

Chapter 8

SOME EXAMPLES OF ORGANIZATION FOR VOLCANIC EMERGENCY MANAGEMENT

8.1 Iceland

The Icelandic Civil Defence Organization has responsibility for dealing with all kinds of disaster situations, natural or man-made, but because the country contains so many active volcanoes, it has paid special attention to planning for volcanic emergencies. This planning takes place in four stages, in all of which close liaison is maintained between civil defence specialists and volcanologists.

A. ROUTINE LONG-TERM PLANNING

- (a) Standard disaster planning at the community level, including response check-list for volcanic crisis;
- (b) Communications between local governments, urban planners and scientists for land-use planning in hazardous areas;
- (c) Budget provision for monitoring vulnerable areas if requested by scientific institutions.

B. IMMEDIATE POTENTIAL ERUPTION DANGER

- (a) Updating and reinforcement of existing plans;
- (b) Convening scientific advisory board;
- (c) Scrutiny and refinement of possible alert measures, keeping them under continuous review;
- (d) Planning of possible means of protective action such as diverting lava by embankments or water cooling, roof reinforcement to take ash loads, etc;
- (e) Improvement of roads, telecommunications, etc., to facilitate emergency action such as evacuation.

C. VOLCANIC CRISIS
*(eruption has started or high
probability of eruption)*

- (a) Hazard assessment (as accurate as feasible);
- (b) Emergency action, if needed, co-ordinating all appropriate governmental and non-governmental resources within the framework of the previously prepared emergency plan;
- (c) Assessment of the vulnerability of property and implementation of protective measures as necessary;
- (d) Daily re-evaluation of the hazard situation.

D. AFTER A CRISIS

- (a) Overall evaluation of actions taken during the crisis;
- (b) Revision of procedures if necessary.

8.2 Japan

Volcanic disaster prevention in Japan is carried out under the provisions of the “Special Countermeasures Law against Active Volcanoes” as well as the “Basic Law for Disaster Prevention” and other general disaster prevention laws.

**A. SPECIAL COUNTERMEASURES LAW
AGAINST ACTIVE VOLCANOES**

This is designed to promote construction of evacuation facilities and other disaster prevention needs in areas seriously affected or threatened by volcanic activity.

According to the law, the Prime Minister shall designate those areas where it is urgent to protect people from volcanic disaster or to step up countermeasures against possible volcanic activity. When such areas are designated, the governor of the prefecture concerned should formulate, in consultation with the heads of municipalities, “the Urgent Construction Plan of Evacuation Facilities” which shall provide for the following:

- (a) Construction and improvement of roads and ports;
- (b) Preservation of areas of open space;

- (c) Construction and improvement of shelters and other refuge facilities;
- (d) Reinforcement and fire-proofing of schools, public halls, etc.;
- (e) Other matters required by ordinance.

The law also provides for such things as the clearing of volcanic ash from roads, sewage works and parks, the protection of schools, social welfare facilities, hospitals, etc., and general conservation of the environment and amenities. It makes provision for surveillance, evacuation and relief, for the necessary liaison during a volcanic emergency and for volcanological research.

The State government endeavours to offer special financial aid to the local government concerned, for the implementation of these plans.

B. VOLCANIC EMERGENCY LIAISON

Information from monitoring equipment or from the person reporting the abnormal phenomena goes to the local observatory, then to municipal and prefectural authorities, local universities and the National Broadcasting Corporation. The municipal government, which includes the civil safety brigade and local branch of the National Broadcasting Corporation, passes information to local residents and tourists.

The municipal and prefectural governments establish the disaster control headquarters if necessary, and the prefectural government relays information to the Civil Safety Agency of the State government, at the same time requesting dispatch of the Self-Defence Force if required.

At the same time, the observatory requests the co-operation of local universities and reports to the Meteorological Agency. The observatory and local university co-operate to set up observation posts. The Meteorological Agency calls in the Co-ordinating Committee for Predicting Volcanic Eruptions, which then establishes a local observation team. The duties of the Committee are to observe current volcanic activity and to try to predict the course of future activity.

8.3 Papua New Guinea

A. THE NATIONAL DISASTER ORGANIZATION

The disaster organization in Papua New Guinea exists by authority of the Disaster Control Act 1983.

“Disaster” means a major disturbance of the earth’s surface, oceanic disturbance, fire, flood, tempest, epidemic, pest, plague, explosion, shipping disaster or any other natural calamity.

B. NATIONAL DISASTER CONTROL COMMITTEE

Responsibility for the management of disasters at the national level is vested in the National Disaster Control Committee consisting of:

The Secretary to the Department of the Prime Minister (Chairman)

The Commander of the Defence Force (Deputy Chairman)

The Commissioner of Police

The Secretary for Finance

The Secretary for Defence

The Secretary for Works and Supply

The Secretary for Health

The Committee may appoint co-opted members but they have no right to vote.

Functions of the National Disaster Control Committee

The functions of the Committee are:

- (a) To supervise the national state of preparedness for emergencies and to report on it to the National Executive Council;
- (b) To maintain the National Emergency Plan of the National Executive Council;
- (c) To assign responsibilities for disaster-related activities to departments and other bodies;
- (d) To co-ordinate departmental relief actions and collate national relief requirements;
- (e) To advise the National Executive Council if an appeal for international assistance is required;
- (f) To examine and where necessary approve all grants from national funds for disaster relief;
- (g) To foster public awareness of the effects of natural phenomena and measures which can be taken to prevent or mitigate them;
- (h) To supervise the establishment of stockpiles of relief supplies; and

- (i) To advise the National Executive Council on whether a National Emergency is required to be declared under the Constitution.

C. NATIONAL DISASTER CONTROL CENTRE

The National Disaster Control Centre co-ordinates all disaster situations at the national level. Its Director is the Executive Officer of the National Disaster Control Committee and one of his duties is to provide assistance to Provincial Disaster Control Committees.

D. PROVINCIAL DISASTER CONTROL COMMITTEE

Responsibility for the management of disasters at the provincial level is vested in the Provincial Disaster Control Committee consisting of:

The Head of the Department of the Province (Chairman);

The Provincial Police Commander;

The Provincial Works Manager;

The Provincial Health Officer;

The Officer in Charge of the Provincial Affairs Branch of the Department of the Province;

The Assistant Secretary, Finance and Administration.

The Committee may appoint co-opted members but they have no right to vote.

(i) *Functions of the Provincial Disaster Control Committee*

The functions of the Committee are:

- (a) To assess the particular hazards facing the province;
- (b) To liaise and co-operate with the Provincial Executive Council in ensuring that development plans for the province take into account hazards facing it;
- (c) To prepare emergency plans for the province and supervise the state of preparedness for emergencies in the province;
- (d) To co-ordinate the stockpiling of relief supplies;
- (e) To receive all applications for relief assistance;
- (f) To foster public awareness of the effects of natural phenomena and the measures which can be taken to prevent or mitigate them; and

- (g) To organize the training of relief workers and to practise the provincial emergency plans.

(ii) *Powers of the Provincial Disaster Control Committee*

The Committee has power to advise on the Declaration of a Disaster Area and after such a declaration to:

- (a) Appoint a Disaster Controller;
- (b) Take possession of or make compulsory use of land or property;
- (c) Control movement;
- (d) Enter land, buildings or structures;
- (e) Erect buildings or structures or make evacuations;
- (f) Alter, demolish or destroy buildings, structures, trees; and
- (g) Prohibit the publication of any material in relation to the disaster.

(iii) *Reports*

The Committee is required to submit a report to the National Government, for presentation to Parliament, as soon as is practicable after the revocation of a Declaration of a disaster area.

The Committee is also required to report to the National Government at least once a year, for presentation to Parliament, on its work and operations including:

- (a) Emergency and other plans;
- (b) Actions taken to implement the requirements of preparedness arising from (a);
- (c) All aid requests to and grants from the National Disaster Control Committee.

E. SUMMARY OF MAIN RESPONSIBILITIES

<i>Function</i>	<i>Responsibilities</i>
Overall Co-ordination Provincial Disaster Control Committee	
Organization of Provincial Disaster Centre and Alternative Provincial Disaster Centre	Executive Officer; Provincial Disaster Control Committee

<i>Function</i>	<i>Responsibilities</i>
Arrangements to call out key staff	Executive Officer; Provincial Disaster Control Committee
Master List of Locations	<i>idem</i>
Collation of Provincial Disaster Plan (including annual reviews)	<i>idem</i>
All aviation matters (supervision of Lakunai and emergency airfields, requisitioning of aircraft, aviation fuel supplies)	Office of Civil Aviation
Long-term public information programmes	Division of Communication Services
Publication of warnings and news bulletins	<i>idem</i>
Shelter	Division of Community Government
Organization of evacuees (pick-up points, transit centres, evacuation centres, area headquarters)	<i>idem</i>
Feeding of relief workers	Division of Community Government
Registration of evacuees	<i>idem</i>
Provision of refreshments in transit centres	Division of Community Services
Welfare and identification of vulnerable groups in evacuation centres	<i>idem</i>
Closure of schools and provision of school buildings for use as evacuation centres	Division of Education
Care of boarding students from homes outside the province	<i>idem</i>
Maintenance of electricity supplies	Electricity Commission
All health matters (first aid posts, casualty stations, hospitals, ambulance service, public health measures, burials)	Division of Health
Advice on feeding of vulnerable groups	<i>idem</i>
All shipping matters (control of shipping, sea evacuation, sea rescue, requisitioning of ships, advice on replenishment by sea)	Marine/Harbours Board
Law and order, prevention of looting, control of movements	Police
Maintenance of telephone, telex and radio communications	Post and Telecommunications
Supplementary first aid teams	Red Cross
Tracing Service	<i>idem</i>
Clothing	<i>idem</i>

<i>Function</i>	<i>Responsibilities</i>
Food and cooking fuels (monitoring of stocks and consumption, stockpiles, advice on supply, distribution and replenishment, distribution programmes)	Rural Development/Commerce
Rescue	Works and Supply assisted by Police, Health and Fire Services.
Co-ordination of vehicle requisitioning and road evacuation	Works and Supply assisted by Division of Community Government
Keeping open evacuation routes	Works and Supply
Requisitioning and control of fuel supplies	<i>idem</i>

8.4 Philippines

Responsibility for the surveillance and prediction of volcanic activity and for volcanic hazard zoning in the Philippines is vested in the Philippine Institute of Volcanology and Seismology, under the National Science and Technology Authority. The Institute maintains permanent observatories at the five most active volcanoes in the country: Bulusan, Canlaon, Hibok-Hibok, Mayon and Taal. The phenomena monitored at each observatory are shown in table 4.

The Institute has prepared hazard maps of each volcano, showing the areas likely to be affected by pyroclastic flows, lava flows, mudflows and heavy ash falls. For each volcano there exists a disaster preparedness plan which is put into action, immediately upon receipt of advice from the Institute, by the National Disaster Co-ordinating Council, which can call upon a large number of government and private agencies. The main elements of the preparedness plan for Mayon may be given as an example:

A. DELIMITATION OF DANGER ZONES

On the basis of the hazard map of the volcano, four zones have been delineated:

- (a) **Permanent Danger Zone:** the area within 6 km of the summit, in which permanent settlement is not allowed.
- (b) **High Risk Zone:** the area within 8 km of the summit is considered to be at high risk during eruption periods. At the onset of an eruption, the population living in the zone is alerted for possible evacuation.
- (c) **Probable Danger Zone:** the area within 10 km of the summit, which is

TABLE 4

Phenomena monitored at the Philippine Institute of Volcanology and Seismology

	Taal	Mayon	Bulusan	Canlaon	Hibok-Hibok
1.	Seismicity	1. Seismicity	1. Seismicity	1. Seismicity	1. Seismicity
2.	Steam emission	2. Steam emission	2. Steam emission	2. Steam emission	2. Steam emission
3.	Magnetic and gravity observations	3. Magnetic and gravity observations	3. Magnetic and gravity observations	3. Magnetic and gravity observations	3. Magnetic and gravity observations
4.	Tilt observations	4. Tilt observations	4. Hotspring temperature measurements	4. Destruction of vegetation	4. Tilt observations
5.	Temperature and level of main crater lake	5. Crater glow	5. Chemical composition of hotspring water	5. Destruction of vegetation	5. Destruction of vegetation
6.	Chemical composition of main crater lake water	6. Destruction of vegetation	6. Destruction of vegetation		
7.	Temperature of ground probe holes	7. Rumbling sounds			
8.	Destruction of vegetation	8. Fissuring at or near the crater			
9.	Rumbling sounds				
10.	Dying of fish at Taal Lake				

- likely to be affected in the event of a major eruption.
- (d) **Zones exposed to Mudflows:** these are areas which are known to have been affected by mudflows in the past, and buffer zones 300 m wide on each side of valleys and gullies radiating from the upper slopes of the volcano.

B. MANAGEMENT OF EVACUATION

The sequence of actions related to an evacuation is divided into four phases:

Phase I: Signs of an impending eruption. This is indicated by a crater glow at the summit, an increase in volume or colour of steam emissions, occasional rumbling sounds, felt earthquakes in the immediate vicinity of the volcano, and/or the occasional occurrence of harmonic tremor. Measures undertaken in this phase are:

- (a) Mobilization of the Provincial Disaster Co-ordinating Council;
- (b) Prohibition of entry into the Permanent Danger Zone;
- (c) Preparation of evacuation centres.

Phase II: Early stage of eruptive activity, eruption imminent. This is indicated by lava extrusion, occasional minor ash puffs, frequent loud rumblings with or without accompanying felt earthquakes, and/or stronger frequent or continuous harmonic tremor. Measures undertaken in this Phase are:

- (a) Absolute prohibition of entry into Permanent Danger Zone;
- (b) Evacuation of population from specific areas within the High Risk Zone;
- (c) Alerting of adjacent communities for possible evacuation.

Phase III: Vulcanian-type activity, possibility of violent eruption. This is indicated by strong emissions of ash containing magmatic material, frequent felt earthquakes, continuous harmonic tremor of increased magnitude and/or an increase in the frequency and intensity of emissions accompanied by strong detonations. Measures undertaken in this Phase are:

- (a) Evacuation of people from threatened sectors of the High Risk Zone and from specific sectors of the Probable Danger Zone;
- (b) Absolute prohibition of entry into the threatened sector of the

High Risk Zone and into specific areas of the Probable Danger Zone.

This phase may last two months or more, depending on the degree of activity.

Phase IV: Volcano returning to normal. This is indicated by small lava emissions, minor ash emissions at increasing intervals, decreased amplitude of harmonic tremor and cessation or decrease of rumbling. During this phase, evacuees may be allowed to return to their homes, those from the Probable Danger Zone being resettled first; residents of the High Risk Zone are allowed to return only after all signs of eruptive activity have ceased. In view of the continuing risk of mudflows, access to mudflow zones and buffer zones is restricted.

C. CARE OF EVACUEES

The preparedness plan includes provisions for:

- (a) The careful selection of evacuation sites with a view to their accessibility, safety from volcanic hazards, health and sanitation, and the provision of facilities such as water, power and medical services.
- (b) The maintenance of law and order both in the sites occupied by evacuees and in the areas evacuated.
- (c) The prevention of epidemics and the maintenance of public health in the sites occupied by evacuees.
- (d) The orderly transportation of evacuees to and from the evacuation sites.
- (e) The co-ordination of the work of the relief and rehabilitation agencies.

8.5 United States of America

The primary responsibility for warning of volcanic hazards in the United States lies with the Volcanic Hazards Programme of the US Geological Survey. University scientists and at least two State Geological Surveys (California and Alaska) also conduct volcanic studies that contribute to warnings of volcanic hazards. The State of Oregon has a programme in which scientists from the State Universities advise the State Geologist on matters of volcanic hazards. In general, communication be-

tween the various scientific groups is close, and efforts are made to reach scientific consensus before public statements are issued.

Information about the state of a volcano is conveyed by the USGS and others to a small number of key government agencies. The list of agencies varies slightly from volcano to volcano, but in general includes the State Department of Emergency Services, any government agency that manages land on and around the volcano (most often, the US National Park Service, Forest Service, or Bureau of Land Management), and local (county) governments. The Federal Emergency Management Agency (FEMA) is kept informed of developments, and is called into a more active role if a major disaster occurs.

At Mount St. Helens, the US Forest Service assumed principal responsibility for co-ordinating the emergency response. Personnel who were trained in co-ordinating forest fire-fighting efforts adapted easily to co-ordinating the efforts of various parties in dealing with the volcano. Emphasis was placed on the word "co-ordination", as contrasted with "direction"; each level of government (federal, state, and local) and each agency within each level retained its own decision-making prerogatives (sometimes guarded jealously), and only rarely was it necessary for an overall disaster manager (FEMA) to intercede. The Forest Service closed large portions of its own lands (including most of the volcano itself); the Forest Service also worked with the State Governor to obtain similar closures on State and private lands. With time, the State has taken a more active role and now has a Volcanic Hazards Management Committee, consisting of many of the same parties that were initially brought together by the Forest Service.

Throughout the emergency, the Forest Service disseminated information from geologists and seismologists to various federal, state, and local agencies, industry and other groups. Many of these agencies, in turn, had further dissemination channels, so that warnings from the scientists were disseminated through an elaborate warning system. As soon as a warning had been passed to the various government agencies, the same warning was conveyed by the US Geological Survey, the Forest Service, and in some cases by the State to the news media. The US Geological Survey and the US Forest Service operated a joint media information centre, for efficiency and to minimize the confusion that inevitably arises from multiple sources.

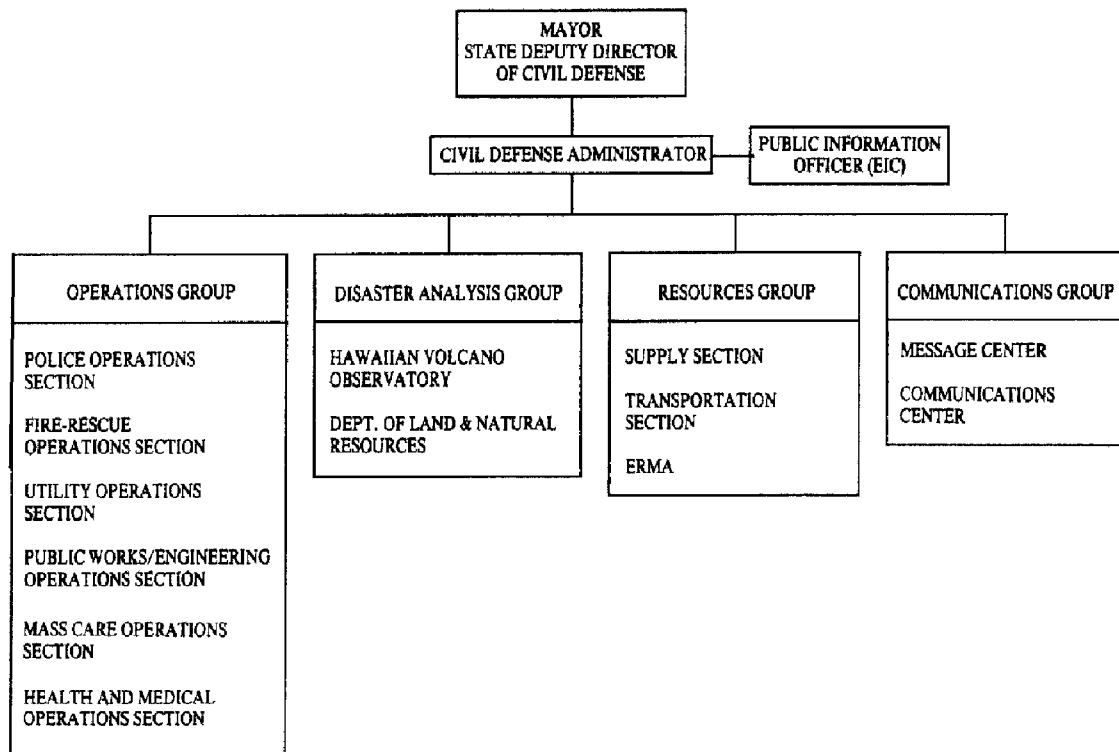
Officials around other US volcanoes, realizing that they too might face a volcanic crisis someday, have drawn up contingency plans and organizational schemes that are broadly similar to the organization at Mount St. Helens. Contingency plans define emergency management

teams consisting of representatives of the key government agencies. Such plans have now been prepared for most of the active Cascade volcanoes, and for Long Valley, California. In general, emergency management decisions will be made at the local level whenever possible, and will be made at the state or federal levels only when the magnitude of a volcanic crisis exceeds the capability of the local government, to respond to the emergency.

Table 5 illustrates the organization of civil defence against volcanic eruptions in Hawaii.

TABLE 5

County of Hawaii—Civil Defense Agency
Emergency Operating Center organisation



Sections to be activated by Administrator as deemed necessary according to the situation.

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