int/files/resources/disaster-mgmt-ref-hdbk-Malaysia.pdf.pdf>>

<sup>117</sup> Federal Institute of Communications [IFT] (2019) Marco Normativo Instituto Federal de Telecomunicaciones, in [PDF]: p. 1. Available at: <[http://www.ift.org.mx/sites/default/files/marco\\_juridico\\_17\\_junio\\_2019.pdf](http://www.ift.org.mx/sites/default/files/marco_juridico_17_junio_2019.pdf)>.

<sup>118</sup> Article 190, paragraph XI, of the Federal Telecommunications and Broadcasting Act. [PDF]. Available at: <[http://www.diputados.gob.mx/LeyesBiblio/pdf/LFTR\\_020419.pdf](http://www.diputados.gob.mx/LeyesBiblio/pdf/LFTR_020419.pdf)>. p. 78.

<sup>119</sup> Articles 254, paragraphs I to III, and 255; both of the same Federal Law.

<sup>120</sup> Article 16 of the Federal Telecommunications and Broadcasting Act. [PDF]. Available at: <[http://www.diputados.gob.mx/LeyesBiblio/pdf/LGCS\\_110518.pdf](http://www.diputados.gob.mx/LeyesBiblio/pdf/LGCS_110518.pdf)>. p. 6.

<sup>121</sup> Federal Institute of Communications [IFT](w/y). Plan de Reacción de Comunicaciones en Situaciones de Emergencia [PDF]: p.1 Available in: <<http://www.ift.org.mx/sites/default/files/contenidogeneral/industria/plandereacciondecomunicacionesensituacionesdeemergenciaacc.pdf>>

<sup>122</sup> Federal Institute of Communications [IFT](w/y). Plan de Reacción de Comunicaciones en Situaciones de Emergencia [PDF]: p.7 Available in: <<http://www.ift.org.mx/sites/default/files/contenidogeneral/industria/plandereacciondecomunicacionesensituacionesdeemergenciaacc.pdf>>

population and authorities to take appropriate precautionary measures<sup>123</sup>. Part of the management directives consists of a coordination plan between the Mexican State (through the IFT) and private companies in the telecommunications sector with the objective of “guiding dealers on what to do and how to react to a scenario of emergency [to] recover and restore its critical functions, partially or fully interrupted within a predetermined time after being interrupted by the event of a disaster”<sup>124</sup>.

Concerning the particular use of certain technologies, the Reaction Plan does not contain any guidance in the matter. However, on 15 December 2017, the IFT submitted for public consultation the *Preliminary Draft Guidelines establishing a Common Protocol on Emergency Alerts* (consultation from 15 December 2017 to 27 February 2018)<sup>125</sup>. The purpose of these guidelines is “the establishment of the Common Alert Protocol, as well as the mechanisms for Dealers and, where appropriate, mobile, broadcasting and restricted television and audio service authorized to collaborate timely and competent authorities in the implementation and operations of this protocol in cases of risk, emergency and/or disaster”<sup>126</sup>.

The alerts generated in this common system will be encoded in XML format and will be directly administered by the Directorate-General for Civil Protection of the Secretary of the Interior (DGPC-SEGOB), having the technical possibility that DGPC-SEGOB can send audio files and/or images related to the alert, and may also indicate when the alert will expire or have been canceled, determining the language in which it should be broadcast, and delimiting the geographical areas in which they should be disseminated. It is also expressly recognized that these alerts should be possible to be transmitted via cell phones, radio stations (both FM and AM), and television stations.

The government institutions that can issue a warning vary depending on the nature of the disaster. For example, seismological alerts are the responsibility of the National Seismological System and the Mexican Seismic Alert System; tsunami alerts correspond to the National Tsunami Warning System; volcanic warnings, to the Popocatepetl Volcano Monitoring System; tropical cyclone alerts to the Early Warning System for Tropical Cyclones; Forest fire alerts are the responsibility of the Early Fire Warning System; and, finally, alerts regarding meteorological disasters are the responsibility of the Mexican Meteorological System.

## 11. New Zealand

**Disasters:** Floods, Cyclones, Hailstorms, Bushfires, Earthquakes, Volcanic Eruptions.

The New Zealand emergency communications system is run by the Ministry of Civil Defense and Emergency Management (MCDEM), under the rule of the Department of the Prime Minister and the Cabinet; its main function is to support and enable communities to manage emergencies. This

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<sup>123</sup> Federal Institute of Communications [IFT](w/y). Plan de Reacción de Comunicaciones en Situaciones de Emergencia [PDF]: p.7 Available in: <<http://www.ift.org.mx/sites/default/files/contenidogeneral/industria/plandereacciondecomunicacionesensituacionesdeemergenciaacc.pdf>>

<sup>124</sup> Federal Institute of Communications [IFT](w/y). Plan de Reacción de Comunicaciones en Situaciones de Emergencia [PDF]: p.7 Available in: <<http://www.ift.org.mx/sites/default/files/contenidogeneral/industria/plandereacciondecomunicacionesensituacionesdeemergenciaacc.pdf>>

<sup>125</sup> Federal Institute of Communications [IFT], Public consultation on the "Draft Guidelines establishing a Common Protocol on Emergency Alerts" [online]. Available at: <[www.ift.org.mx/consultas-publicas/consulta-publica-sobre-el-anteproyecto-de-lineamientos-mediante-los-cuales-se-establecera-un](http://www.ift.org.mx/consultas-publicas/consulta-publica-sobre-el-anteproyecto-de-lineamientos-mediante-los-cuales-se-establecera-un)>. [consultation date: 10 July 2019].

<sup>126</sup> Federal Institute of Communications [IFT] (2015) Anteproyecto de directrices que establecen el protocolo de alerta común de acuerdo con la cuadragésima novena línea de las directrices de colaboración de seguridad y justicia publicadas en el Diario Oficial de la Federación el 2 de diciembre de 2015, in [PDF]: p.1. Available at: <<http://www.ift.org.mx/sites/default/files/industria/temasrelevantes/9464/documentos/anteproyectodelineamientos.pdf>>

Ministry works with a diverse range of agencies that comprise the civil defense and emergency management sector, each with different responsibilities and approaches<sup>127</sup>, and was created through the “Civil Emergency Management Defense Act 2002”. By Law, their responsibilities are: Advise the government on civil defense and emergency management matter; identify risks and threats; develop, maintain and evaluate the effectiveness of the strategic framework on civil defense and threat management; ensuring coordination between emergency bodies at local, regional and national levels; maintaining and operating the National Crisis Management Center, and issuing warning to the population; etc.<sup>128</sup>

As part of its obligations, the MCDEM implemented in November 2017 the *Emergency Mobile Alert* system, consisting of “messages about emergencies sent by authorized emergency agencies to capable mobile phones”<sup>129</sup> with the aim of “keep people safe if there is an emergency. The alerts will only be sent when there are serious threats to life, health or property”<sup>130</sup>, highlighting as threats “a tsunami affecting land areas, a wildfire affecting people, armed offenders at large or seriously contaminated drinking water”<sup>131</sup>. The Emergency Mobile Alert system “are broadcast via cell towers to mobile phones with the ability to receive Emergency Mobile Alerts. Authorized emergency agencies can target the alerts to specific areas affected by serious hazards”<sup>132</sup>.

The Emergency Mobile Alert system can only be sent by authorized emergency agencies. Currently, can only be sent by: The New Zealand Police, Fire and Emergency New Zealand, Ministry of Health, Ministry for Primary Industries, Ministry of Civil Defense & Emergency Management, and Local Civil Defense Emergency Management Groups. In any case, the agency issuing an Emergency Mobile Alert must be identified in the message of the alert<sup>133</sup>.

In any case, the Ministry itself recognizes the lacks of the system, noting that “[The Emergency Mobile Alert] system may not work if mobile phone towers are damaged or if there is a power outage. For this reason you must also rely on other information sources”<sup>134</sup>, and “[the Emergency Mobile Alert systems] are not meant to replace other emergency alerts, or the need to take action after natural warnings”<sup>135</sup>.

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<sup>127</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section About the Ministry Available at: <<https://www.civildefence.govt.nz/about/about-the-ministry>>

<sup>128</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section About the Ministry Available at: <<https://www.civildefence.govt.nz/about/about-the-ministry>>

<sup>129</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

<sup>130</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

<sup>131</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://getready.govt.nz/prepared/stay-informed/emergency-mobile-alert/ema-faqs/>>

<sup>132</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

<sup>133</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

<sup>134</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

<sup>135</sup> Information provided by the official website of the Ministry of Civil Defense and Emergency Management (MCDEM), in the section Emergency Mobile Alert frequently asked questions (FAQ). Available in: <<https://www.civildefence.govt.nz/get-ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>>

Is important to recognize the efforts made by the MCDEM in the preparedness programs available to the public in regards of both earthquakes and tsunamis. New Zealand is part of the “ring of fire” of the Pacific Ocean, putting this APEC economy on a higher risk of seismic related disasters. That is why the MCDEM not only contemplate both earthquakes and tsunamis on their early warning system, but implemented on a national level the “New Zealand ShakeOut” program<sup>136</sup>, which seek to educate the population about what to do in a case of an earthquake and a tsunami; with emphasis on self-protection in earthquakes (drop, cover and hold) and evacuation plans and knowledge in tsunamis.

## 12. Papua New Guinea

**Disasters:** Earthquakes, Floods, Volcanic eruptions, Cyclones.

The legal framework about disaster and emergency management in Papua New Guinea is the Disaster Management Act 1984, which establishes the National Disaster Committee, formed by a series of government agencies listed in the law<sup>137</sup>; a replica of this body is also recognized at the provincial level<sup>138</sup>. The law also establishes a National Disaster Centre, a national body called to “coordinate all disaster situations and surveillance matters”<sup>139</sup>; the National Disaster Centre is run by a Director, which functions are:<sup>140</sup>

1. To manage the National Disaster Centre.
2. To provide assistance to the Provincial Disaster Committees.
3. Other functions and duties are, from time to time, directed by the National Disaster Committee.

However, this policy has not been deployed efficiently or effectively. Therefore, the Papua New Guinea Government, in 2010, adopted the National Disaster Mitigation Policy, which establish a new authority: The National Environment and Disaster Mitigation Authority, which absorbed the functions and management arrangements by this authority. The main roles and functions of the Authority are: “To implement the National Environment and Disaster Mitigation Program; to formulate, implement, monitor, evaluate and manage mitigation programs and policies; and to secure funding and manage financial activities”<sup>141</sup>. The implementation and participation on the Program “include all relevant agencies including corporate organizations, non-government organizations, churches and government both at the national and provincial levels”<sup>142</sup>.

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ready/civil-defence-emergency-management-alerts-and-warnings/emergency-mobile-alert/emergency-mobile-alert-frequently-asked-questions-faq>

<sup>136</sup> Ministry of Civil Defense and Emergency Management, Government of New Zealand. Get Ready. New Zealand ShakeOut. [on line]. Available at: <<https://getready.govt.nz/involved/shakeout/>>.

<sup>137</sup> Part II. Division 1. Section 3 of the Disaster Management Act 1984. [on-line]. Available on: <<http://extwprlegs1.fao.org/docs/pdf/png51666.pdf>>

<sup>138</sup> Part II. Division 2 of the Disaster Management Act 1984. [on-line]. Available on: <<http://extwprlegs1.fao.org/docs/pdf/png51666.pdf>>

<sup>139</sup> Part III. Section 15 of the Disaster Management Act 1984. [on-line]. Available on: <<http://extwprlegs1.fao.org/docs/pdf/png51666.pdf>>

<sup>140</sup> Part III. Section 17 of the Disaster Management Act 1984. [on-line]. Available on: <<http://extwprlegs1.fao.org/docs/pdf/png51666.pdf>>

<sup>141</sup> National Disaster Center Department of Provincial & Local Government Affairs, National Disaster Mitigation Policy: p.1 Available at: <[https://www.preventionweb.net/files/8142\\_mitigationpolicy.pdf](https://www.preventionweb.net/files/8142_mitigationpolicy.pdf)>

<sup>142</sup> National Disaster Center Department of Provincial & Local Government Affairs, National Disaster Mitigation Policy: p.1 Available at: <[https://www.preventionweb.net/files/8142\\_mitigationpolicy.pdf](https://www.preventionweb.net/files/8142_mitigationpolicy.pdf)>

A special chapter on the National Disaster Mitigation Policy is dedicated to emergency response, which considers the development of the following activities<sup>143</sup>:

1. To alert the public.
2. To instruct the public about the nature of the danger.
3. To describe actions the public can take to protect their property and personal health, and warn people about what to do.
4. To explain what to do for food, shelter, medicine, or how to obtain assistance in locating missing persons.

The policy recognizes that “emergency public awareness programmes emphasize getting people to react. To do this, a well-planned and thoroughly developed system of getting timely messages out needs to be in place before the emergency occurs”<sup>144</sup>, this is the genesis of an early warning system on Papua New Guinea.

According with an APEC official document, “the Government of Papua New Guinea, under the Climate Change Development Authority (CCDA), is developing a program to Enhance the Adaptive Capacity of Communities to Climate Change-related Floods in the North Coast and Islands Region of Papua New Guinea”<sup>145</sup>. This program consisted on four phases<sup>146</sup>:

1. Phase 1: An inception visit was completed from 27 March-7 April 2017. As well as briefings with the UNDP, the inception visit was used to confirm the project scope in detail with key stakeholders and as an initial opportunity to provide field training for meteorology staff from the Papua New Guinea National Weather Service (PNG-NWS), hydrology staff from the Conservation and Environment Protection Authority (CEPA), and staff from the Morobe Provincial Disaster Centre (PDC-Morobe).
2. Phase 2: Pre-installation site inspections and situation assessment were carried out between May and September 2017. This phase focused on a detailed review of the Bumbu catchments to identify sites for installation of three river water-level stations, five rain gauges and an automatic weather station in the Morobe province, including site logistics and implementation planning. This phase also involved pre-installation visits to the other four project provinces to assess the proposed monitoring sites and logistics associated with installation of an Automatic Weather Station (AWS) in each province. Prior to phase 3 installation activities, technical instrumentation training was undertaken in New Zealand at NIWA, for key meteorology staff from the PNG-NWS, and hydrology staff from the CEPA.
3. Phase 3: Station installations in Morobe province and in each of the other four provinces. This phase was carried out over successive installation missions between November 2017 and April 2018, and involved commissioning of satellite based near-real time telemetry of field data, including integration into Papua New Guinea’s meteorological and hydrological databases for longer term analytical use including initial development of hydro-meteorological and climate products. Hands-on equipment and systems technical training was also provided to PNG-NWS and CEPA hydrology technicians during installation activities.

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<sup>143</sup> National Disaster Center Department of Provincial & Local Government Affairs, National Disaster Mitigation Policy: p.7. Available at: <[https://www.preventionweb.net/files/8142\\_mitigationpolicy.pdf](https://www.preventionweb.net/files/8142_mitigationpolicy.pdf)>

<sup>144</sup> National Disaster Center Department of Provincial & Local Government Affairs, National Disaster Mitigation Policy: p.7. Available at: <[https://www.preventionweb.net/files/8142\\_mitigationpolicy.pdf](https://www.preventionweb.net/files/8142_mitigationpolicy.pdf)>

<sup>145</sup> Williams, Shaun; Gomoga, Jimmy; Porteous, Alan; Maiha, Samuel; Elley, Graham. (2018). Flood and Climate Early Warning Systems Development in Papua New Guinea: Towards Regionally Consistent Hydroclimatic Monitoring and Warning Systems to Support Disaster Resilience in the Pacific - Write-up. 12th Senior Disaster Management Official Forum, Kokopo, Papua New Guinea, 25-26 September 2018: p. 1. Available at: <[http://mddb.apec.org/Documents/2018/EPWG/SDMOF/18\\_epwg\\_sdmof\\_012.pdf](http://mddb.apec.org/Documents/2018/EPWG/SDMOF/18_epwg_sdmof_012.pdf)>

<sup>146</sup> Williams, Shaun; Gomoga, Jimmy; Porteous, Alan; Maiha, Samuel; Elley, Graham. (2018). Flood and Climate Early Warning Systems Development in Papua New Guinea: Towards Regionally Consistent Hydroclimatic Monitoring and Warning Systems to Support Disaster Resilience in the Pacific - Write-up. 12th Senior Disaster Management Official Forum, Kokopo, Papua New Guinea, 25-26 September 2018: p. 1. Available at: <[http://mddb.apec.org/Documents/2018/EPWG/SDMOF/18\\_epwg\\_sdmof\\_012.pdf](http://mddb.apec.org/Documents/2018/EPWG/SDMOF/18_epwg_sdmof_012.pdf)>



4. Phase 4: Operationalization and sustainability; this phase included the design of a Flood Warning methodology using data from the monitoring network, and development and evaluation of a Flood Simulation Exercise. This exercise brought together key hydrometeorological monitoring and forecasting staff from NWS and CEPA, as well as disaster management/adaptation staff from the PDC Morobe, National Disaster Centre and Climate Change and Development Authority (CCDA). This phase also included the delivery of a 'Final Report' for the pilot project.

This project to increase surveillance and flood prevention capabilities of Papua New Guinea adds to the adoption of an Early Warning System for flooding, which is “a principal theme in the PNG framework for action (2005-2015), by the National Disaster Centre. The global objective is to assess the ‘Early Warning Systems’ (EWS) for inland and coastal flooding in Papua New Guinea. Special attention is given to five selected pilot provinces; East Sepik, Madang, Morobe and Northern and New Ireland”<sup>147</sup>. The first geographical area of the member economy with the EWS fully operational was Lae, on the Morobe Province, which is at risk of flooding from the Bumbu river and since May 2018, the residents of this area (which are more than 5000 people) now benefit from the first EWS installation on Papua New Guinea<sup>148</sup>.

## 13. People's Republic of China

**Disasters:** Earthquakes, Floodings, Typhoons.

Since May 2018, China has an exclusive authority to emergency response: The Ministry of Emergency Management, responsible for “the emergency response system should be improved, and capacity should be strength to ensure rapid, effective response”<sup>149</sup>. The legal framework in this matters is given by the Emergency Response Law of the People’s Republic of China (Order of the President N° 69), which was adopted with “the purpose of preventing and reducing the occurrence of emergencies, controlling, mitigating and eliminating the serious social harm caused by emergencies, regulating the activities in response to emergencies, protecting the lives and property of the people, and maintaining national security, public security, environmental safety and public order”<sup>150</sup>, and establishes its application in the designated areas in its article 2:

1. Prevention of and preparation for response.
2. Monitoring and early warning.
3. Emergency handling, rescue and relief.
4. Post-emergency rehabilitation and reconstruction.
5. Other activities in response to emergencies.

The member economy emergency management system classifies the emergencies in four grades: Especially serious, serious, relatively serious and common. This graduation determines which level of the state administration is called to react to the disaster, thereby determining the resources and

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<sup>147</sup> Antea Group International. (2014). Papua New Guinea: Assessment of early warning systems for flooding. Available at: <<https://www.anteagroup.com/en/case-studies/papua-new-guinea-assessment-early-warning-systems-flooding-0>>.

<sup>148</sup> UNDP Papua New Guinea. (2018). Bumbu gets country's first early warning flood system. Available at: <[http://www.pg.undp.org/content/papua\\_new\\_guinea/en/home/presscenter/pressreleases/2018/05/30/bumbu-gets-country-s-first-early-warning-flood-system0.html](http://www.pg.undp.org/content/papua_new_guinea/en/home/presscenter/pressreleases/2018/05/30/bumbu-gets-country-s-first-early-warning-flood-system0.html)>

<sup>149</sup> The State Council of the People’s Republic of China. (2018). New authority focuses on emergency response. Available at: <[http://english.gov.cn/state\\_council/ministries/2018/03/30/content\\_281476095337420.htm](http://english.gov.cn/state_council/ministries/2018/03/30/content_281476095337420.htm)>

<sup>150</sup> Article 1, 29th Meeting of the Standing Committee of the 10th National People’s Congress of the People’s Republic of China. (2014). Emergency Response Law of the People’s Republic of China. Published in English by the State Council of the People’s Republic of China. Available at: <[http://english.gov.cn/archive/laws\\_regulations/2014/08/23/content\\_281474983042515.htm](http://english.gov.cn/archive/laws_regulations/2014/08/23/content_281474983042515.htm)>.

security and rescue forces committed. The standards for classifying the grades of emergencies are formulated by the State Council or the department designated to that task<sup>151</sup>.

About the development of emergency plans, the economy emergency framework follows a “one planning plus three systems” logic: “This means one emergency response plan is followed by emergency legislative, institutional, and regulatory systems”<sup>152</sup>. In addition, the law requires the State to establish a precautionary system for emergency response, being the State Council the “responsible for drawing up and organizing the making of special national emergency response plans for specific national emergencies. The various departments of the State Council are coordinated to make their departmental State emergency response plans in their respective capacities in line with the relevant emergency response plans of the State Council”<sup>153</sup>. With this level of regulatory development required by the law, “the Chinese government has developed more than 60 laws and sets of regulations on subjects including natural disaster incidents, accidental disaster incidents, public health incidents and social security incidents”<sup>154</sup>.

The emergency management system is designed by the State following major features: “unified leadership, all-round coordination, control according to grades, responsibility at different levels and, chiefly, territorial jurisdiction”<sup>155</sup>. This features means that, based on the classification of the disaster, one or another government body (on a local, district or national level) is called to give response and relief to the population affected by the emergency, which will organize the response and coordinate with other agencies and state-bodies through the centralized emergency management body (which was, until 2018, the State Emergency Management Office, which was replaced by the Ministry of Emergency Management).

Until 2018 “the response could be led by the most appropriate government ministries. For example, response to natural disaster incidents could be led by the Ministry of Civil Affairs, the Ministry of Water Resources or the China Seismological Bureau”<sup>156</sup>; but after the reform of 2018, the Ministry of Emergency Management brought together the emergency management offices of the different ministries, assuming seismological surveillance and inspection workplaces in order to reduce the rate of occupational accidents and the associated mortality.

Regarding communication technologies in emergencies, after the 2008 Wenchuan Earthquake, China has developed an Early Warning System to address the public about the risk of an earthquake. Finally, in April 2011, China’s earthquake early warning system successfully sent out their first alert<sup>157</sup>.

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<sup>151</sup> Article 3, 29th Meeting of the Standing Committee of the 10th National People’s Congress of the People’s Republic of China. (2014). Emergency Response Law of the People’s Republic of China. Published in English by the State Council of the People’s Republic of China. Available at: <[http://english.gov.cn/archive/laws\\_regulations/2014/08/23/content\\_281474983042515.htm](http://english.gov.cn/archive/laws_regulations/2014/08/23/content_281474983042515.htm)>.

<sup>152</sup> Wang, Zhe; Chan Eyy, Emily; Liu, Kevin; Yeung, May. (2016). The Disaster and Emergency Management System in China: p. 3. Available at: <<http://www.hkjcdpri.org.hk/download/policy/PolicyBriefDisasterandEmergMxSysinChina.pdf>>.

<sup>153</sup> Wang, Zhe; Chan Eyy, Emily; Liu, Kevin; Yeung, May. (2016). The Disaster and Emergency Management System in China: p. 3. Available at: <<http://www.hkjcdpri.org.hk/download/policy/PolicyBriefDisasterandEmergMxSysinChina.pdf>>.

<sup>154</sup> Wang, Zhe; Chan Eyy, Emily; Liu, Kevin; Yeung, May. (2016). The Disaster and Emergency Management System in China: p. 4. Available at: <<http://www.hkjcdpri.org.hk/download/policy/PolicyBriefDisasterandEmergMxSysinChina.pdf>>

<sup>155</sup> Article 4, 29th Meeting of the Standing Committee of the 10th National People’s Congress of the People’s Republic of China. (2014). Emergency Response Law of the People’s Republic of China. Published in English by the State Council of the People’s Republic of China. Available at: <[http://english.gov.cn/archive/laws\\_regulations/2014/08/23/content\\_281474983042515.htm](http://english.gov.cn/archive/laws_regulations/2014/08/23/content_281474983042515.htm)>.

<sup>156</sup> Wang, Zhe; Chan Eyy, Emily; Liu, Kevin; Yeung, May. (2016). The Disaster and Emergency Management System in China: pp. 4-5. Available at: <<http://www.hkjcdpri.org.hk/download/policy/PolicyBriefDisasterandEmergMxSysinChina.pdf>>.

<sup>157</sup> China.org.cn. (2019). 11 years on a new start for China’s emergency response. Published in English by CISION PR Newswire. Available at: <<https://www.prnewswire.com/news-releases/11-years-on-a-new-start-for-chinas-emergency-response-300847008.html>>

In June of 2019, a 6.0 magnitude earthquake hit Changning County, Sichuan Province; a few moments later the residents on the provincial capital, Chengdu, which is located more than 200 kilometers away from the epicenter, received an early warning alerting the incoming seismic wave, accompanied by a count-down and a siren. The alerts were broadcasted on local television stations, mobile apps and the internet, and given one minute before the seismic wave hit the city<sup>158</sup>. According to the press, the China Earthquake Administration “has invested about 2 billion yuan (US\$300 million) on the early warning and quick intensity reporting system. Similar to those used in other quake-prone countries, like Japan, Mexico and the US, the system works by detecting the P-waves created by an earthquake. These are fast moving, but mostly harmless waves that give a warning of the slower moving, but far more dangerous S-waves that follow. As the waves are picked up by a network of seismographs, so the alerts are sent out of the pending tremor”<sup>159</sup>. And the member economy government plans to have 15,000 monitoring stations across the member economy by 2020, especially in key areas with a high risk of earthquakes<sup>160</sup>.

In addition to the early warning system implemented in China, the member economy government has also installed close to 1,500 super-base stations with various types of resilience, subject to stricter building standards and specially designed to withstand the disasters they must monitor. Thus, we have super anti-seismic, anti-flood, anti-typhoon, anti-ice and snow base stations, and super complete anti-disaster base stations (which can withstand various disasters combined)<sup>161</sup>. The government also has invested in providing satellite phones in areas with a high risk of disasters<sup>162</sup>; and the 1.4Ghz band on LTE communications (also known as narrow band communications) gives to the emergency agencies a common channel to broadcast warnings and alerts; while the government, the public security forces, the energy bodies and key industries have their own private wireless networks, spectrum resources and independent professional networks<sup>163</sup>.

Regarding the use of early warning systems in case of terrorism, the Chinese government haven't used the early warning system to provide alerts in case of terrorist attacks. According to the UK government, “the risk is higher in the Xinjiang Uyghur Autonomous region. According to the Chinese government, most attacks are carried out by Uyghur separatists with possible links to the East Turkestan Islamic Movement (ETIM)”<sup>164</sup>. However, there have been episodes of terrorist attacks outside this Chinese region: On 28 October 2013, a man drove a jeep full of explosives into a crowd in Tiananmen Square, the heart of the Chinese capital-city of Beijing. The attack killed five people (two civilians, the driver and his wife and mother), and injury dozens<sup>165</sup>; and “carried enormous

<sup>158</sup> Xinhuanet. (2019). China Focus: China's early warning system alarms public before quake waves arrive. Available at: <[http://www.xinhuanet.com/english/2019-06/18/c\\_138153770.htm](http://www.xinhuanet.com/english/2019-06/18/c_138153770.htm)>.

<sup>159</sup> South China Morning Post. (2018). China's early earthquake warning system gives people life-saving seconds to prepare for tremor. Available at: <<https://www.scmp.com/news/china/society/article/2106309/chinas-early-earthquake-warning-system-gives-people-life-saving>>.

<sup>160</sup> South China Morning Post. (2018). China's early earthquake warning system gives people life-saving seconds to prepare for tremor. Available at: <<https://www.scmp.com/news/china/society/article/2106309/chinas-early-earthquake-warning-system-gives-people-life-saving>>

<sup>161</sup> Instituto Federal de Telecomunicaciones [IFT] (2018). Uso de las Tecnologías de la Información en situaciones de emergencia, [PDF], Office of Commissioner Javier Juárez Mojica, August 2018: p. 6. Available at: <<http://www.ift.org.mx/sites/default/files/conocenos/pleno/otrosdocumentos/javier-juarez-mojica/vf-ticsensituacionesdeemergencia300718.pdf>>.

<sup>162</sup> Instituto Federal de Telecomunicaciones [IFT] (2018). Uso de las Tecnologías de la Información en situaciones de emergencia,, in [PDF], Office of Commissioner Javier Juárez Mojica, August 2018: p. 6. Available at: <<http://www.ift.org.mx/sites/default/files/conocenos/pleno/otrosdocumentos/javier-juarez-mojica/vf-ticsensituacionesdeemergencia300718.pdf>>.

<sup>163</sup> Instituto Federal de Telecomunicaciones [IFT] (2018). Uso de las Tecnologías de la Información en situaciones de emergencia,, in [PDF], Office of Commissioner Javier Juárez Mojica, August 2018: p. 7. Available at: <<http://www.ift.org.mx/sites/default/files/conocenos/pleno/otrosdocumentos/javier-juarez-mojica/vf-ticsensituacionesdeemergencia300718.pdf>>.

<sup>164</sup> Government of the United Kingdom. *Foreign travel advice. China. Terrorism*. [online]. Available at: <<https://www.gov.uk/foreign-travel-advice/china/terrorism>>.

<sup>165</sup> The Guardian. (2013). Jeep crash in China's Tiananmen Square leaves five dead. [online]. Available at: <<https://www.theguardian.com/world/2013/oct/28/china-tiananmen-square-crash-beijing>>.

symbolic significance as it took place meters from the giant portrait of Chairman Mao Zedong that hangs outside the main entrance to the Forbidden City in the heart of Beijing. On the west side of the square stands the Great Hall of the People, where a meeting of the plenary session of the Chinese Communist Party was planned”<sup>166</sup>. The attack was later praised on a video recorded by the Turkistan Islamic Party, an Islamic terrorist and separatist movement with links to Al-Qaida<sup>167</sup>, which promises more attacks in the future, threat that was reassured with the bombings of a building of a provincial office of the Chinese Communist Party, on 6 November 2013, killing one person and injuring other eight<sup>168</sup>.

The increase of the terrorist threat in China has not meant its contemplation within their emergency alert systems. Quite the contrary, every response from the Chinese government's public security bodies has been deployed with secrecy and censorship, removing citizens and tourists from affected areas and preventing reporters (especially foreigners) from covering the incidents. As an example, the British newspaper The Guardian pointed out that, in the case of the Tiananmen Square attack that “pictures of the crash were posted online but quickly deleted by censors”<sup>169</sup> and “two reporters from AFP were detained on the scene ‘with images deleted from their digital equipment’, the newswire reported. A BBC team was also briefly detained”<sup>170</sup>.

## 14. Peru

**Disasters:** Floodings, Landslides, Earthquakes, Volcanic eruptions, Tsunamis, High tides.

Since the enactment of the Ministerial Resolution No. 173-2015/PCM in 2015, Perú has adopted the National Early Warning Network (Red Nacional de Alerta Temprana, RNAT) and implemented an Early Warning System (Sistema de Alerta Temprana, SAT). This Resolution was adopted within the framework of the Law No. 29.664, which creates the National Disaster Risk Management System (Sistema Nacional de Gestión de Riesgos y Desastres, SINAGERD); created as part of the institution for emergencies, the National Institute of Civil Defense (Instituto Nacional de Defensa Civil, INDECI), a public institution that depends on the Ministry of Defense and whose job is to seek an optimal response from society in the event of disasters. INDECI has, within its legally recognized powers, to “develop the guidelines for the development of technical instruments that public entities can use for the planning, organizations, implementation and monitoring of the actions of preparations, response and rehabilitation”<sup>171</sup>.

The legal framework is defined by the Supreme Decree No. 048-2011/PCM, which establishes the Regulations for the Law No. 29.664, and order that the emergency preparedness actions consists on the “establishment and operation of the national early warning and management network of resources”<sup>172</sup>.

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<sup>166</sup> Gohel, Sajjan M. (2014). *The ‘Seventh Stage’ of Terrorism in China*. In: CTC Sentinel. Vol. 7. (11): p. 6. Available at: <<https://ctc.usma.edu/app/uploads/2014/12/CTCSentinel-Vol7Iss117.pdf>>

<sup>167</sup> The Guardian. (2013). *Islamist group claims responsibility for attack on China's Tiananmen Square*. [online]. Available at: <<https://www.theguardian.com/world/2013/nov/25/islamist-china-tiananmen-beijing-attack>>.

<sup>168</sup> The Guardian. (2013). *Series of deadly explosions outside Communist party office in China*. [online]. Available at: <<https://www.theguardian.com/world/2013/nov/06/explosions-china-communist-party-office>>.

<sup>169</sup> The Guardian. (2013). *Jeep crash in China's Tiananmen Square leaves five dead*. [online]. Available at: <<https://www.theguardian.com/world/2013/oct/28/china-tiananmen-square-crash-beijing>>.

<sup>170</sup> The Guardian. (2013). *Jeep crash in China's Tiananmen Square leaves five dead*. [online]. Available at: <<https://www.theguardian.com/world/2013/oct/28/china-tiananmen-square-crash-beijing>>.

<sup>171</sup> Law No. 29,664. Article 13(E).

<sup>172</sup> Supreme Decree No. 048-2011-PCM. Articles 29 and 30 numeral 30.5.

The legislative and regulatory landscape establishes the administration and coordination of the RNAT and the SAT are obligations for the INDECI. To this end, INDECI developed the *Guidelines for the Formation and Functioning of the National Early Warning Network–RNAT and the Formation, Operation and Strengthening of Early Warning Systems–SAT*, which were approved by the Ministerial Resolution No. 173-2015/PCM. In the Guidelines, the RNAT is defined as an “articulated organization of communal, district, provincial, regional and national early warning systems”<sup>173</sup>, having to consider four components: Knowledge and ongoing surveillance and in real-time risks; monitoring and alerting them; mechanisms to disseminate and communicate the proximity of a hazard through alerts and alarms; and building responsiveness through activities and exercises developed by the population<sup>174</sup>.

The Early Warning System is defined by the INDECI as “the set of capabilities, instruments and procedures articulated for the purpose of monitoring, processing and systematizing information on foreseeable hazards in a specific area (...) to disseminate and alert the authorities and the population”<sup>175</sup>. About the technology used by the SAT, the Guidelines only states that the use of multiple communication channels should be “promoted to ensure that the alert reaches the greatest number of people at risk”<sup>176</sup>. In this sense, technological flexibility for the spread of disaster alarms is privileged<sup>177</sup>.

## 15. Republic of Korea

**Disasters:** Typhoons, Heavy Snowfall, Landslides, Storms, Rains, Droughts, Sandstorms, Earthquakes, Wildfires, Building Collapsing, Terrorism, Pollution, Missile Attacks, Military Attacks.

South Korea its located in the southern Korean Peninsula, and surrounded by the Yellow Sea and the Sea of Japan. The most frequent natural disaster in Korea are the typhoons, which are present between the months of July to September (summer and fall), and also suffers from heavy snowfall, landslides, storms, rains, drought, sandstorms, earthquakes, wildfires, as natural disasters, and building collapsing, terrorism, pollution, missile attacks and military attacks of North Korea as human-made disasters.<sup>178</sup>

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<sup>173</sup> Instituto Nacional de Defensa Civil (INDECI). Guidelines for the Formation and Operation of the National Early Warning Network–*Lineamiento para la conformación y funcionamiento de la red nacional de alerta temprana – RNAT* and the Formation, Operation and Strengthening of Early Warning Systems–*y la conformación, funcionamiento y fortalecimiento de los Sistemas de Alerta Temprana – SAT*: p. 2. Available at: <<https://www.indeci.gob.pe/wp-content/uploads/2019/01/201705101219311.pdf>>.

<sup>174</sup> Instituto Nacional de Defensa Civil (INDECI). Guidelines for the Formation and Operation of the National Early Warning Network–*Lineamiento para la conformación y funcionamiento de la red nacional de alerta temprana – RNAT* and the Formation, Operation and Strengthening of Early Warning Systems–*y la conformación, funcionamiento y fortalecimiento de los Sistemas de Alerta Temprana – SAT*: p. 2. Available at: <<https://www.indeci.gob.pe/wp-content/uploads/2019/01/201705101219311.pdf>>.

<sup>175</sup> National Institute of Civil Defense (INDECI). Instituto Nacional de Defensa Civil (INDECI). *Lineamiento para la conformación y funcionamiento de la red nacional de alerta temprana – RNAT y la conformación, funcionamiento y fortalecimiento de los Sistemas de Alerta Temprana – SAT*: p. 4. Available at: <<https://www.indeci.gob.pe/wp-content/uploads/2019/01/201705101219311.pdf>>.

<sup>176</sup> Instituto Nacional de Defensa Civil del Perú [INDECI]. (2019). *Lineamiento para la conformación y funcionamiento de la red nacional de alerta temprana – RNAT y la conformación, funcionamiento y fortalecimiento de los Sistemas de Alerta Temprana – SAT*: p. 7. Available at: <<https://www.indeci.gob.pe/wp-content/uploads/2019/01/201705101219311.pdf>>.

<sup>177</sup> Instituto Nacional de Defensa Civil del Perú [INDECI]. (2018). *Implementación de SAT*. [online]. Available at: <<https://www.indeci.gob.pe/preparacion/sat/implementacion-de-sat/>>.

<sup>178</sup> Kyoo-Man Ha and Sang-Hyun Park (2012) "Rapid Evolution of Emergency Management Culture: The Case of South Korea" in *Administration & Society* 46(3): 318-335. DOI: 10.1177/0095399712454114. Available at: <[https://www.researchgate.net/publication/274983285\\_Rapid\\_Evolution\\_of\\_Emergency\\_Management\\_Culture\\_The\\_Case\\_of\\_South\\_Korea](https://www.researchgate.net/publication/274983285_Rapid_Evolution_of_Emergency_Management_Culture_The_Case_of_South_Korea)>

According to Ha and Park<sup>179</sup>, the Koreans historically didn't have a sense of the importance about management disaster, and it wasn't until the first decade of this century that the government start worrying about this matter. Since the Era of the Three Kingdoms (500 B.C), the main preoccupation of the Koreans were the fires, natural or human provoked, because they were a menace to the raisings city of the peninsula. The rest of the disaster was considered an act of God, and it only needs to accept the consequences of it.

The legal framework for disasters is:

1. Civil Defense Basic Act of 1975, enacted to protect the population of terrorism or outside attacks
2. Natural Disaster Counter-Measure Act of 1995, for disaster management of natural disasters, was related with older "Disaster and Relief Act" and "Flood with Typhoon Counter-Measure Act.
3. The Emergency Management Act was also enacted in 1995, for protection of human-made disasters and passed after combining aspects of the "Architecture Act" and the "Firefighting Act." In this Act, passed after the Sampoong Department Store collapse, the government stipulated that every building should construct by earthquake-proof technology. However, they couldn't do anything to regulate the previously constructed buildings and resulted from the fact that the Koreans constructed their buildings by using growth-oriented technology under the culture of emergency numbness.
4. The Emergency and Safety Management Basic Act enacted in 2004, for comprehensively manage natural disasters, human-made emergencies, and "social disasters" such as cyberattacks, critical infrastructure and fast-spreading diseases (like influenzas). The first article of this acts estates: "The purpose of this Act is to establish disaster and safety control systems of the State and local governments, and to prescribe matters necessary for the disaster prevention, preparedness, response and recovery, activities for safety culture and disaster and safety control, in order to preserve national land against various disasters and to protect citizens' lives, bodies and property." This law passed after the big disasters that hit the peninsula in the first decade of the century, "In 2003, the same year typhoon Maemi struck, an insane man threw two gasoline bottles into the subway train in Daegu to express his anger at society. A total of 192 people choked or burned to death. The government enacted the Basic Act of Emergency and Safety Management. In 2007, oil was spilt from the oil tanker Hebei Spirit around the Taeon peninsula. Many volunteers took part in mopping up the oil. In short, with these three major emergencies, Koreans became aware of emergency situations much more than ever before (Committee of Daegu Subway Fire, 2011)"<sup>180</sup>.

In 2004 the National Emergency Management Agency (NEMA) was created by the South Korean Government for disaster management, and worked under the administration of Ministry of Public Administration and Security (MOPAS), until 2013 when the Ministry of Public Safety and Security (MPSS) was founded at the same day on the incident of the MV Sewol ferry disaster, and developed the "Master Plan for Safety Innovation" who standardized the framework for disaster management.<sup>181</sup>

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<sup>179</sup> Kyoo-Man Ha and Sang-Hyun Park (2012) "Rapid Evolution of Emergency Management Culture: The Case of South Korea" in *Administration & Society* 46(3): 318-335. DOI: 10.1177/0095399712454114. Available at: <[https://www.researchgate.net/publication/274983285\\_Rapid\\_Evolution\\_of\\_Emergency\\_Management\\_Culture\\_The\\_Case\\_of\\_South\\_Korea](https://www.researchgate.net/publication/274983285_Rapid_Evolution_of_Emergency_Management_Culture_The_Case_of_South_Korea)>

<sup>180</sup> Kyoo-Man Ha and Sang-Hyun Park (2012) "Rapid Evolution of Emergency Management Culture: The Case of South Korea" in *Administration & Society* 46(3): 318-335. DOI: 10.1177/0095399712454114. P. 325. Available at: <[https://www.researchgate.net/publication/274983285\\_Rapid\\_Evolution\\_of\\_Emergency\\_Management\\_Culture\\_The\\_Case\\_of\\_South\\_Korea](https://www.researchgate.net/publication/274983285_Rapid_Evolution_of_Emergency_Management_Culture_The_Case_of_South_Korea)>

<sup>181</sup> Ministry of the Interior and Safety of the Republic of Korea, official site. [online] Available at: <<https://www.mois.go.kr/eng/a01/engMain.do>> [consultation date: 26 July 2019].

In July 2017, the MPSS was dissolved and replaced for the Ministry of the Interior and Safety. This Ministry launched the Safety e-Report system in 2014 and enables citizens to easily report risk situations through the homepage ([www.safetyreport.go.kr](http://www.safetyreport.go.kr)) or smartphone App. People can report safety threats anytime and anywhere, enabling the government to react promptly to secure public safety from disasters, accidents, and dangers.

Also, in 2014, South Korea observed that the economy required a unified public safety network, the Disaster and Safety Communications Network or Korea Safe-Net. This system is working over the Long-Term Evolution (PS-LTE) Public Protection and Disaster Recovery (PPDR) network frequency band as 718 – 728 MHz uplink and 773 – 783 MHz downlink. This is band 28, which is the standard frequency for the Asia-Pacific Telecommunity (APT) band plan known as APT-700.

According to the official information, the Korea Safe Net is an "essential communication system enables policemen, firefighters, and other groups of public officials to communicate and promptly support rescue efforts using dedicated terminals both in normal times and emergencies. It is a single communication network on a national scale supporting one channel of command and control, and integrated response at disaster sites. It adopts fourth-generation wireless technologies for Disaster and Safety management, making available real-time feeds of accident and/or risk sites in real time for quick and efficient response."<sup>182</sup>

The Korea Safe-Net pilot was set to launch in Gangwon Province because PyeongChang was elected in 2011 as the host city for the Olympic Winter Games of 2018. Between 2016-2017, the system expanded to 9 Provinces and, finally in 2018 to reach nationwide, adding functionality in Seoul, Gyeonggi and other six Metropolitan Cities. This system successfully alerts of the Pohang earthquake of 2017 and the Paju Wildfire of February 2018. Also, the government developed the "Emergency Ready App" for smartphones, a mobile application whose provide 125 types to alert in Korean, Chinese, and English. This system is still developing and expanding through South Korea in the present day<sup>183</sup>.

## 16. The Russian Federation

**Disasters:** Floodings, Earthquakes, Hurricanes, Tornadoes, Storms, Heavy Rain, Heavy Snowfall, Blizzards, Landslides.

At the institutional level, the call to address emergencies that may be triggered on Russian territory is the Ministry of Civil Defense, Emergencies and Elimination of Natural Disaster Consequences, or better known simply as the Ministry of Emergencies. Its main tasks relate to the development, implementation and control of public policies aimed at civil defense against natural and/or man-made disasters; in addition to deploying technological and human resources for containment of the disaster

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<sup>182</sup> Ministry of the Interior and Safety of the Republic of Korea, "Disaster and Safety Communications Network (Korea Safe-net)," Official site [online]. Available at: <<https://www.mois.go.kr/eng/sub/a03/bestPractices7/screen.do>> [consultation date: 26 July 2019].

<sup>183</sup> Jinhong Sim, Korea Safe-Net Based on ICT, The Ministry of Public Safety and Security, KOREA, APEC 10th Emergency Preparedness Working Group Meeting, Lima, Perú, 15-16 August 2016, [PDF]. Available at: <<https://www.apec-epwg.org/public/uploadfile/act/ee519d6b5f21c15aaf7044507fba62ee.pdf>>

and the distribution of necessary humanitarian aid, both inside and outside the territory of the Russian Federation<sup>184 185 186</sup>.

In 1994 the Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM)<sup>187</sup> was created by decree of the President of the Russian Federation to ensure prompt and effective actions when emergencies arise, “coordinating civil emergency planning, search and rescue operations, and the evacuation process during major natural disasters and technological emergencies”<sup>188</sup>. EMERCOM work with the Governmental Commission on Prevention and Elimination of Emergencies and for Ensuring of Fire Safety, created in 2003, and is the coordinating body for joint activities of the executive bodies, NGO’s, state policy in emergency management and technological characters and international agency. Since 2006, EMERCOM is the controller of the Public Counsel, a permanent advisory body of public control. In 2010, EMERCOM cooperates in the document “Fundamentals of the Unified State Policy in the Field of Civil Defense for the Period up to 2010”, setting the foundation for the jurisdiction of civil defense in the new political and socioeconomic conditions, defining objectives and directions and to implement this policy.

Within these competences and functions, and after the floods that were recorded in the city of Krymsk, southern Russia and that resulted in the deaths of some 170 people, in July 2012; emergency alert. As of 1 January 2014, the Russian news agency Sputnik reported that the Russian emergency system was fully operational in 39 of 83 Russian regions, while in 40 of these it was almost ready and in the remaining 4 work was not yet completed the work was not yet completed<sup>189</sup>.

Russia’s legal framework for disaster management its based in the “On Protection of Population and Territories from Natural and Man-Made Emergencies” Law and the “On Emergency and Rescue Services and Status of Rescuers” Law, both enacted in 1995; “On community and area protection against natural and technological disasters” of 1994; Federal Decree of 1996 “EMERCOM Agency for Support and Coordination of Russian Participation in International Humanitarian Operations”, “On Protecting the Population and Territories from Emergency Situations” of 1994, and the “On Emergency-Rescue Services and Status of Rescue Personnel” enacted in 2003.

The administration of the Russian emergency alert system is the responsibility of the National Crisis Management Center<sup>190</sup>. *“All-Russian comprehensive system for information and warning of the population in crowded places (OKSION) was created 2006 and has been set up. 114 Systems have been installed to inform and warn populations in Moscow, St Petersburg, Rostov-on-Don and Pyatigorsk. There is also a mobile system for warning in operation. The warning system will be installed in subways, at stations, on streets and in supermarkets. Large plasma screens will broadcast the necessary information about emergencies which may occur, and inform people on how to behave and how to render first aid to those injured”*.<sup>191</sup>

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<sup>184</sup> In this regard, review: EMERCOM of Russia. Main tasks of the Emergencies Ministry of Russia. [online]. Available at: <[http://en.mchs.ru/ministry/tasks\\_functions/tasks](http://en.mchs.ru/ministry/tasks_functions/tasks)>. [consultation date: 15 July 2019].

<sup>185</sup> In this regard, review: EMERCOM of Russia. Competencies of Emergencies Ministry of Russia. [online]. Available at: <[http://en.mchs.ru/ministry/tasks\\_functions/competencies](http://en.mchs.ru/ministry/tasks_functions/competencies)>. [consultation date: 15 July 2019].

<sup>186</sup> In this regard, review: EMERCOM of Russia. Main functions of the Emergencies Ministry of Russia. [online]. Available at: <[http://en.mchs.ru/ministry/tasks\\_functions/functions](http://en.mchs.ru/ministry/tasks_functions/functions)>. [consultation date: 15 July 2019].

<sup>187</sup> UN, Office for Disaster Risk Reduction, Russian Federation [online]. Available at: <<https://www.unisdr.org/partners/countries/rus>>

<sup>188</sup> Roffey, Roger (2016). Russia’s EMERCOM: Managing emergencies and political credibility. Försvarsdepartementet, 2016: p. 15. Available at: <<https://www.foi.se/rest-api/report/FOI-R--4269--SE>>

<sup>189</sup> Sputnik News (2014) ‘Russia introduces new Emergency Alert System, via Sputnik’, in Sputnik News [online], 1 January 2014. Available at: <<https://sputniknews.com/russia/20140101186147650-Russia-Introduces-New-Emergency-Alert-System>>

<sup>190</sup> Information provided in the website of EMERCOM of Russia in section National Crisis Management Centre. Available at: <<http://en.mchs.ru/additional/forces/ncms>>

<sup>191</sup> Roffey, Roger (2016). Russia’s EMERCOM: Managing emergencies and political credibility. Försvarsdepartementet, 2016: p. 33. Available at: <<https://www.foi.se/rest-api/report/FOI-R--4269--SE>>



## 17. Singapore

**Disasters:** Earthquakes, Floods, Pollution, Volcanic eruptions, Tornados, Cyclones, Tsunamis, Hurricanes.

In Singapore the emergency preparedness programs and disaster management system are regulated by several laws, some of the main legislations are the following:

- The Civil Defense Act 1986: This Act provides the legal framework for the declaration of a state of emergency and the deployment of operationally ready national service rescuers to support the Singapore Civil Defense Force (SCDF).<sup>192</sup>
- The Fire Safety Act 1993: This Act provides the legal framework to impose fire safety requirements on commercial and industrial premises as well as the involvement of the management and owners of such premises in emergency preparedness against fires.<sup>193</sup>
- Civil Defense Shelter Act 1997: which provides the legal framework for buildings to be provided with civil defense shelters for use by persons to take refuge during a state of emergency.<sup>194</sup>
- Infectious Disease Act: This act provides provisions for and deals with the prevention and control of infectious diseases.<sup>195</sup>
- National Tsunami Response Plan: The National Tsunami Response plan serves as a multiagency government effort comprising of an early warning system, tsunami mitigation and emergency response plans, and public education.<sup>196</sup>

Singapore has established a national Framework policy that operates in peacetime and in times of emergency, which is known as the '*Whole-of-Government Integrated Risk Management*' (WOG-IRM) Policy Framework.<sup>197</sup> This is a cross-ministerial policy framework for disaster risk reduction and disaster management, that seeks to improve risk awareness at multiple levels, it incorporates medical response systems during emergencies, mass fatality management, risk reduction legislation for fire safety and hazardous materials, police operations, information and media management during crises, and public private partnerships in emergency preparedness.<sup>198</sup>

During peacetime operations there are four fundamental agencies at the central government level that that are part of the home team:

- The Strategic Planning Office: It provides management and guidelines as the principal platform to direct and evaluate the overall development of the WOG-IRM framework. For the

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<sup>192</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 3. Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>193</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": pp. 3-4. Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>194</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 4. Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>195</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 34. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>196</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 34. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>197</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 33. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>198</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 33. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

period of peacetime, the Strategic Planning Office assembles meetings four times a year for the permanent secretaries from the various ministries across government.<sup>199</sup>

- The Home front Crisis Ministerial Committee (HCMC): In a crisis it provides a ‘ministerial committee’ accountable for all crisis situations in Singapore.<sup>200</sup> In the WOG-IRM framework, the HCMC is headed by the Ministry of Home Affairs (MHA). In peacetime, MHA is the primary policy-making governmental body for safety and security in Singapore. In the occurrence of a national disaster, the MHA leads at the strategic level of incident management. The incident management system in Singapore is identified as the Home front Crisis Management System (HCMS). Under the HCMS, the SCDF is appointed as the Incident Manager, taking responsibility of managing the effects of disasters and civil emergencies. HCMC oversight includes an administrative group known as the Homefront Crisis Executive Group (HCEG), which is chaired by the Permanent Secretary for MHA. The HCEG is in charge of planning and managing all categories of disasters in Singapore. Within operations, there are various functional inter-agency crisis management groups with detailed duties, unified by the various governmental crisis management units. At the tactical layer, there are the crisis and incident managers who oversee service delivery and coordination. The Singapore government holds appropriate ministries responsible in accordance to the nature and scope of the disaster.<sup>201</sup>
- The National Security Coordination Secretariat (NSCS): it is a unit under the Prime Minister’s Office responsible for national security planning and coordination. It works with agencies and stakeholders to develop, coordinate and implement Singapore’s strategies to address national security concerns. NSCS also works with agencies to anticipate and identify emergent security risks, and to build up capabilities and resources to deal with these.<sup>202</sup>
- The Ministry of Finance: it works at the policy layer.<sup>203</sup>

The National Disaster Management Agency the MHA is the primary policy and governing authority responsible for civil defense emergency preparedness and disaster management in Singapore.<sup>204</sup> It oversees two emergency agencies, which are responsible for planning, coordination, and the implementation of disaster risk reduction programs and activities<sup>205</sup>:

- The Singapore Civil Defense Force (SCDF): is the primary agency for the implementation of disaster management activities, its primary responsibilities include emergency response, fire safety enforcement, public protection, and community engagement.<sup>206</sup>

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<sup>199</sup> Lai, Allen and Seck Tan (2012), ‘Impact of Disasters and Disasters Risk Management in Singapore: A Case Study of Singapore’s Experience in Fighting the SARS Epidemic’, in Sawada, Y. and S. Oum (eds.), *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses*. ERIA Research Project Report 2011-8, Jakarta: ERIA: p.470. Available at <[http://www.eria.org/Chapter\\_13.pdf](http://www.eria.org/Chapter_13.pdf)>

<sup>200</sup> Lai, Allen and Seck Tan (2012), ‘Impact of Disasters and Disasters Risk Management in Singapore: A Case Study of Singapore’s Experience in Fighting the SARS Epidemic’, in Sawada, Y. and S. Oum (eds.), *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses*. ERIA Research Project Report 2011-8, Jakarta: ERIA: p.470. Available at <[http://www.eria.org/Chapter\\_13.pdf](http://www.eria.org/Chapter_13.pdf)>

<sup>201</sup> Lai, Allen and Seck Tan (2012), ‘Impact of Disasters and Disasters Risk Management in Singapore: A Case Study of Singapore’s Experience in Fighting the SARS Epidemic’, in Sawada, Y. and S. Oum (eds.), *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses*. ERIA Research Project Report 2011-8, Jakarta: ERIA: p.470. Available at <[http://www.eria.org/Chapter\\_13.pdf](http://www.eria.org/Chapter_13.pdf)>

<sup>202</sup> Information available at <<https://www.nscs.gov.sg/>>

<sup>203</sup> Lai, Allen and Seck Tan (2012), ‘Impact of Disasters and Disasters Risk Management in Singapore: A Case Study of Singapore’s Experience in Fighting the SARS Epidemic’, in Sawada, Y. and S. Oum (eds.), *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses*. ERIA Research Project Report 2011-8, Jakarta: ERIA: p.470. Available at <[http://www.eria.org/Chapter\\_13.pdf](http://www.eria.org/Chapter_13.pdf)>

<sup>204</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 34. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>205</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 34. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>206</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: pp. 34-35. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

- The SCDF also has an elite rescue team, the Disaster Assistance and Rescue Team (DART), to carry out complex rescue operations, including tunneling, Mass Rapid Transport rescue and high-rise rescue. DART is outfitted with state-of-the-art equipment, such as the robots, search cameras, fiber-optical scopes, thermal imaging cameras, trapped persons locator, as well as rescue dogs.<sup>207</sup>
- The Singapore Police Force: The Singapore Police Force is responsible for the security, investigation and traffic management as well as coordination matters.<sup>208</sup>

During the management of disasters, the SCDF and the Singapore Police Force are supported by additional government agencies<sup>209</sup>:

- The Ministry of Community Development is responsible for management of the homeless in respite facilities.
- The Ministry of Information and The Arts coordinates media relations and public information.
- The Ministry of Environment is responsible for removal of the deceased and debris disposal.
- The Public Works Department provides guidance on engineering and structural safety.
- The Public Utilities agencies are responsible for cutting power to affected areas, the diversion of power, gas and water supplies to facilitate the fire-fighting and rescue operations, and for the restoration of all utilities in the aftermath of a disaster.

In case of public health emergencies, the Ministry of Health (MoH) is the primary agency for the implementation of disaster management activities.<sup>210</sup> There are other relevant lead agencies:

- Ministry of Communication and Information
- National Environment Agency (NEA)

In the event of a major disaster the activities undertaken by Singapore are based on the following main principles<sup>211</sup>:

- a) Prevention: The tragic consequences resulting from major incidents can be minimized through prevention, via a set of comprehensive government regulations to ensure safety.<sup>212</sup>
- b) Readiness: Readiness is contingent upon preparation. Pre-planning for possible response to different forms of emergencies enhances readiness. The contingency plans are exercised regularly;<sup>213</sup>
- c) Awareness: The community must be aware of the nature and scope of disasters. They have to be educated on the importance of emergency preparedness and involvement in exercises, training and physical preparations;<sup>214</sup>

<sup>207</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 35. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>208</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 35. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>209</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 35. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>210</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2017) *Singapore Disaster Management Reference Handbook*, May 2017: p. 34. Available at <<https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h-cuJACKEA8%3D&portalid=0>>

<sup>211</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 5-6 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>212</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 5 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>213</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 5 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>214</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 5 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

- d) Coordination (Internal & External): All local agencies responding to an emergency must work within a unified framework to coordinate multi-agency efforts in emergency response and management of disasters. This will involve swift deployment of forces to mitigate the incident at the tactical level, and to provide expert advice at the operational level, in order to minimize damage to lives and property; and<sup>215</sup>
- e) Recovery: Rehabilitation of the injured and restoration work is an important component of the total disaster management program. A speedy recovery will enable the affected population to return to near-normal conditions after a disaster.<sup>216</sup>

Finally, regarding the Government Disaster Response plan Singapore has developed the Operations Civil Emergency (Ops CE) Plan, a national response plan for civil emergencies which outlines the work of SCDF and all the related agencies in the management of a major disaster. According to the Ops CE the SCDF is overall-in-charge of the multi-agency response, and it direct and coordinate the agencies' responses through the Joint Planning Staff (JPS) who provide specialist advice to manage the incident.<sup>217</sup>

## 18. Thailand

**Disasters:** Floodings, Heavy Rainy, Earthquakes, Tsunamis.

The legal framework in this matter is given by the Disaster Prevention and Mitigation Act B.E.2550, of 2007. This law created both the National Disaster Prevention and Mitigation Committee (NDPMC), an inter-agency committee formed by the authorities indicated in Section 6 of the law; and the Department of Disaster Prevention and Mitigation (DDPM), "the central government unit [responsible of] operate any related activities on national disaster prevention and mitigation"<sup>218</sup>. The DDPM works as a part of the Ministry of Interior.

The DDPM operates, like any centralized agency, delegating certain functions to representatives at a provincial level, who in their turn are responsible for implementing Provincial Disaster Prevention and Mitigation Plans in their respective territories<sup>219</sup>. And by mandate of the law, these provincial plans must contemplate the implementation of an early warning system<sup>220</sup>.

The early warning system that has been adopted in Thailand consists of the installation of 268 warning towers that receive information from the DDPM and warn the population by sound alarms. The information is also sent to the media and delivered to certain web pages, so that they can

<sup>215</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 5-6 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>216</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 6 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>217</sup> Asian Disaster Reduction Center (2006) "Republic of Singapore. Country Report on Disaster Reduction Measures": p. 6 Available at: <<https://www.adrc.asia/countryreport/SGP/2005/english.pdf>>

<sup>218</sup> Section 11 of the Disaster Prevention and Mitigation Act B.E.2550. Available at: <[http://thailaws.com/law/t\\_laws/tlaw0397.pdf](http://thailaws.com/law/t_laws/tlaw0397.pdf)>

<sup>219</sup> Section 15 (1) of the Disaster Prevention and Mitigation Act B.E.2550. [on-line]. Available at: <[http://thailaws.com/law/t\\_laws/tlaw0397.pdf](http://thailaws.com/law/t_laws/tlaw0397.pdf)>

<sup>220</sup> Section 16 (3) of the Disaster Prevention and Mitigation Act B.E.2550. [on-line]. Available at: <[http://thailaws.com/law/t\\_laws/tlaw0397.pdf](http://thailaws.com/law/t_laws/tlaw0397.pdf)>

distribute it to the population<sup>221</sup>. The issue of an early warning is validated with “data and information confirming that probability of disaster occurrence has increased by more than sixty percent”<sup>222</sup>.

## 19. The Republic of the Philippines

**Disasters:** Floods, Landslides, Typhoon, Tropical Cyclones, Earthquakes, Volcanic eruptions.

In the Philippines, the Philippine National Disaster Risk Reduction and Management Act 2010 (DRRM Act 2010 or Republic Act No. 10121) establishes a multilevel disaster risk management system<sup>223</sup>. The Act establishes the National Disaster Risk Reduction & Management Council (NDRRMC), a coordinated agency that reunites a number of government agencies with the idea of coordinating their response and preparedness of natural and human made disasters. The NDRRMC is the peak policy-making body for coordination, integration, supervision, monitoring and evaluation,<sup>224</sup>. The administers the national civil defense and disaster risk reduction and management program<sup>225</sup>. The DRRM Act 2010 is accompanied by a set of “Implementing Rules and Regulations” that lists the powers and functions of the National, Regional and Local Disaster Risk Reduction and Management Councils (DRRMCs), as well as provisions for installing Local Disaster Risk Reduction and Management Offices (LDRRMOs)<sup>226</sup>.

The Philippines issued in 2011 the National Disaster Risk Reduction and Management Framework, which explains the member economy government commitments into priority programs, projects, and budgets and is integrated into the Philippines National Disaster Risk Reduction Plan 2011-2028 (NDRRP), which outlines key planning aspects such as timelines, lead agencies, outcomes and activities according to four thematic areas<sup>227</sup>:

1. Disaster prevention and mitigation
2. Disaster preparedness
3. Disaster response
4. Disaster rehabilitation and recovery.

The NDRRMP fulfills the requirement of DRRM Act 2010, which provides the legal basis for policies, plans and programs to deal with disasters. The NDRRP also outlines provisions for developing and

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<sup>221</sup> Baimoung, Somchai (2007) ‘The National Natural Disasters Warning Plan of Thailand’, in United Nations/Austria/European Space Agency Symposium on “Space Tools and Solutions for Monitoring the Atmosphere in Support of Sustainable Development” Graz, Austria, 11 to 14 September 2007: p. 48 and 50. Available at: <[http://www.unoosa.org/documents/pdf/psa/activities/2007/graz/presentations/07\\_05.pdf](http://www.unoosa.org/documents/pdf/psa/activities/2007/graz/presentations/07_05.pdf)>

<sup>222</sup> National Disaster Risk Management Plan (2015). [on-line]. Available at: <[http://www.disaster.go.th/upload/download/file\\_attach/584115d64fcee.pdf](http://www.disaster.go.th/upload/download/file_attach/584115d64fcee.pdf)> p. 69.

<sup>223</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 33. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>224</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 33. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>225</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 33. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>226</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 33. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>227</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 33. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

implementing disaster risk reduction plans at the regional, provincial, city, municipal and barangay levels<sup>228</sup>.

Another relevant plans about Disaster Management are:

- The Strategic National Action Plan (SNAP) 2009-2019, which attempts to strengthen disaster risk reduction and outlines 18 priority programs and projects based on 150 strategic actions<sup>229</sup>, including the upgrading of the forecasting capability of warning agencies; intensification of public information and education campaign on disaster preparedness; enhancing capacity building of local chief executives and disaster coordinating councils; and strengthening mechanisms for government and private sector partnerships<sup>230</sup>.
- The Philippines has the National Disaster Response Plan for Hydrometeorological Hazards which outlines the processes and mechanisms for national, regional and local disaster response, focusing on hydrometeorological hazards including typhoons, tropical storms and flooding. This plan outlines the role of the Armed Forces of the Philippines (AFP), who directs the Search, Rescue and Retrieval (SRR) cluster<sup>231</sup>.
- The National Disaster Response Plan for Earthquake and Tsunami: This plan provides response assistance for managing earthquakes and tsunamis<sup>232</sup>.
- Armed Forces Humanitarian Assistance and Disaster Response Plan: This plan outlines core functions and operational processes and systems to be used by the AFP in Humanitarian Assistance and Disaster Relief (HADR) operations<sup>233</sup>.
- Metro Manila Earthquake Contingency Plan (Oplan Metro Yakal Plus): This plan aims to prepare for earthquake disaster preparedness response of the MMDRRMC and its partners by defining roles and responsibilities that are carried out before, during, and after a strong earthquake<sup>234</sup>.
- AFP Earthquake Preparedness and Response Plan “PAGLIGTAS” for Metro Manila: The role of the AFP is to conduct search and rescue operations, support operations, and other humanitarian assistance activities. The Plan also established that the AFP will conduct stability and security operations in support to the Philippine police if needed. The AFP with its capabilities and assets, can provide support to the NDRRMC through Unified Commands and Joint Task Force<sup>235</sup>.
- CBRN National Action Plan: The Philippines has a national Chemical, Biological, Radiological, and Nuclear (CBRN) Action Plan. This plan unifies the capacity of the member economy and establishes priority actions for enhancing capabilities to predict, prevent,

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<sup>228</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>229</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>230</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>231</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>232</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>233</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>234</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>235</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

prepare for, and perform mitigating activities on CBRN incidents and disasters. The plan also sets plans for conducting post action activities<sup>236</sup>.

- Operational Guidelines on Philippine International Humanitarian Assistance Cluster: These operational guidelines for the Philippines International Humanitarian Assistance Cluster (PIHAC) contain provisions for the cluster to manage incoming international humanitarian assistance<sup>237</sup>, it is important to men.

The Office of Civil Defense (OCD) is the implementing arm of the NDRRMC, it coordinates training and capacity building, and creates, supervises and monitors the implementation of National DRRM and Civil Defense training policies, plans and programs<sup>238</sup>.

Since 2013 the United Nations International Strategy for Disaster Reduction (UNISDR) has been actively engaged through its regional and sub-regional offices and the UNISDR Global Education and Training Institute (GETI) to provide capacity development, policy advice and tailored technical assistance to national and local governments<sup>239</sup>.

In the Philippines are three services for disaster information, mitigation, and management as Early Warning Systems:

- The Climate Experiment Project: software that calculates the percent chance of rain (PCOR) or probability of rain using infrared and water vapor satellite image data, and Doppler Radar data in combination with statistical evaluation of historical rainfall<sup>240</sup>.
- Nationwide Operational Assessment of Hazards (NOAH): service that aims to increase awareness for disaster risk and involves preparedness and reducing the catastrophic impacts of extreme hazard events. NOAH can mitigate disasters such as floods, typhoons, and landslides by providing information about bad weather through their website and free mobile phone application. The application provides information on rainfall in real time on water levels, rainfall, and humidity in 200 areas in the Philippines. The government has installed sensors, rain gauges, and weather monitoring systems in various areas. In addition, people can access Tweets sent out via Twitter via cell phones from the Philippines weather bureau, or the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA)<sup>241</sup>.
- Philippine Geoportal: advocates the use of standard multiscale base maps that serve as tools for strategic planning, decision making, situational analysis and other common requirements<sup>242</sup>.

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<sup>236</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>237</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 34 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>238</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 35 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>239</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 35 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>240</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 35 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>241</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 35 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>242</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 35 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

The Flood-prone towns receive from the Department of Science and Technology (DOST) early warning devices composed of an electric siren, LED beacon, controller box, and solar panel, that alert residents in low lying areas of impending floods or flash floods and allow residents to evacuate to safer areas<sup>243</sup>.

The responsible agencies for Early Warning are:

1. DOST is the responsible for monitoring and forecasting EWS; the chair on Disaster Preparedness and Mitigation of the Regional Disaster Risk Reduction and Management Council; and brings EWS Information, Education and Communication (IEC) forums into Philippine provinces<sup>244</sup>.
2. The Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) is responsible for provide tropical cyclone warnings, flood bulletins and advisories, and various weather forecasts<sup>245</sup>.
3. The Philippine Institute of Volcanology and Seismology (PHIVOLCS) is a service institute of the DOST and is responsible for the mitigation of disasters that may arise from volcanic eruptions, earthquakes, and tsunamis<sup>246</sup>.

## 20. The United States

**Disasters:** Earthquakes, Volcanic eruptions, Landslides, Droughts, Hurricanes, Tornados, Cyclones, Extreme precipitation, Floodings, Extreme Temperatures, Wildfires, Lightning, Famines.

The most important piece of emergency legislation In the Federal Level is the “Robert T. Stafford Disaster Assistance and Emergency Assistance Act”, or better known as the Stafford Act (Public Law 100-707), which “authorizes the President to declare a disaster zone in any state or jurisdiction”<sup>247</sup>. This law was inserted into the United States Code under Title 42, Chapter 68.

Section 418 of this Act is responsible for Emergency Communications, stating that “the President is authorized during, or in anticipation of, an emergency or major disaster to establish temporary communications systems and to make such communications available to State and local government officials and other persons as he deems appropriate”<sup>248</sup>.

Concerning this matter and after the criticism to U.S. government's for responses to Hurricane Katrina, in June 2006 President George W. Bush, through Executive Order No. 13,407, ordered the Secretary of Homeland Security establish a new program to integrate and modernize the emergency systems for the population that already existed. Thus, the Integrated Public Alert and Warning System (IPAWSS) was born, which coordinates the following emergency systems:

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<sup>243</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: pp. 35-36 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>244</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 36 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>245</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 36 Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>246</sup> Center for Excellence in Disaster Management & Humanitarian Assistance (2018) *Philippines Disaster Management Reference Handbook*, March 2018: p. 36. Available at <[https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines\\_2018-0318.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf)>

<sup>247</sup> Federal Emergency Management Agency (FEMA). Your Civil Rights and Disaster Assistance: p. 1. Available at: <[https://www.fema.gov/pdf/about/divisions/disaster\\_ops/civilrights\\_fs.pdf](https://www.fema.gov/pdf/about/divisions/disaster_ops/civilrights_fs.pdf)>.

<sup>248</sup> Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 418: p. 54. Available at: <<https://www.fema.gov/media-library-data/1519395888776-af5f95a1a9237302af7e3fd5b0d07d71/StaffordAct.pdf>>.



1. Emergency Alert System (EAS): Implemented since 1 January 1997, enable the president of the United States to speak to the entire population of the member economy within 10 minutes, allowing to alert the public disasters such as tornadoes and flash floods. It is jointly coordinated by the Federal Emergency Management Agency (FEMA), the Federal Communications Commission (FCC) and the National Oceanic and Atmospheric Administration (NOAA). It worked, at first, by interrupting normal TV and radio broadcasts, delivering a message aloud with a text-to-speech system<sup>249</sup>. It currently also uses wireless text, SMS, or public signage messages.
2. National Warning System (NAWAS): Automatic telephone system used to issue warnings to local and federal governments in the U.S., as well as to civilian and military population, about an imminent enemy attack on the United States, an accidental missile attack on the United States, and any information about natural and/or technological disasters. It is fully operated and funded by FEMA.
3. Wireless Emergency Alerts (WEA): Network alert designed to disseminate emergency alerts to mobile devices such as smartphones and pagers. Three types of alerts can be broadcasted through this system, namely alerts issued by the President of the United States, alerts involving imminent threats to life, and AMBER alerts. The management of this system is delivered to the joint effort of FEMA, the Department of Homeland Security Science and Technology Directorate (DHS S&T), the Alliance for Telecommunications Industry Solutions (ATIS), and the Telecommunications Industry Association (TIA).
4. NOAA Weather Radio: Is an automated 24-hour network of VHF FM weather radio stations in the United States that broadcast weather information directly from a nearby National Weather Service office.

Besides these systems, already in place, there are mainly two bills that seek to modify the U.S. emergency communication systems:

1. H.R. 5785. To establish a unified national hazard alert system, and for other purposes<sup>250</sup>: Presented to the House of Representatives on 13 July, 2006, it seeks to create a National Voluntary Alert System to provide a public communications system capable of alerting the public on a national, regional or local scale of emergencies that require a public response.
  - i) Among the functions that this National Emergency System would have are:
    - 1) Will enable any Federal, State, tribal, or local government official with credentials issued under section 3 by the National Alert Office to alert the public to any imminent threat that presents a significant risk of injury or death to the public.
    - 2) Will coordinate with and supplement existing Federal, State, tribal, and local emergency warning and alert systems.
    - 3) Will be flexible enough in its application to allow specific alerts in circumstances where only a small geographic area is exposed or potentially exposed to a threat.
    - 4) Will transmit alerts across as many communications technologies as possible, including digital and analogue transmissions, Cable and satellite TV, satellite and terrestrial radio, wireless communications, cable communications and the internet; to reach most of the affected population.

With regard to the capabilities that should be available, the project indicates that (1) it should incorporate multiple communication technologies and be designed to incorporate technologies that appear in the future; (2) shall not interfere with existing warning systems;

<sup>249</sup> Example: [ORIGINAL] - Emergency Alert System - Tornado Warning for Knoxville, TN (March 2, 2012). Available at: <https://www.youtube.com/watch?v=bNLUP4nDJGQ>.

<sup>250</sup> H.R. 5785 – Warning, Alert and Response Network Act. [on-line]. Available at: <<https://www.congress.gov/bill/109th-congress/house-bill/5785/text>>

and (3) should not rely solely on a technology or platform, but should be designed to provide alerts to most of the affected (or potentially affected) population and improve the ability for remote areas to receive alerts.

The System would be headed and directed by the National Alert Office, established within the National Telecommunications and Information Administration; and must have official staff with a significant technical experience in the communications industry.

2. H.R.2101. To amend the Homeland Security Act of 2002 to direct the Secretary of Homeland Security to develop and implement the READICall emergency alert system<sup>251</sup>: Presented to the House of Representatives on May 04, 2005, it seeks to amend the National Security Act, adding a Section 510 in title V, ordering the Secretary of Homeland Security to, within one year of the law being implemented , and after coordination with the federal, state and local law enforcement agencies, in addition to the private sector, the implementation of a telephone notification alert system, called the “Emergency Responsive Alert and Dissemination of Information Call System”, or READICall.

The System shall be designed to (1) alert the U.S. population to events that pose a current or imminent danger, caused by terrorist acts, any other man-made disaster, or a combination of both; and (2) to provide information to individuals about appropriate measures that can be taken to alleviate or minimize the threats to their safety and well-being that such events cause.

In the development of the system, the Secretary should:

- i) To the maximum extent possible, use the networks, technology, personnel and infrastructure of the national private sector to develop and implement the system.
- ii) Develop a coordinated infrastructure for the System, in collaboration with the Assistant Secretary of Commerce for Communications and Information, the national telecommunications and teleservices industries, and other Federal, State, and local governmental agencies as may be necessary.
- iii) In developing the System, undertake a collaborative effort between the Department and other Federal agencies, State, and local domestic security agencies, and organizations of first responders.

In any case, the emergency alert systems in the USA have not been without criticism: The Emergency Alert System was never activated on the Terrorist Attacks of 11 September 2001. The chairman of the Federal Communications Commission in that era, Michael K. Powell, pointed to “the ubiquitous media environment” as a justification to not activate the EAS, arguing that the system was scooped by different news channels. Glenn Collins, journalist of The New York Times, wrote in December 2001 that “no president has ever used the current system or its technical predecessors in the last 50 years, despite the Soviet missile crisis, a presidential assassination, the Oklahoma City bombing, major earthquakes and three recent high-alert terrorist warnings”<sup>252</sup>.

## 21. Viet Nam

**Disasters:** Droughts, Earthquakes, Landslides, Wildfires, Floods, Storm surge, Typhoons, Volcanic eruptions.

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<sup>251</sup> H.R. 2101 – To amend the Homeland Security Act of 2002 to direct the Secretary of Homeland Security to develop and implement the READICall emergency alert system. Available at: <<https://www.congress.gov/109/bills/hr2101/BILLS-109hr2101ih.xml>>

<sup>252</sup> Collins, Glenn. Collins, Glenn. (2001). The Silence of the Alert System; Experts Urge Overhaul of Plan Unused Even on Sept. 11. In: The New York Times, 21 December 2001. [online]. Available at: <<https://www.nytimes.com/2001/12/21/nyregion/silence-alert-system-experts-urge-overhaul-plan-unused-even-sept-11.html?scp=1&sq=Emergency%20Alert%20System&st=cse>>.

The member economy/Vietnamese emergency management authority is the Central Steering Committee for Natural Disaster Prevention and Control, which had to work with other Ministries and People's Committees in the elaboration and implementation of emergency response and control plans. Accordingly to the Order No. 07/2013/L-CTN, or Law on Natural Disaster Prevention and Control, the Ministry of Agriculture and Rural Development have to elaborate a National Strategy on Natural Disaster Prevention and Control every 10 years, with a 20 year vision and being updated and adjusted once every 5 years or upon great changes in the situation of natural disasters<sup>253</sup>. They also elaborate a Natural Disaster Prevention and Control Plans every 5 years, with an annual adjustment<sup>254</sup>; those plans have to being elaborated on a commune, distrital, provincial, ministerial and national level<sup>255</sup>; being responsibility of people's committees and ministries the elaboration of those plans.

The law recognize that the adoption of an early warning system is part of any preventive plan of disasters, therefore, imposes to the State the obligation of build and maintain early warning stations, using advanced and modern technologies<sup>256</sup>. This is visible in the current National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020<sup>257</sup>.

About the dissemination of information and early warnings, the law establishes that the "ministries, ministerial-level agencies, government-attached agencies and provincial-level People's Committees shall, within the scope of their tasks and powers, build, manage and operate radio and television broadcasting systems, communication systems and other information transmission systems for collecting and transmitting information on natural disaster forecasts and warnings for organizations, individuals and communities"<sup>258</sup>.

The responsibility for issuing the warnings varies among government agencies, depending on the nature of the disaster: The Ministry of Natural Resources and Environment shall issue meteorological and hydrographical forecasts and warnings; and the Viet Nam Academy of Science and Technology shall issue bulletins on earthquakes and tsunami forecasts and warnings. In any case, those both agencies have to issue the forecast and warnings to both Viet Nam Television and the Voice of Viet Nam (the official radio station)<sup>259</sup>. In addition to the transmissions through the radio and official government TV, since 2016 the use of SMS is reported to send warnings activated by the corresponding governmental bodies<sup>260</sup>.

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<sup>253</sup> Article 14 (1) and (4) of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>254</sup> Article 15 of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>255</sup> Article 15 of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>256</sup> Article 20 (1) Article 15 of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>257</sup> National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. [on-line]. Available at: <[https://www.preventionweb.net/files/60654\\_vietnamnatstratfornaturaldisasterpr.pdf](https://www.preventionweb.net/files/60654_vietnamnatstratfornaturaldisasterpr.pdf)>. [consultation date: 19 July 2019]. p. 4.

<sup>258</sup> Article 21 (3 a) of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>259</sup> Article 24 (3) of the Order No. 07/2013/L-CTN, Law on Natural Disaster Prevention and Control. Available at: <[https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%2033\\_IFW.pdf](https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf)>

<sup>260</sup> Information provided by Prevention Web, Early warning system innovations in Viet Nam: SMS technology and education Available at: <<https://www.preventionweb.net/news/view/49839>>

## APEC Economies and their Emergency Management

APEC ECONOMIES	LEGAL FRAMEWORK	POLICIES, PLAN OR PROGRAMS	RESPONSIBLE INSTITUTIONS	DISASTER MANAGEMENT SYSTEMS	TYPE OF CATASTROPHES OR EMERGENCIES
<b>Australia</b>	There is no law that explicitly regulates the operation of Australian emergency agencies (except for some state-level laws, such as the Disaster and Emergency Management Act 2001, in force in the territory of Norfolk Islands), but the Australian Commonwealth Constitution imposes on the State and on territorial authorities the responsibility to protect life, property and environment within their territories	System of SMS and pre-recorded messages that is known such as Emergency Alert Australia	Department of Internal Affairs.	The Government coordinate the identification and response to an emergency, develops an appropriate message for the alert and the area of interest where it should spread, delivering the message in each mobile network operator, who in turn identifies all subscribers within that area using the mobile network and sends the message as an SMS using a special telephone number (0444 444 444).	Floods, cyclones, hailstorms, bushfires, earthquakes, drought, volcanic eruptions.

<p><b>Brunei Darussalam</b></p>	<p>Disaster Management Order (DMO) (status of law) 2006.</p>	<p>Strategic National Action Plan (SNAP) for Disaster Risk Reduction for the 2012-2025</p> <p>Association of Southeastern Asian Nations (ASEAN) Agreement of Disaster Management and Emergency Response (AADMER), Brunei's Strategic National Action Plan was based on the five priorities of the Hyogo Framework for Action (HFA)</p> <p>Incident Command System (ICS), with the cooperation of the United States Forestry Department.</p> <p>Flood and Storm Warning System</p>	<p>National Disaster Council (NDC) National Disaster Management Center (NDMC)</p> <p>Ministry of Home Affairs, the Disaster Command Center (DCC), the Brunei Darussalam Meteorological Department, and the Ministry of Communications are all agencies in Brunei that are sources of hazard and risk information and provide early warning</p> <p>Meteorological Services of the Department of Civil Aviation, Ministry of Health, Department of Agriculture and Agrifood, Marine Department, Fisheries Department, Department of Environmental and Recreation and others that have put in place policies and strategic planning to improve the management of disasters through effective early warning systems.</p>		<p>Landslides, Forest fire</p> <p>Flooding,</p>
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			Brunei Meteorological Service.		
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<b>Canada</b>	Department of Public Safety and Emergency Preparedness Act	National Public Alert System (Alert Ready)	Department of Public Safety and Emergency Preparedness (Public Safety Canada)	<p>This system consists of infrastructure and standards for the presentation and distribution of public alerts issued by government authorities, such as weather emergencies, AMBER Alerts, and other emergency notifications, by all broadcasters and last mile distributors in the affected region, including television stations, radio stations, television providers, and LTE mobile networks in the affected region; and is designed “to deliver critical alerts and possibly lifesavers to Canadians through TV, radio and compatible mobile devices.</p> <p>The system, at a technical level, is managed by Pelmorex Corp., a Canadian company that owns the private weather networks and weather information and the forecast channels The Weather Network (English-speaking) and MétéoMédia (French-speaking); the company designed what is known as the National Alert Aggregation and Dissemination (NAAD) System, a system that was approved by the CRTC and, after that approval, began working with federal, provincial and territorial authorities to make the NAAD operational. It began operating in 2010 and became the technical platform on which Alert Ready operates.</p>	Earthquakes, Floods, Hail Icebergs, sea ice, sea fog, Landslides, snow avalanches, Tornadoes, Tsunamis, storm surges, Volcanic eruptions, Winter Storms
<b>Chile</b>	<ul style="list-style-type: none"> <li>- Law No. 18,168, General Law of Telecommunications</li> <li>- Law No. 20,478, in December 2010, which amended Law No. 18,168.</li> <li>- Decree No. 60 of 2012, which creates the Emergency Alert System (Sistema de Alerta de Emergencia, SAE)</li> </ul>	Emergency Alert System	<ul style="list-style-type: none"> <li>- Telecommunications Secretariat (SUBTEL)</li> <li>- National Emergency Office, ONEMI</li> </ul>	Unified Central Platform (PCU), by the Means of Alert Detection, and by the Means of Broadcast of georeferenced alerts messages. Those broadcast means transmits alert messages, generated by the PCU, within the geographical area specified by the ONEMI”	Earthquakes, Floods, Forest Fires, Volcanic Eruptions and Tsunamis
<b>Chinese Taipei</b>	- Disaster Prevention and Protection Act (2000)	- National Science and Technology Center for Disaster Reduction, Program	<ul style="list-style-type: none"> <li>- National Science and Technology Center for Disaster Reduction (NCDR)</li> <li>- National Communications Commission (NCC)</li> </ul>	- Common Alerting Protocol (CAP)	Earthquake, Landslide, Typhoons, Floods, Debris flow, Storm surge, Pollution.

			- Ministry of Science and Technology		
<b>Hong Kong, China</b>	There is no standalone legal document on this matter, instead, the Hong Kong legislation on this issue is spread out over a number of legal instruments, subjects to constant change	<ul style="list-style-type: none"> <li>- 'Three Tier' emergency response system in order to ensure timely and appropriate responses.</li> <li>- Six contingency plans for dealing with the following events: (a) natural disasters, (b) aircraft crashes, (c) the salvage of crashed aircraft, (d) maritime and aeronautical search and rescue, (e) emergencies at the Daya Bay nuclear power stations, and (f) the coordination of emergency response operations by the Hong Kong Special Administrative Region</li> </ul>	<ul style="list-style-type: none"> <li>- Security Bureau of the Hong Kong Special Administrative Region</li> <li>- Hong Kong Observatory (HKO)</li> <li>- Information Services Department</li> </ul>	Transmit the warnings to the media and Government departments. To the public, those alerts and warnings are broadcasted through radio and television.	Heavy rain, storm surges, thunderstorms and tropical cyclones.



<p><b>Indonesia</b></p>	<ul style="list-style-type: none"> <li>- Law of the Republic of Indonesia Number 3 of 2002 on National Defence.</li> <li>- Law of the Republic of Indonesia Number 34 of 2004 Concerning the National Armed Forces.</li> <li>- Law of the Republic of Indonesia, Number 24 of 2007 Concerning Disaster Management.</li> <li>- Government Regulation Number 23 of 2008 Concerning Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management.</li> <li>- BNPB Guideline Number 22 of 2010 on the Role of the International Organizations and Foreign Non-Government Organizations during Emergency Response</li> </ul>	<ul style="list-style-type: none"> <li>- Disaster Management Strategic Policy (2015- 2019)</li> <li>- National Disaster Management Plan (2010- 2014)</li> </ul>	<ul style="list-style-type: none"> <li>- The National Disaster Management Agency.</li> <li>- The Indonesian National Armed Forces (Tentara Nasional Indonesia) (TNI) and Indonesian National Police (Kepolisian Negara Republik Indonesia) (POLRI).</li> <li>- Regional and Provincial Agencies (Badan Penanggulangan Bencana Daerah) (BPBDs).</li> <li>- Ministry of Social Welfare.</li> <li>- Ministry of Health.</li> <li>- Ministry of Defense.</li> <li>- DKI Jakarta Regional Disaster Management Agency, Badan Penanggulangan Bencana Daerah (BPBD DKI Jakarta)</li> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- Incident Command System (ICS)</li> <li>- Indonesia Tsunami Early Warning System (InaTEWS).</li> <li>- Jakarta Flood Early Warning System (FEWS)</li> </ul>	<p>Earthquake, Tsunami, Volcanic Eruptions, Floods, Drought, Landslides.</p>
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<b>Japan</b>	<ul style="list-style-type: none"> <li>- Forest Conservation and Flood Control Urgent Measures Law (1960).</li> <li>- Disaster Countermeasures Basic Act (1961).</li> <li>- Acts on Special Measures concerning disaster prevention in areas frequently struck by Typhoons (1958) or Heavy Snow (1962), then in the seventies started to establish Acts on Special Measures concerning countermeasures for: Active Volcanoes (1973), Large-Scale Earthquakes (1973) and Earthquake Disaster (1980).</li> <li>- Basic Act on Reconstruction in Response to the Great East Japan Earthquake.</li> <li>- Special Zones for Reconstruction in Response to the Great East Japan Earthquake Act.</li> </ul>	Basic Disaster Management Plan	National Disaster Management Council	Japanese Emergency Broadcast System (J-Alert)	Tsunamis, Floods, Typhoons, Earthquakes, Cyclones, Volcanic Eruptions, Hailstorms, Tornadoes, Thunderstorms.
<b>Malaysia</b>	<ul style="list-style-type: none"> <li>- NSC Directive No. 20 and Fixed Operating Regulations</li> </ul>		<ul style="list-style-type: none"> <li>- National Disaster Management Agency (NADMA)</li> <li>- Malaysian Meteorological Department.</li> </ul>	<ul style="list-style-type: none"> <li>- Early Warning System against floods</li> <li>- Tsunami Early Warning System.</li> </ul>	Floods, Landslides, Forest fire, Haze, Tsunamis, Earthquake, Cyclonic Storms, Drought.
<b>México</b>	<ul style="list-style-type: none"> <li>- General Roads of Communication Act.</li> <li>- General Law on Social Communications.</li> <li>- Federal Telecommunications and Broadcasting Act.</li> </ul>	<ul style="list-style-type: none"> <li>- Communications Reaction Plan in Emergency Situations.</li> <li>- Preliminary Draft Guidelines establishing a Common Protocol</li> </ul>	<ul style="list-style-type: none"> <li>- Instituto Federal de Telecomunicaciones, IFT</li> <li>- Directorate-General for Civil Protection of the Secretary of the Interior (DGPC-SEGOB)</li> </ul>	<ul style="list-style-type: none"> <li>- Common Alert Protocol</li> </ul>	Floods, Earthquakes, Hurricanes, and Volcanic Eruptions

		on Emergency Alerts.			
<b>New Zealand</b>	Civil Emergency Management Defense Act (2002)	No information	- National Crisis Management Center	- Emergency Mobile Alert system	Floods, cyclones, hailstorms, bushfires, earthquakes and volcanic eruptions
<b>Papua New Guinea</b>	- Disaster Management Act (1984)	- National Disaster Mitigation Policy - National Environment and Disaster Mitigation Programme	- National Environment and Disaster Mitigation Authority - Climate Change Development Authority (CCDA) - National Disaster Centre.	- Early Warning System	Earthquakes, Floods, Volcanic eruptions, Cyclones.
<b>The People's Republic of China</b>	- Emergency Response Law of the People's Republic of China (Order of the President No. 69) - State Council.	- Emergency management system	- Ministry of Emergency Management (2018)	- Early Warning System	Earthquake, Floodings, Typhoons, Terrorism
<b>Peru</b>	- Ministerial Resolution No. 173-2015/PCM - Law No. 29.664. - Ley que crea el Sistema Nacional de Gestión del Riesgo de Desastres	- National Disaster Risk Management System (Sistema Nacional de Gestión de Riesgos y Desastres, SINAGERD) - Guidelines for the Formation and Functioning of the	National Institute of Civil Defense (Instituto Nacional de Defensa Civil, INDECI)	- National Early Warning Network (Red Nacional de Alerta Temprana, RNAT) - Early Warning System (Sistema de Alerta Temprana, SAT)	Flooding, Landslides, Earthquakes, Volcanic eruptions, Tsunamis, High tides

		National Early Warning Network–RNAT and the Formation, Operation and Strengthening of Early Warning Systems–SAT			
<b>Republic of Korea</b>	<ul style="list-style-type: none"> <li>- Civil Defense Basic Act (1975)</li> <li>- The Emergency Management Act (1995)</li> <li>- Natural Disaster Counter-Measure Act (1995)</li> <li>- Emergency and Safety Management Basic Act (2004)</li> </ul>	<ul style="list-style-type: none"> <li>- Disaster and Safety Communications Network</li> <li>- Master Plan for Safety Innovation</li> </ul>	Ministry of the Interior and Safety	<ul style="list-style-type: none"> <li>- Korea Safe-Net</li> <li>- Safety e-Report</li> </ul>	Typhoons, heavy snowfall, landslides, storms, rains, drought, sandstorms, earthquakes, wildfires, building collapsing, terrorism, pollution, missile attacks, military attacks.
<b>Russia</b>	<ul style="list-style-type: none"> <li>- On Protection of Population and Territories from Natural and Man-Made Emergencies (1995)</li> <li>- On Emergency and Rescue Services and Status of Rescuers (1995)</li> <li>- On community and area protection against natural and technological disasters (1994)</li> <li>- EMERCOM Agency for Support and Coordination of Russian Participation in International Humanitarian Operations (2006)</li> <li>- On Protecting the Population and Territories from Emergency Situations” (1994)</li> <li>- On Emergency-Rescue Services and Status of Rescue Personnel (2003)</li> </ul>	<ul style="list-style-type: none"> <li>- Fundamentals of the Unified State Policy in the Field of Civil Defense</li> <li>- Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM)</li> </ul>	<ul style="list-style-type: none"> <li>- Ministry of Civil Defense, Emergencies and Elimination of Natural Disaster Consequences.</li> <li>- Governmental Commission on Prevention and Elimination of Emergencies and for Ensuring of Fire Safety</li> </ul>	Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM)	Flooding, hurricanes, earthquakes, tornadoes, storms, heavy rain, heavy snowfall, blizzards, landslides

<b>Singapore</b>	<ul style="list-style-type: none"> <li>- The Civil Defense Act (1986)</li> <li>- The Fire Safety Act (1993)</li> <li>- Civil Defense Shelter Act (1997)</li> <li>- Infectious Disease Act (1976)</li> </ul>	Whole-of-Government Integrated Risk Management' (WOG-IRM) Policy Framework	<ul style="list-style-type: none"> <li>- The Strategic Planning Office</li> <li>- Home front Crisis Ministerial Committee (HCMC)</li> <li>- National Security Coordination Secretariat (NSCS)</li> <li>- Ministry of Finance</li> <li>- National Disaster Management Agency</li> </ul>	National Tsunami Response Plan.	Earthquakes, Floods, Pollution, Volcanic eruptions, Tornados, Cyclones, Tsunamis, Hurricanes.
<b>Thailand</b>	- Disaster Prevention and Mitigation Act B.E.2550 (2007)	No information	<ul style="list-style-type: none"> <li>- National Disaster Prevention and Mitigation</li> <li>- Committee (NDPMC), Department of Disaster Prevention and Mitigation (DDPM)</li> </ul>	No information	Flooding, Rainy season, Earthquake, Tsunami.
<b>The Philippines</b>	- Philippine National Disaster Risk Reduction and Management Act (2010)	<ul style="list-style-type: none"> <li>- National Disaster Risk Reduction and Management Framework</li> <li>- Strategic National Action Plan (SNAP)</li> <li>- National Disaster Response Plan for Hydrometeorological Hazards</li> <li>- National Disaster Response Plan for Earthquake and Tsunami</li> <li>- Armed Forces</li> <li>- Humanitarian Assistance and</li> </ul>	<ul style="list-style-type: none"> <li>- National Disaster Risk Reduction &amp; Management Council (NDRRMC)</li> <li>- Office of Civil Defense (OCD)</li> </ul>	<ul style="list-style-type: none"> <li>- Early Warning Systems</li> <li>- The Climate Experiment Project</li> <li>- Nationwide Operational Assessment of Hazards (NOAH)</li> </ul>	Floods, Landslides, Typhoon, Tropical Cyclones, Earthquakes, Volcanic eruptions

		<p>Disaster Response Plan</p> <ul style="list-style-type: none"> <li>- CBRN National Action Plan.</li> <li>-</li> </ul>			
<b>The United States</b>	Robert T. Stafford Disaster Assistance and Emergency Assistance Act (1988)	Integrated Public Alert and Warning System (IPAWSS)	Secretary of Homeland Security	<p>Integrated Public Alert and Warning System (IPAWSS) coordinates: Emergency Alert System (EAS), National Warning System (NAWAS), Wireless Emergency Alerts (WEA), NOAA Weather Radio.</p> <p>The READICall emergency alert system is still on discussion in the Federal Congress</p>	Earthquakes, Volcanoes eruptions, Landslides, Droughts, Hurricanes, Tornadoes, Cyclones, Extreme precipitation, Flooding, Extreme Temperature (Heat & Cold), Wildfires, Lightning, Famines, Terrorism
<b>Viet Nam</b>	Law on Natural Disaster Prevention and Control (2013)	- National Strategy on Natural Disaster Prevention, Response and Mitigation	- Central Steering Committee for Natural Disaster, Prevention and Control	SMS, National Radio and TV	Droughts, Earthquakes, Landslides, Wildfires, Floods, Storm surge, Typhoons, Volcanic eruptions.

## TIC solutions to Disaster Management o Alert Systems in APEC Economies

APEC MEMBER	IT SOLUTION	FEATURES	RESPONSIBLE INSTITUTION	COVERED DISASTER OR EMERGENCY
<b>Australia</b>	Emergency Alert Australia	SMS	Department of Internal Affairs	Heavy weather, Fires
<b>Brunei Darussalam</b>	Incident Command System (ICS)	No information	Flood and Storm Warning System Brunei Meteorological Service	Heavy weather, Floods
<b>Canadá</b>	National Public Alert System (Alert Ready)  Wireless Public Alerts (WPAS)	TV and Radio interruption in programming, social media, SMS, e-mails and through LTE mobile networks  Smartphones push notifications	An authorized government authority, which varies through local, provincial and national levels. However, on a technical level, the responsible for both early warning systems are the CRTC and Pelmorex Corp.	Fires, tornadoes, flash floods, earthquakes, hurricanes, tsunamis, thunderstorms, storm surges, landslides, dam overflow, magnetic storm, meteorite, lahar, pyroclastic flow, pyroclastic surge, and volcanic ash, biological threat, chemical threat, drinking water contamination, explosive threat, air quality, falling object, terrorist threat, civil emergencies, animal danger, and AMBER Alerts
<b>Chile</b>	Sistema de Alerta de Emergencia (SAE)	Smartphones push notifications	ONEMI	Earthquake, tsunami.
<b>Chinese Taipei</b>	Common Alerting Protocol (CAP)	- Cell Broadcast Entity (CBE) to a Cell Broadcast Center (CBC), and then broadcast to the citizen's phones as an SMS or push notification	- Central Disaster Prevention and Response Office	- Earthquake, Landslide, Typhoons, Floods, Debris flow, Storm surge.
<b>Hong Kong, China</b>	Early Warning System	Alerts broadcasted through radio and TV	Hong Kong Observatory	Meteorological-based risks, tsunamis, earthquakes
<b>Indonesia</b>	Disaster Information Management System (DIMS) application  PetaBencana.id	- Quick early warning system - Software that manages damage and shelter information, a digital map, and can send	- Bandung Institute of Technology's Centre for Disaster Management, the Asian Disaster Preparedness Centre (ADPC), and the Jakarta Provincial Government. - DKI Jakarta Regional Disaster Management Agency known as the	Flood and Storm Warning.

		<p>messages to staff and other disaster management agencies.</p> <ul style="list-style-type: none"> <li>- Free, open-source platform in collaboration with the MIT Urban Risk Lab to deal with the potential threat of flooding during the rainy season.</li> <li>- Users can visit the website to access the latest information on flooding in areas of Indonesia.</li> <li>- Users can also actively provide real-time reports and maps on the flood situation using social media and instant messaging applications (crowdsourcing). This last are supported by United States Agency for International Development (USAID), the Pacific Disaster Center (PDC) and the Humanitarian OpenStreetMap Team (HOT).</li> <li>- The platform collects reports from crowdsourcing from social media and also</li> </ul>	<p>Badan Penanggulangan Bencana Daerah (BPBD DKI Jakarta).</p>	<p>Flooding.</p>
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		disaster-related information infrastructure.		
<b>Japan</b>	J-Alert (Japanese Emergency Broadcast system)	<ul style="list-style-type: none"> <li>- Satellite-based system that enables local authorities to transmit warning messages directly to local media and citizens.</li> <li>- Transmit emergency information to J-ALERT receiver equipment via satellite and backup terrestrial circuits.</li> <li>- All warnings, except for severe weather warnings, are send in five languages: Japanese, English, Mandarin, Korean and Portuguese, and transmitted through wide variety of media like: television, radio, internet, loudspeakers vans, disaster management radio communication network, CCTV in public transport, push notifications in mobile phones, announcements on speakers mounted on towers and buildings.</li> <li>- The J-Alert was ultimately deployed nationwide by May 2013.</li> </ul>	Fire and Disaster Management Agency (FDMA)	Earthquake, tsunami, heavy weather (like heavy rain or snow), storm surges, volcanic activity, and typhoons.

<p><b>Malaysia</b></p>	<p>Fixed-Line Disaster Alert System.</p> <p>Government Integrated Radio Network (GIRN)</p>	<ul style="list-style-type: none"> <li>- Early warnings are disseminated through sirens, short messaging systems, telephone, telefax, webpage, mass media broadcasting system and public announcements.</li> <li>- Provides radio communication between responders during emergencies or disasters.</li> </ul>	<p>Malaysian Meteorological Department</p> <p>-</p> <p>Ministry of Information, Communication and Culture has established a Disaster Unit in the Department of Broadcasting Malaysia</p>	<p>Flood, tsunami</p>
<p><b>México</b></p>	<p>No information</p>	<p>Alerts broadcasted through radio, TV, smartphones push notifications, and internet</p>	<ul style="list-style-type: none"> <li>- National Seismological Service.</li> <li>- Mexican Seismic Alert System.</li> <li>- Popocatepetl Volcano Monitoring System.</li> <li>- Early Warning System for Tropical Cyclones.</li> <li>- National Tsunami Warning System.</li> <li>- Early Fire Warning System in Mexico.</li> <li>- National Meteorological Service.</li> </ul>	<p>Earthquakes, tsunamis, volcanic eruptions, tropical cyclone, wildfire, weather-related disasters</p>

<b>New Zealand</b>	Emergency Mobile Alert system	<ul style="list-style-type: none"> <li>- Messages about emergencies sent by authorized emergency agencies to capable mobile phones.</li> <li>- The Emergency Mobile Alert system “are broadcast via cell towers to mobile phones with the ability to receive Emergency Mobile Alerts. Authorized emergency agencies can target the alerts to specific areas affected by serious hazards</li> </ul>	<ul style="list-style-type: none"> <li>- Ministry of Civil Defence and Emergency Management (MCDEM)</li> <li>- The New Zealand Police.</li> <li>- Fire and Emergency New Zealand.</li> <li>- Ministry of Health.</li> <li>- Ministry for Primary Industries.</li> <li>- Ministry of Civil Defence &amp; Emergency Management.</li> <li>- Local Civil Defence Emergency Management Groups.</li> </ul>	Tsunami, wildfires, weather related disasters.,
<b>Papua New Guinea</b>	Early Warning System	In development	<ul style="list-style-type: none"> <li>- Papua New Guinea National Weather Service (PNG-NWS)</li> <li>- Conservation and Environment Protection Authority (CEPA)</li> <li>- Morobe Provincial Disaster Centre (PDC-Morobe)</li> </ul>	Floods
<b>The People’s Republic of China</b>	Early Warning System	<ul style="list-style-type: none"> <li>- The alerts are broadcasted by smartphones notifications, TV, radio and public placed speakers</li> </ul>	The Ministry of Emergency Management	Earthquakes, tsunamis, floods, and weather-related disasters
<b>Perú</b>	Sistema de Alerta Temprana (SAT)	<ul style="list-style-type: none"> <li>- No homogeneous information</li> </ul>	Instituto Nacional de Defensa Civil (INDECI)	Earthquakes, tsunamis, floods, frost
<b>Republic of Korea</b>	Korea Safe-Net	<ul style="list-style-type: none"> <li>- Disaster and Safety Communications Network or Korea Safe-Net: essential communication system enables</li> </ul>	Ministry of the Interior and Safety	Typhoons, heavy snowfall, landslides, storms, rains, drought, sandstorms, earthquakes, wildfires, building collapsing, terrorism, pollution, missile attacks, military attacks, diseases.

	Emergency Ready App	<p>policemen, firefighters, and other groups of public officials to communicate and promptly support rescue efforts using dedicated terminals both in normal times and emergencies.</p> <ul style="list-style-type: none"> <li>- This system work over the Long Term Evolution (PS-LTE) Public Protection and Disaster Recovery (PPDR) network frequency band as 718 – 728 MHz uplink and 773 – 783 MHz downlink. This is band 28, which is the standard frequency for the Asia-Pacific Telecommunity (APT) band plan known as APT-700</li> <li>- Emergency Ready App: for smartphones, a mobile application whose provide 125 types to alert in Korean, Chinese, and English</li> </ul>		
<b>Russia</b>	No information	No information	Ministry of Emergency Management of Russia (EMERCOM)	No information
<b>Singapore</b>	Disaster Assistance and Rescue Team (DART)	<ul style="list-style-type: none"> <li>- Rescue operations, including tunneling, Mass Rapid Transport rescue and high-rise rescue.</li> </ul>	The Singapore Civil Defense Force (SCDF)	No information

		<ul style="list-style-type: none"> <li>- DART is outfitted with state-of-the-art equipment, such as the robots, search cameras, fiber-optical scopes, thermal imaging cameras, trapped persons locator, as well as rescue dogs</li> </ul>		
<b>Thailand</b>	Early warning system	<ul style="list-style-type: none"> <li>- Installation of 268 warning towers that receive information from the DDPM and warn the population by sound alarms.</li> <li>- The information is also sent to the media and delivered to certain web pages, so that they can distribute it to the population.</li> </ul>	<ul style="list-style-type: none"> <li>- National Disaster Prevention and Mitigation Committee (NDPMC)</li> <li>- National Disaster Warning Centre</li> <li>- Department of Disaster Prevention and Mitigation</li> </ul>	No information
<b>The Philippines</b>	<ul style="list-style-type: none"> <li>- The Climate Experiment Project</li> <li>- National operational risk assessment (NOAH).</li> <li>- Philippine Geoportal.</li> <li>- Early warning devices</li> </ul>	<ul style="list-style-type: none"> <li>- Software that calculates the percentage of probability of rain (PCOR) or probability of rain using infrared satellite image data and water vapor, and Doppler radar data in combination with statistical evaluation of historical rainfall.</li> <li>- The application provides real-time rain information about water, rain and humidity levels in 200 areas in the</li> </ul>	<ul style="list-style-type: none"> <li>- DOST is the responsible for monitoring and forecasting EWS; the chair on Disaster Preparedness and Mitigation of the Regional Disaster Risk Reduction and Management Council; and brings EWS Information, Education and Communication (IEC) forums into Philippine provinces.</li> <li>- The Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA)</li> <li>- The Philippine Institute of Volcanology and Seismology (PHIVOLCS)</li> </ul>	Volcanic eruptions, earthquakes, and tsunamis, tropical cyclone, flood

		<p>Philippines. The government has installed sensors, rain gauges and climate monitoring systems in several areas. In addition, people can access Tweets sent via Twitter via cell phones from the Philippine meteorological office or the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA)</p> <ul style="list-style-type: none"> <li>- Use of multi-scale standard base maps that serve as tools for strategic planning, decision making, situational analysis and other common requirements.</li> <li>- Electric siren, LED beacon, control box and solar panel.</li> </ul>		
<b>The United States</b>	<ul style="list-style-type: none"> <li>- Emergency Alert System</li> <li>- National Warning System</li> <li>- Wireless Emergency Alert</li> <li>- NOAA Weather Radio</li> </ul>	<ul style="list-style-type: none"> <li>- Interruption of TV and radio broadcasting</li> <li>- Automatic telephone system</li> <li>- Smartphones push notifications</li> <li>- Broadcast of emergency alerts on radio programming</li> </ul>	Federal Emergency Management Agency (FEMA)	Earthquakes, tsunamis, floods, frost, hurricanes, heat-wave, weather-related disasters, AMBER alerts, terrorist attacks, foreign attacks, nuclear attacks

<b>Viet Nam</b>	No official information	The alerts must be broadcasted through Viet Nam Television and “The Voice of Viet Nam”, the State-owned TV and radio stations. And since 2016, the member economy government has started using SMS	<ul style="list-style-type: none"> <li>- Ministry of Natural Resources and Environment shall issue meteorological and hydrographical forecasts and warnings.</li> <li>- Viet Nam Academy of Science and Technology shall issue bulletins on earthquakes and tsunami.</li> </ul>	Earthquakes, tsunamis, floods, and any weather-related emergency
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