Chapter 5
About Natural Disasters

Disaster is an event or a series of events caused by both natural and/or unnatural factors including human-made ones that threaten and disrupt people's lives and livelihoods, causing human casualties, environment damage, property loss and psychological impacts.

Natural Disaster is a tragic event or a series of tragic events caused by natural occurrences like earthquakes, tsunami, volcano eruptions, drought, floods, tornadoes and landslides.

Non Natural Disaster is any disaster caused by an unnatural event or a series of unnatural events like technological failure, modernization failure, epidemics and plague.

Social Disaster is any disaster caused by an event or a series of events triggered by humans activities like conflicts between social groups and terrorist attacks.

Source: Law of the Republic of Indonesia No. 24/ 2007 on Disaster Management.

The United Kingdom-based charity Oxfam has stated that the number of people hit by climate-related disasters is expected to rise by about 50%, to reach 375 million a year by 2015.

Earthquakes

An earthquake is the result of a sudden and often violent release of energy from the Earth's crust releasing seismic waves. Earthquakes are sometimes called tremors or temblors. The outward signs of an earthquake are the shaking and sometimes displacement of the ground. The intensity may vary from not being felt to uncontrollable shaking, resulting in the destruction of major structures, landslides, etc. If a major earthquake occurs under the ocean it can cause a tsunami.

Causes

Earthquakes are mostly caused by the movement of geological faults and continental plates. They can also be caused by volcanic activity, landslides, nuclear experiments, mining and other such underground activities or explosions. The point within the earth's crust where the earthquake originates is called its focus or hypocenter. The epicenter is the point at ground level directly above the hypocenter.

Where do earthquakes happen?

Although most earthquakes occur along or near plate boundaries (faults), they can occur anywhere in the world.
90% of the world's earthquakes and 80% of the largest earthquakes occur in the earthquake prone Pacific Ring of Fire (east coasts of South, Central and North America, Japan, China, Taiwan, Southeast Asia, etc.). Earthquakes are also common in the Mediterranean and Arab countries as well as China.

Effects

- **Ground shaking and distortion:** When an earthquake occurs the ground will shake. The tremor may be so light it cannot be felt by humans. These are very common. People may feel a light shake in the ground or building they are in during a mild earthquake. Usually there is no serious damage. It is almost impossible to stand and a person can be thrown about inside a building in a major earthquake. Brick and weak buildings will collapse, even strong reinforced concrete buildings and structures may be seriously damaged. Distortions,

cracks and fissures in the ground surface may appear.
- **Landslides and avalanches:** When a major earthquake happens landslides and avalanches may occur.
- **Fires:** Fires often break out, due to damage to electrical power or gas systems and sometimes where chemicals are stored. These can be the cause of more deaths than the earthquake itself. Even in modern cities like Kobe, enormous damage was caused by fire resulting from the Hanshin-Awaji Earthquake.
- **Soil liquefaction:** When an earthquake occurs liquid sometimes seeps up from underground causing the surface of reclaimed land, man-made islands, etc. to become a sea of mud as was seen on Port Island, Kobe, in the Hanshin-Awaji Earthquake (1995) and on reclaimed land in other earthquakes in Japan.
- **Floods:** When an earthquake happens riverbanks, dams, etc. may be destroyed and landslides may divert rivers or create natural dams which can cause floods. Floods may also result from tsunami.

- **Tsunami:** When a large earthquake happens in the ocean there is the possibility of a tsunami occurring. (see Tsunami)

Warnings and precautions

Since earthquakes happen suddenly it is very difficult to predict them. However, people living in earthquake prone regions should expect them to happen at any time and be prepared for them.
At present predictions by scientists are still very

general, but they do serve to encourage earthquake disaster management policymaking at governmental and local levels.

Recently, Japan has introduced a P-wave warning system. When an earthquake occurs it sends P-waves through the earth at a speed of 6~7km a second, these waves are detected and passed on through a system that warns that tremors are expected in seconds. However, this system is not yet widely in use and has been found to be faulty at times.

Minor earthquakes or earthquake activity may be a prelude to a major earthquake. When a relatively large earthquake occurs, it may be followed by an even larger one. Most major earthquakes are followed by aftershocks, some of which can cause considerable damage to already weakened structures.

Governmental and local measures, both hard and soft, for earthquake disaster mitigation and management are a prerequisite to cope with earthquakes.

Tsunami

A tsunami is a wave or series of waves that can vary in size and force. Most tsunami go unnoticed, but some have huge destructive force. An example of such a tsunami is the Indian Ocean tsunami that occurred on Dec. 26, 2004 which is reported to have caused the death of over 300,000 people and widespread damage over vast regions on both sides of the Indian Ocean. There are basically two types of tsunami; teletsunami which can cross vast oceans, and local tsunami. About 80% of all tsunami occur in the Pacific Ocean area.

Causes of tsunami
Most tsunami are triggered by earthquakes or plate movements under the ocean. Tsunami can occur in major oceans, smaller seas and even in large lakes.

There is another type of tsunami which is caused by tropical cyclones that can create 'meteotsunami' (or storm surge) which can cause tides to rise many meters above normal tide levels. Such a meteotsunami hit Burma (Myanmar) in May 2008. Though metrotsunami are like tsunami are not real tsunami.

Some characteristics of tsunami
Length: (the length of a wave from crest to crest): A normal wind wave has an average wavelength of approximately 100m, a tsunami

can have a wavelength of approximately 200km, but this decreases to about 12km when it reaches shallow waters.

Height: A normal wave has an average height of approximately 2m. A tsunami wave can be as high as 30m (Okushiri, Hokkaido, Japan). Often ships on deep sea oceans don't notice tsunami. But as a tsunami approaches shallow waters its height increases dramatically as in the case of Okushiri. Since tsunamis have a very long wavelength, it may take minutes before the peak of the tsunami's height is reached.

The rise or height of smaller tsunami are often not noticed because the wave does not break, often a gradual or even a sudden rise in water level is seen. However, with major tsunami a wave crest may be seen in the distance as it approaches.

Speed: A tsunami when crossing an ocean can travel at a speed of 800kph; as it approaches land and shallow waters, its speed drops to about 80kph.

Multiple waves: Large tsunami may contain multiple waves and the first may not be the highest.

Drawback: A drawback is when the sea withdraws dramatically before the oncoming tsunami wave. Understanding this phenomenon has helped people to act in time to reach high land or a safe place before the tsunami arrives. On the other hand, people who do not understand this are sometimes curious and go to the beachside and sometimes out into where the sea has receded, resulting in them being submerged by the oncoming tsunami. In the Indian Ocean tsunami, while a drawback was experienced in parts of India and Thailand, it was not reported

on African coasts or any other eastern coast.

If a drawback is observed, people should act as quickly as possible to get to high ground or onto the higher floors of a strong building.

Warnings and precautions

Hesitation to act quickly can cause the loss of life.

If a person near the seaside feels even a mild earthquake, he/she should not hesitate to immediately evacuate to higher ground or some distance from the shore.

Since the source of a tsunami may be thousands of kilometers from the coast, it is difficult for local people to be aware of an approaching a tsunami unless there is a warning system.

Attention should be paid to any abnormal phenomena such as drawbacks, or a long wave crest in the distance and act quickly.

Many regions that are at high risk use tsunami warning systems. People should familiarize themselves with them.

Japan has built seawalls (up to 4.5m high) and floodgates in many coastline areas.

It was found that the village of Naluvendapathy in India's Tamil Nadu region suffered only minimal damage and few deaths from the Indian Ocean tsunami. It is said that the forest of coconut trees and mangroves planted along the coast absorbed the energy of the tsunami.

Floods

A flood is an overflow or accumulation of water that submerges land. Floods usually occur along or near rivers, lakes, and the seaside. Floods happen when rivers overflow or when riverbanks break, when water levels rise due to heavy rain, or are the result of tsunami or abnormal high tides.

Some floods are seasonal and predictable and even good for the land, however, many floods are sudden and cause enormous damage and huge loss of life (2.5~3.7 million deaths in the 1931 China floods).

Types of floods

River floods: (a) **Slow floods** occur when rivers overflow because they cannot cope with the rise in the volume of water from continued rainfall or sudden snow melting. They include flooding caused by monsoons, hurricanes, tropical storms, etc. Blockage due to landslides, debris, etc. is also another cause. (b) **Fast floods** or flash floods are caused by unusually intense and heavy rainfall in thunderstorms, typhoons, etc. They can also be caused by a sudden release of a large volume of water upstream.

Estuary floods: These floods are usually caused by a combination of sea tidal surges and high water level in the river, or by either.

Coastal floods: These are caused by sea storms, tsunami, hurricanes (typhoons) etc. and a rise in sea levels or tides in low-level islands and coastal areas (Venice, Maldives, etc.).

Poor drainage area floods: Floods occur in these areas when the soil cannot absorb or there is no escape route for water poured into it from rainfall or other sources.

Other floods: Floods caused by dam breakage, landside, earthquake, volcano eruption, etc. Floods caused by continuous storms over the same area.

Effects:

Main effects:

- Floods can damage or destroy bridges, buildings, roadways, canals, riverbanks, sewer systems, etc.

- People and livestock die due to drowning. Floods can also lead to epidemics and diseases.

- Crops can be damaged or destroyed.

Secondary effects:

- Water supplies can be contaminated and drinking water become scarce.

- Because of contaminated water and other unhygienic conditions diseases often break out.

- Long and short-term food supply shortage.

Long term effects:

Depending on the extent of the flood, economic problems will occur due a decline in tourism, rebuilding costs, housing, demands on the social welfare system, price increases caused by food and other shortages, etc.

Warnings and precautions

Many slow floods can be predicted in time to evacuate the endangered area, others like flash

floods give very little forewarning. Monsoons, protracted rainfall, hurricanes (typhoons) are some indicators of possible flooding. All of these can be predicted with modern weather forecasting technology and that is why paying attention to weather forecasts is important.

Fast floods are more difficult to predict because many are caused by local intense cloudbursts often upstream unknown to inhabitants in the endangered areas downstream. Cloudbursts or local thunderstorms are difficult to forecast. However, large hark heavy rain clouds in the hillside can be a warning sign, especially in areas where the mountainside is steep and the rivers are narrow.

Most floods caused by debris blocking rivers upstream can be predicted and prevented if observation and action are undertaken.

Areas along the coast and river estuaries need to pay attention to abnormal high tides, sea storms and tsunami warnings.

Tropical Cyclones (Hurricanes / Typhoons)

A tropical cyclone (hurricane/typhoon) is a tropical storm with sustained winds of at least 33 meters per second which rotate counter-clockwise. It also contains an enormous amount of moisture which can cause intense heavy rainfall.

Depending on the region different names are used to describe a strong 'tropical cyclone'

Hurricane: North Atlantic Ocean, Northern Pacific Ocean (east of the dateline), South Pacific Ocean (east of 160E)

Typhoon: Northwest Pacific Ocean (west of the dateline)

Severe Tropical Cyclone: Southwest Pacific Ocean (west of 160E), Southeast Indian Ocean (east of 90E)

Severe Cyclonic Storm: North Indian Ocean

Tropical Cyclone: Southwest Indian Ocean

Where and when

Tropical cyclones (typhoons/hurricanes) are caused by a large difference in air and sea temperatures which occurs especially in the late summer months.

Almost one-third of the world's tropical cyclones (typhoons) are formed in the Western Pacific doldrums. Typhoons are formed throughout the year but usually peak between August and October. May is the least active, September the most active. The Western Pacific Basin is also the source of the world's most intense storms. The Atlantic hurricane season basically corresponds to the typhoon season.

Typhoon paths

Straight: These generally follow a westward path and affect the Philippines, southern China, Taiwan and Vietnam

Recurving: These follow a westward path then turn north and affect China, Taiwan, Japan and Korea

Northward: These turn northward almost from their point of origin and affect some Pacific islands

Effects

- While still at sea, tropical cyclones cause large waves, heavy rain and high winds disrupting sea transportation and often causing ship-wrecking.
- When they reach land, they can cause a rise in sea level (storm surge), and high waves which can result in flooding in low-level coastal regions and is the cause of 90% of tropical cyclone deaths.
- On land, cyclones can seriously damage and destroy buildings, structures, or anything that is exposed to their severe winds. Flying debris can become deadly projectiles.
- Tornadoes can also be formed as a result of cyclones.
- Because these storms occur in or near tropical areas in summer, the risk of the spread of diseases is high, especially in overcrowded evacuation centers and in the unhygienic conditions that remain in the wake of such disasters.
- The damage caused by the storms often makes relief and recovery work difficult, and in some cases the economic damage is astronomical (Hurricane Katarina). In many Pacific regions, these storms hit just before or during the rice harvesting season and often wipe out a whole season's crop.

Warnings and precautions

Tropical cyclones (hurricanes/typhoons) can be

strength and course and therefore need continuous observation. Since the path of a tropical cyclone can be generally predicted, there is time prepare as much as possible to reduce the risk of disaster. However, if they are not predicted early enough, they can strike quickly and violently with gale-force winds and torrential rain, and in coastal areas they can cause flooding due to sea surge and high waves thus giving local people no chance to evacuate or prepare.

Volcano Eruptions

A volcano is an opening in the earth's surface from which allows magma, cold and hot ash and gasses to escape. A volcanic eruption occurs when there is an explosion of a large volume of hot magma, ash, rock debris, etc. from the mouth of the volcano.

Volcanoes are often found in the same areas that earthquakes regularly occur such as the Pacific Rim of Fire (so called because so many volcanoes are located along the Pacific Rim).

Types of volcanoes
This classification is used to describe the frequency of eruptions of a volcano. However, volcanologists believe that this method is not very accurate because some volcanoes have a lifespan of anywhere between a few months to a few million years. It is quite dangerous to think that a dormant or extinct volcano will not erupt.

Active: Volcanoes are considered active if they erupt regularly, or if they have erupted within historic times. However, recorded history varies from region to region; in the Mediterranean and China it is over 3,000 years but in Hawaii and New Zealand it is only about 200 years. However, scientists consider a volcano active if it is likely to erupt it there are signs of unusual earthquake activity, gas emissions, etc.

Extinct: Extinct volcanoes are those scientists consider unlikely to erupt because there is no lava within it. There are some volcanoes like the Yellowstone Caldera that have not erupted for more than 500,000 years but scientists still consider active because there is geothermal ground uplift activity.

Dormant: It is difficult to distinguish a dormant (sleeping) volcano from an extinct or active volcano. Most dormant volcanoes are those which have no record of eruption, but cannot be written off as extinct.

Effects
- Since there are many kinds of volcanic eruptions, there are many different effects, some direct others indirect.
- When an eruption occurs, debris (basalt, etc.) can be thrown over a wide area and act like non-explosive missiles and hot lava can flow down volcano slopes sometimes covering and burning villages and towns.
- Lava is super-hot molten rock which can flow slowly or quickly when there is an eruption. It can destroy anything in its path.
- Ash, because it is lighter rises higher into the air or stratosphere and travels over a wide area and when it falls can cause serious crop damage and pollution. In areas near the volcano, ash can accumulate causing considerable damage to the environment. If mixed with water (rain, etc.) the ash can become a concrete-like mixture. Large amounts of ash may cause roofs, etc. to collapse.
- Volcanoes also emit many kinds of dangerous gasses; carbon dioxide, sulfur dioxide, hydrogen sulfide, etc. If these chemicals are mixed with rain they can create what is called acid rain, which also damages crops.

Warnings and precautions
Considerable advances have been made in predicting volcanic eruptions. Earth movements (volcano seismology), gas emissions, thermal monitoring, ground deformation, hydrology, etc. are used to predict volcanic eruptions. However not all volcanoes are monitored adequately and many developing countries do not have the means to predict eruptions. Because of the nature and complexity of volcanoes, long-term predictions are usually general.

Generally speaking, the greatest damage done by volcano eruptions is in the immediate area around the erupting volcano. It would be sensible not to build villages, towns, cities, or farms

in the area, but since many volcanoes have not erupted for hundreds or thousands of years, people think they have become dormant or inactive and build settlements around them. Although an eruption can occur very suddenly and violently, often there are signs of irregular activity beforehand such as abnormal small eruptions, emission of gas, hydrothermal activity, rumbling sounds, etc. If these are noticed, early evacuation or preparation for evacuation

Tornadoes

A tornado is a violent, dangerous rotating column of air. It is visible in the form of a spiraling narrow funnel connecting a cumulonimbus cloud or the base of cumulus cloud with the surface of the earth. Tornadoes have a wind speed of 64~177 kph, are about 75 m across and travel a few kilometers before they dissipate. The worst tornadoes can have a wind speed of more than 480 kph and travel more than 100 km.

Effects
Tornadoes often affect a rather limited area during a very short time. Large tornadoes are one of the most intensively destructive natural climatic forces and are extremely dangerous. They can uproot most small and light structures, vehicles of all kinds and sizes and large trees. Waterspouts and landspouts are less destructive because of their size so the damage is relatively smaller.

Warnings and precautions
Most advanced countries have radar systems that can detect large tornadoes, but they are still difficult to predict. Waterspouts and landspouts are even more difficult to predict because they are very local, they form and dissipate suddenly and of a relatively small size. Some large tornadoes can be seen coming, but there is often only enough time to evacuate to a safe place. Because of their destructive force, light buildings, wooden houses etc. are often torn to pieces, thrown into the air and scattered over a wide area. This flying debris is also very dangerous and some can even pierce through roofs, etc. As a result it is difficult to find adequate shelter in rural and open-space regions where they often strike.

Landslides / Mudslides

Mudslides (**Mudflows**)**:** Mudslides are the movement of a large mass of mud (loose soil and water). They can be very fast (up to 80 kph). A mudslide can be comprised of very soft (almost liquid-like) or wet soil, rock, volcanic ash, etc.
Mudslides usually occur on or near hill slopes after heavy or prolonged rainfall, which causes soil or sediment to become soft and erode. Some mudslides can affect a wide area and often travel some distance from their source if assisted by rivers and streams.

Effects
Mudslides can cause loss of life and destroy houses, villages, and farms built on hillsides, at the foot of hills or near riverbanks.

Predictions and precautions
Because most mudslides are the result of heavy or prolonged rainfall or snow melting and usually occur on hillsides composed of soft soil or loose rock, they can be expected to occur if

these conditions exist. People living in such areas need to be constantly aware of the possible occurrence of mudslides, especially when there is heavy and prolonged rainfall.

Landslides (Landslip): A landslide includes any of the following: rock falls, earth flows, slope failures (collapse of slopes), shallow debris flows, etc.
Landslides occur when the surface of a slope becomes unstable under the following condi-

tions: (a) if they become excessively wet, (b) have lost their vegetation, (c) if there is erosion at the toe of the slope caused by rivers or ocean waves, (d) due to effects of melting snow or glaciers, (e) after earthquakes render the slope structure unstable, (f) liquefaction (g) as a result of earthquakes or volcanic eruptions.

Major landslides can be triggered by earthquakes, as was seen in Sichuan, China in 2008. Human activities such as deforestation (logging), cultivation (farming), construction and vibrations from blasting, mining and machinery may cause landslides on fragile slopes. The construction roads etc. which alters the shape of a slope can induce landslides. Changing the eco-system is another possible cause.

Wildfires

Wildfires are uncontrollable fires which burn in hills, and other wildland areas. They usually occur during hot, dry seasons and are started by lightning and drought, though some are caused by human negligence or by arson.

Effects
Fires can threaten and destroy farmland, housing, and human life especially in rural areas. They can also seriously damage the wildlife environment in the area and can continue to burn for days.

Predictions and precautions

Prolonged and severe droughts create an ideal environment for wildfires. People should expect wildfires to occur in such climatic conditions and as such be ready for them.

Local authorities may need to issue a temporary ban on the use of open fires in such situations, as is the case in Australia when there is a threat of wildfires starting.

Hikers and campers, etc. need to be careful when using fires. Casually tossing a lit cigarette butt away near a wildlife or forest area can also cause a wildfire.

Epidemics / Pandemics / Diseases

An **epidemic** is an outbreak of an infectious disease that spreads quickly among many people. A **pandemic** is an epidemic that spreads globally. There have been many epidemics throughout history; the most infamous is probably the Black Death which spread throughout Europe between 1348 and 1350 and is estimated to have killed between 30% and 60% of the population of Europe.

There have been a number of serious pandemics in the last 100 years: the 1918 Spanish Flu (est. 50 million deaths worldwide), the 1957~8 Asian Flu (est. 1 million deaths), AIDS beginning in 1959, the 1968~9 Hong Kong Flu, SARS in 2002~3, and the recent H1N1 Influenza in 2009. Other serious diseases such as malaria kill an estimated 1.5 million people a year.

Precautions
Good public and personal hygiene can help pre-

vent the spread of many contagious diseases, therefore educating people about the importance of public and private hygiene is very important. Educating the public about the disease, how it spreads, how to prevent being infected and how to treat it are very important.

Public panic and unnecessary anxiety often occur when an epidemic or pandemic breaks out. To prevent these, the dissemination of accurate and practical information to all members of the community is important.

In serious cases, putting people into quarantine may be necessary.

Cleaning up after disasters can be dangerous!
Cleaning up after disasters can be dangerous to workers and volunteers.
Possible dangers are:
(1) collapsing buildings, etc, (2) injury by sharp objects, electrical cables and other hazardous

materials, (3) biological hazards – contamination through blood, human fluids, polluted water, unhygienic conditions, (4) exposure to heat and cold, (5) overwork and strain causing musculoskeletal problems, (6) stress (physical and mental), (7) trauma, etc.

Workers and volunteers need to be aware of the possible dangers and be prepared, and disaster relief managers need to ensure that their workers and volunteers are aware of these dangers and are provided, if possible, with hard hats, heavy work gloves, boots with steel toes and soles, and other protective wear.

Disasters in Indonesia

Various disasters have been close to Indonesian people's lives. Almost every year big disasters happen. In the last few years disaster incidents seemed endless: earthquake in Papua (2004), earthquake and tsunami in Aceh and North Sumatra (2004), earthquake in Nias (2007), eruption of Mount Merapi (2006), earthquake and tsunami in West Java (2006), flash flood in South Sulawesi (2006), earthquake in West Sumatra (2007), earthquake and tsunami in Mentawai (2007) and the latest earthquakes in West Java and West Sumatra (2009), not to mention other various natural occurrences in other parts of Indonesia, which have brought adverse impacts to people's lives. During the period of 2006 – 2007, for example, 840 disasters had occurred. The death toll reached about 10,000 and more than 4 million people were directly affected by the disasters.

Seeing the prevailing situation and condition, the Indonesian government and communities have begun to make an effort to mitigate the impacts of disaster in a better way. In the last few years, the paradigm of disaster management has changed from the previously reactive and responsive actions following disaster to actions of earlier preparedness before disaster. This means preventive and mitigating actions have begun to be taken seriously. At present the paradigm of disaster management refers to the measures taken to reduce disaster risks, done before, during and after any occurrence of a disaster.

In any occurrence of disaster, certainly the main priority is to save human lives. The Law of the Republic of Indonesia No. 24/2007 on Disaster Management clarifies in Article 26 the rights of the people who suffer from a disaster. People, especially those prone to disaster, have the right to receive social protection and security. They have the right to have basic needs fulfilled. In particular, in disasters caused by construction failure, victims have the right to receive compensation. Some measures of disaster management have been taken in order to fulfill these basic rights.

Chapter 6
The Role of Community Radio in Disaster Management Efforts
(Case Studies)

Padang Sago Community Radio

The earthquake that shook West Sumatra on September 30, 2009 caused countless loss of lives and property. The earthquake brought deep sorrow and trauma to the people. Yet, the disaster awakened community radio activists to develop a community-based Disaster Information System. Padang Sago Community Radio is one of the community radio stations in Padang Pariaman Regency. It was established a week following the earthquake. Formerly, the radio was an emergency radio established by Combine Resource Institution (CRI). Because of the high enthusiasm and participation of the people in running the radio, CRI gave them the radio equipment.

Why did community radios in Padang Pariaman Regency develop a Disaster Information System following the earthquake? What did they do? What strategies did they apply to develop the system? One problem that the people faced during the emergency response phase was the low performance of governments in handling victims and distributing aid. The aid distribution had to pass through a long bureaucratic chain. As a result, the victims' needs could not be quickly tackled. Such a condition was worsened by the government's inaccurate data. Information about the number of victims, which areas were hit by the disaster, victims' needs, etc., was not reliable.

Considering this condition, activists in community radio in the regency and the city of Padang Pariaman agreed to set up a Community Radio Network working group. Facilitated by CRI, they participated in developing the SAHANA-based disaster management system. There were four community radio stations participating in this activity.

To solve the problem of distance between the radio stations, communication radio technology was used. This technology is cheap because there is no need to pay any costs. Every day, these radio activists exchanged information. The information then was disseminated through their respective radio stations. In addition, community radio stations in the Regency and City of Padang Pariaman mobilized volunteers to collect data, especially from firsthand sources, from people's groups at the level of *Korong* – a residential unit area as large as a *rukun tetangga* (neighborhood). Data collected from them was then used for broadcasting materials. This program was used by donor organizations and the government as a guide for distributing aid; for example, in determining type and quantity of aid, and in improving their data. Through the Disaster Information System, community radio activists in Padang Pariaman developed two-way information and communication activities between the people and the government.

Padang Sago Community Radio itself regularly broadcast advice on how to access aid from these organizations, and how to pass through the transition period safely. It also broadcast information on how to build an earthquake-resistant house, how to cope with health problems following the disaster, and gave information on the general overview of disaster management efforts. To maintain the validity of their data, they reported in accordance with the principles of journalism.

(Sabar Rina, Director of Padang Sago Community Radio, Padang Pariaman)

Suara Pangandaran Community Radio

The disaster caused by the earthquake and tsunami that hit the southern coast of Java, including Pangandaran, on July 17, 2006, roused people's awareness of how important knowledge about the environment, nature and weather is. Suara Pangandaran (Voice of Pangandaran) Community Radio on 107.7 FM appeared as a reliable information source for the surrounding communities. This radio station was easily accessed by the community, especially those staying at the refugee camp.

On-air programs produced by Suara Pangandaran Community Radio were, among others:
1. News programs which covered information about aid distribution, aftershocks and weather conditions for fishermen. To validate the information, the radio made a contact with the Meteorology Station I of the Meteorology and Geophysics Agency in Cilacap. For weather information, fishermen offshore also gave information to the radio. Therefore, a two-way communication between the radio and listeners could be established, making exchange of information possible from both sides.

2. Entertainment Programs

3. A special program for recovery activities, namely Recovery Forum for All. This program discussed the acceleration of post-disaster recovery. Many competent speakers experienced in their fields were presented to directly talk to people who could communicate through SMS or telephone.

Off-air Programs:
1. Education and Information on Disaster
This program also took on the activity of English learning for kids, and was held on the beach. Besides its educational purposes, this activity could also be seen as a tool for healing post-disaster trauma.

2. The radio station also always reported on the latest situation in a rational manner both through on-air and off-air programs. When there was an uncertain rumor, the radio mobilized volunteers to patrol around the neighborhood. A Scooter team, using Vespa motorbikes or *suku nu muter* (Sundanese language, referring to a bike). As a result, the people always felt safe. This activity became quite an effective solution to calm the people down. Slowly, they began to be cautious and critical of the information that circulated among themselves.

3. Data and information services for victims of the disaster
The radio station always took care to communicate the interests of the affected communities, including information about the needs of refugees, and the availability of food and other necessities. This radio also had a team of volunteers to assist the affected communities and to act as motivators and facilitators. For example, they encouraged community members to work together to improve sanitation facilities. The best field facilitators also provided training on trauma healing, especially to children and women, and were assisted by volunteers coordinated by the radio. The radio also planned off-air activities such as World Clean Beach Day on September 19, 2006.

4. Suara Pangandaran Community Radio organized community dialogs and conducted disaster management training in schools.

Radio Menara Siar Pedesaan

When an earthquake with a magnitude of 5.9 on the Richter scale shook Yogyakarta, the entire equipment of Menara Siar Pedesaan Community Radio in Terong Village, Dlingo Sub-district, Bantul Regency, was damaged by a falling wall. At that time, everybody was busy trying to save their own families. But after three days, personnel of the radio station decided that the radio had to resume broadcasting immediately. Fortunately, the transmitter still worked. Therefore, a transmitting antenna using a tape recorder and planks was constructed, and the broadcasting was carried out. Despite the absence of electricity, MSP Community Radio could run its broadcasts after borrowing a generator from a fellow villager. They then realized their radio could play an important role for the people at that time. They could send information faster. Through MSP radio, the residents of Terong Village could make reports to organizations or the government which needed information about the latest condition, and the other way round, it could receive information from the government. MSP radio received aid in the form of broadcasting equipment from Radio News Agency 68-H and Combine Resource Institution for outside studio broadcast activity.

The broadcasting program during the emergency response period totally changed. It broadcast information about the needs of the victims and the distribution of aid to the people. MSP also presented actual information about the latest natural conditions through collaboration with the Meteorology and Geophysics Agency, Sarkolak, at both province and district levels, and many non-government organizations.

MSP radio also took part in activities to collect data and disseminate information about the number of families. This data was used as the database for the reconstruction program funded by the government. The data was collected from several hamlets and about 1,500 houses, and in two days it was found that there were only 300 houses left worth living in. At the beginning, the activity of data collecting encountered problems because there was no clarity about the scale with which the degree of damage could be assessed. Personnel from MSP radio set out to find out accurate information from the government of Bantul Regency. As a result, the radio station could get an information sheet explaining the criteria for a damaged house. The information was then repeatedly broadcast so that every RT (Rokun Terong) neighborhood association could collect the data more accurately. To make the role of the heads RT associations easier and to have agreement on the indicators for damaged houses, the radio gave each RT association head a radio receiver. On the authority of the village head, Sudirman, the radio required them to listen to the radio for 24 hours.

MSP community radio presented not only information but also entertainment like songs, *kethoprak* and *wayangan*, as well as live shows. The kethoprak show had a special story. MSP radio, working together with NICO Japan, presented a kethoprak show, a combination of Japanese tradition and *Mataram-style* kethoprak. This show was part of the trauma-healing program for the people. The role of women seemed to be very helpful for MSP personnel in the process of post-disaster recovery. Many post-disaster aid roles were given to women. After passing through the reconstruction stage and entering the reconciliation stage, the women of Terong Village organized a special activity for mental recovery. It was a mass exercise with prizes like goats, chickens and hundreds of other gifts, attended by approximately 1500 women of Terong.

Angkringan Community Radio

Until the fourth day after the earthquake all information from Angkringan Community Radio halted due to the absence of electricity. Because the studio was damaged the radio personnel could not run any broadcasts. It was worsened by the fact that the radio personnel were also victims of the earthquake. They could not even communicate with one another because they were too busy with their own necessities. On the third day they planned to create an emergency studio at Saryanto's house. This decision was made because the house was near a place used as a shelter. The studio was equipped with any devices they had at hand. Some devices belonged to villagers. At that time the antenna was placed on a tree. Due to lack of equipment, they also borrowed an antenna and cables. The placement of the antenna was far from the emergency studio because there was no available spot in or on the house. The distance between the emergency studio and the transmitter antenna was approximately 30 meters. Even after all devices could be installed, the problem of the absence of electricity remained. But after borrowing a generator from CRI, the radio could run its broadcasts again.

In delivering information, Angkringan Community Radio ran entertainment programs. In the evening many people came to the studio and requested the radio station to play their favorite songs. Other people came to ask the truth about the information spreading among the people. A month after the earthquake, the equipment of the radio was better although it was still in the emergency studio. The radio station had quite a lot of personnel. So, an aid post was set up at the studio, too. It was managed by Angkringan Community Radio and located at the emergency studio where the distribution of the aid became more organized. Aid mostly took the form of craftsmen's tools and money. The aid was immediately distributed to people in need.

Anticipating the lateness of Timbulharjo village government in managing aid distribution, Angkringan radio coordinated with non-government organizations and became busy distributing aid directly to the people. The earthquake disaster indeed depressed the psychological condition of the community. However, Angkringan creatively tried to make the people become not too occupied by the grief. Besides delivering information, Angkringan Community Radio also produced comedy programs to cheer up the residents. During the programs announcers always told typical jokes of Yogya, making the people laugh and feel a little happy. Collaborating with CRI, Angkringan Community Radio held a 'Nonton Bareng' (Watching Together) activity. Using an outdoor screen, people could watch live football matches of the World Cup. For 14 months, activity of Angkringan Community Radio continued to broadcast from its emergency studio for 14 months.

Swara Meulaboh FM Community Radio (RAKAN FM)

Formerly this radio station was called Swara Meulaboh FM (Voice of Meulaboh FM) located at a volunteer post in Johan Pahlawan sub-district, Meulaboh. But four months after its founding, the studio was moved and the name was changed to Rakan FM and stands for *Radio Komunitas Aneuk Nanggroe* (Community Radio of Nanggroe Children). This radio broadcasts on frequency 107.7 Mhz, providing information about the recovery of Aceh. Field reportage was often done and broadcast through radio, both on live and delayed broadcasts. In the beginning of May 2005, the radio broadcast a live report of the Festival of Aceh's Culture which was held by a foreign non-government organization in collaboration with the local government. This event showed local art and traditional performances done by Aceh children from all the refugee shelters in West Aceh. The Rakan crew covered this event on location with a communication device and from their studio. Information from the location of the event was sent through radio communication to broadcasting equipment in the studio, and then was broadcast through the radio. Such a pattern of broadcasting from the field was often done if it happened that the radio was able to transmit live broadcasts.

Enthusiasm of the people (especially the youths) to participate in the radio activities was quite high. It was not surprising some announcers were young; they were university students, high school students and youths from the refugee camps. They were so spirited and optomistic. The presence of this community radio provided these young people with a place to show and express their creativity, which had almost faded after being eaten way by years of conflict. For a very long time, they had no access to communication and information especially through the medium of the radio.

Al-Jumhur Community Radio

Al-Jumhur FM Community Radio was rather different from other community radio stations in Aceh. This radio station focused on programs with an Islamic character. The mission of its broadcast was the proselytizing and education of Islam, such as Koran reciting, religious speech, etc. All songs played were Islamic songs. The location of the studio beside a refugee shelter in Simpang Mamplam made the radio a friend of the displaced people in the shelter. When it broadcast for the first time, it had to be an entertaining and educating medium through religious education. Advice and religious messages were delivered through the radio were quite influential in healing the trauma and awakening the spirit of the people staying in the refugee shelter.

Information about the shelter was often broadcast by the radio personnel, some of whom came from the shelter. However, radio personnel were dominated by students of Dayah Ikhayaul Ullum Al Aziziyah. The name 'Al-Jumhur' itself comes from Arabic, and in English means "shared property". Even today, the radio station that was born during the emergency response following the disaster still runs on frequency 107.8 MHz.

Seha FM Community Radio

Seha FM Community Radio located in the Jantho Sub-district, Aceh Besar, broadcasts on frequency 107.8 Mhz. The word 'Seha' is an abbreviation for *'seunang hatee'* (the literal translation in English is 'delighted heart'). The radio opened space for and facilitated groups of traditional artists of Aceh to preserve and develop all products of the local culture. Once a week this radio had live program that was filled in turns by Koran recitation groups from Jantho City of Aceh Besar Regency. Dalail Akhirat was one of the groups filling the program. This group consisted of men who disseminated Islam religion through enchanting the *dalail* that contained prayers of adoration, religious message/advice in Arabic.

Besides male Koran recitation groups, female ones also involved in the program. Most of them were refugees who lived in refugee camps in some areas in Jantho at that time .The existence of this radio station was very helpful for displaced people in Jantho, which became the main place for refugees from Pulau Aceh, Meuraxa, Leupung and other areas. This radio facilitated many different art and culture communities like the *Pengajian Dalail Akhirat* group, consisting of men and women (married women). Displaced people were very enthusiastic to listen to Seha FM. Besides entertainment (songs), the radio also relayed programs from Radio News Agency 68-H and the emergency the program "Peuneugah Aceh" from Internews, which contained news and information about the latest conditions in Aceh following the earthquake and tsunami.

Lots of information about the condition of the refugees in the tents were broadcasted by the volunteers in Seha Fm. The news that it reported was also sent to radio stations in Jakarta like KBR 68H and Elshinta, and program of *Peunegah Aceh* that was produced by Internews.

Radio Samudera FM

Samudera FM Community Radio broadcasts on 107.7 MHz. A team of reporters actively broadcast field reports from the refugee shelters in the Samudera sub-district, North Aceh. They raised issues that occurred around the refugee shelters. This was what made the relationship between the radio and the community, especially the displaced people, become closer and closer. Their conditions were often broadcast on the radio. This closeness became a factor in building public trust which resulted in the community not hesitating to deliver its aspirations through the radio.

The personnel/announcers of Samudera FM Community Radio were youths from the refugee shelters. They felt could heal their pains caused by the disaster through their involvement in community radio and related activities. In addition, they also wanted to share with other fellow refugees by providing them with amusement and encouragement to continue improving their lives. To heal the pain and trauma of the displaced people, besides entertainment (songs) played on the radio, the radio station also had a spiritual program that contained religious speeches, Aceh's advising *Nazam* (poem), etc. All these programs were aimed at strengthen the spirit of the refugees and to heal their trauma. Activities at the mosque close to the studio location were also often broadcast live by the radio.

Broadcasting multi-language programs for immigrants

On October 23, 2004, an earthquake of magnitude 6.8 struck the Chuetsu region of Niigata Prefecture. Volunteers, composed mainly of people who worked as volunteers after the Hanshin-Awaji Earthquake, provided people in the area who had difficulty understanding Japanese with information in their own language.

Information sent from the region was translated into Chinese, Tagalog, Portuguese, Spanish, English and Korean and was sent back to the area as audio data where it was used by the local community radio station in its broadcasts. In addition, 6,000 radios were collected and a label with the times of broadcasts in different languages was attached to each radio. These were brought to the disaster-struck area and distributed to those in need

of them. Included in broadcast information was the message "Aid from around the country will reach you. Do not worry," which helped to ease the anxiety of the victims. The region had a community radio station but it did not have multilanguage programs at the time. However, as a result of broadcasting disaster-related information in various languages, multilanguage programs began to be broadcast by the station.
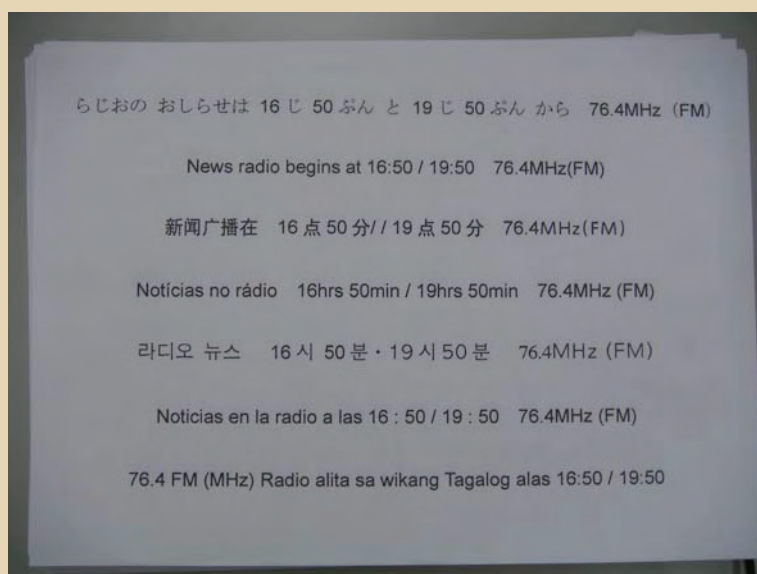
International Solidality

"Taiwan, Jiji Earthquake Support"

On September 21, 1999, an earthquake of magnitude 7.3 struck the central region of Taiwan. Because Thai, Philippine and Indonesian immigrants lived in the region, a party, composed mainly of Hanshin-Awaji Earthquake volunteers, was sent from Kobe and set up information and consultation services in Thai, Tagalog, Indonesian, English and Japanese for 3 months as emergency support. One year later, in order to pass on important information on the recovery period, we worked together with local NGOs and had information sent from Taiwan translated into various languages and broadcast it on information programs. In addition, a Chinese language program was created to introduce Taiwanese culture and traditions, both of which were broadcast on the Internet. Multilanguage information was also passed on in printed form and on the Internet.

Through these activities, residents in the Hanshin-Awaji Earthquake and Jiji Earthquake areas continue to have exchanges today.

Networking with other radio stations

There are limits to what one radio station can do during any of the following phases: pre-disaster prevention, during disaster, and the post-disaster reconstruction period.

For example: What would happen if the building housing the radio station was seriously damaged in a natural disaster? What would happen if radio station staff were victims of the disaster and couldn't carry out their broadcasting work?

In situations like this, the most dependable measure is support from other stations. Because they know about radio stations and how they are run, they can provide various kinds of support necessary for broadcasting.

However, if there is no regular contact or communication among stations, mutual support will not work efficiently when a disaster occurs. If stations meet regularly, co-produce radio programs, and work together, a disaster management network can be built.

Below are examples of how networking can be carried out.

Regular Meetings

Through regular meetings, not only for disaster prevention but also for exchanges about everyday affairs, a mutual exchange of know-how and experience can be created.

Network Programs / Co-produced Programs

A network composed of multiple radio stations can create a timetable for broadcasting the same programs, decide a theme and in turn, broadcast programs each station has created. By choosing disaster prevention as a unifying theme, stations can create programs treating this theme from various points of view. This can lead to an increase in listeners' disaster prevention awareness.

Creating co-produced programs also strengthens the network.

Program Contests

Program contests in which judges chosen from each station judge programs in different categories and present prizes to excellent programs can be held. "Disaster prevention" should be included in the program category list, and every station should broadcast the most excellent program in this category.

Equipment List

Each station should prepare a list of equipment it can lend out, and share this list with other stations to prepare for when a station's equipment is damaged due to a disaster, or for an occasion when equipment breaks down or cannot be used.

By carrying out such regular networking activities, radio stations can reduce disaster damage risk, and become a media with listener-confidence. Such activities can be begun at a level that can be managed.

Memorial Events

As an off-air activity, events play an important role in providing listeners with an opportunity to learn with their five senses about disaster prevention and about the importance of life. Unlike watching TV or listening to the radio, participation in events creates opportunities to actually experience many things.

Also, informing TV and major radio stations in advance that the community radio will broadcast an event live on the theme of natural disasters, and broadcasting the event live will result in many listeners gathering and participating. Broadcasting events in which residents participate, gives listeners a sense of participation and a feeling that it is something close them.

For example, through live broadcasting of annual memorial events of natural disasters that are held together with local residents, we can pass on to listeners experiences of disasters, the message of the preciousness of life, and the importance of disaster prevention activities.

Another event representative of a disaster prevention event is the 'town-walk workshop.' It is an open event where Radio FMYY listeners can listen to disaster prevention specialists, program personalities and announcers as they walk around the town looking at it from a disaster prevention perspective. It is an event combining disaster prevention study and hiking.

  Live coverage of the event with commentators and announcers gives listeners who cannot participate the chance to learn about things that are useful in times of disaster or problems that might occur in a disaster.

  In this way, events provide radio stations with the opportunity to bring listeners directly in touch with disaster damage risk reduction. Also, live broadcasting of these events can give listeners the feeling they are actually at the event.

1.17 Kobe ni Akari wo in Nagata (1.17 "Bring Light to Kobe" in Nagata)

On the anniversary of the Great Hanshin-Awaji Earthquake (January 17), the commemorative event *1.17 Kobe ni Akari wo in Nagata* (1.17 "Bring Light to Kobe" in Nagata) is held together with many listeners and local residents as a memorial to the victims of the earthquake as well as to increase disaster prevention awareness. The figures "1.17" are created with candles which are lit at the time the earthquake struck. At that time all participants offer a silent prayer for the repose of the spirits of earthquake victims. The event includes the singing of a song born from the earthquake by junior high school students, a Japanese drum performance in memory of the victims and for the recovery of the disaster-hit area and music performances on stage. Radio FMYY broadcasts live radio coverage of these memorial events as well as talks about earthquake experiences and disaster prevention activities with earthquake victims, specialists, local government staff, NGO staff and various artists from its outdoor studio set up at the event venue.

However, as time passes, the number of these events has decreased. In order to prevent the experiences of the earthquake disaster from being forgotten, we produce programs that pass on the lessons learned from the earthquake to enhance residents' disaster prevention awareness, and provide other community radio stations with these programs. As well as this, we provide live coverage of events in the disaster-hit area on January 17 by telephone to a number of radio stations.

Program – "*Daishinsai wo kataritsugu*" (Continuing to talk about the great earthquake disaster)

In order to prevent the experiences of the Great Hanshin-Awaji Earthquake from being forgotten, a thirty-minute program **"*Daishinsai wo kataritsugu*"** (**Continuing to talk about the great earthquake disaster**) is broadcast every week on Sundays (holidays).

In this program we want to pass on to future generations the important themes of "The Preciousness of Life" and "Lessons Learned from the Earthquake," and create communities that can cope with natural disasters by having disaster victims, disaster-relief volunteers, local government staff and specialists, etc. discuss the earthquake disaster and how to create disaster-strong communities. The program is uploaded onto the Internet the following day and can be downloaded on demand by those who missed it.

Fukkotai "Yumehikaru machi wo"

"Yumehikaru machi wo"(Dream-light to the city), a song expressing the pain of the

earthquake disaster and the desire for recovery, composed and sung by a 3-member band "Fukkotai" who were victims of the Great Hanshin-Awaji Earthquake, is broadcast as the theme song of a daily lunchtime regular program. Listeners who hear *"Yumehikaru machi wo"* sing it as their own song on various occasions. The song has now become the community's theme song.

Sources of Information

Disaster Management Audio Materials
http://www.drlc.jp/dmam/

Free and Open Source Disaster Management system "SAHANA"
http://www.sahanafoundation.org

Asian Disaster Reduction Center (ADRC)
http://www.adrc.asia/

Asian Disaster Reduction and Response Network (ADRRN)
http://www.adrrn.net/

Asian Disaster Preparedness Center (ADPC)
http://www.adpc.net/v2007/

UN International Strategy for Disaster Reduction
http://www.unisdr.org/

UN Office for the Coordination of Humanitarian Affairs
http://ochaonline.un.org/

UNCRD Disaster Management Planning Hyogo Office
http://www.hyogo.uncrd.or.jp/

Relief Web
http://www.reliefweb.int/

International Federation of Red Cross and Red Crescent Societies
http://www.ifrc.org/

SEEDS India
http://www.seedsindia.org/

Mercy Malaysia
http://www.mercy.org/my/

Gender and Disaster Network
http://www.gdnonline.org/

INTERNES
http://www.internews.org/

JICA Hyogo/Disaster Reduction Learning Center (DRLC)
http://www.drlc.jp/english

Combine Resource Institution (CRI)
http://www.combine.or.id/

World Association of Community Radio Broadcasters (AMARC)
http://www.amarc.org

Profiles of Organizations

JICA Hyogo / Disaster Reduction Learning Center (DRLC)

Japan, as one of the world's natural disaster-stricken countries, has accumulated a fair amount of disaster reduction knowledge. In addition, Japan has provided emergency disaster aid for developing countries and has encouraged the efforts to improve disaster reduction measures and the commitment to disaster reduction in affected countries and areas.

On April 1,2007, Hyogo Prefecture Government and the Japan International Cooperation Agency (JICA) established the Disaster Reduction Learning Center (DRLC) as a base to more efficiently foster the personnel who will be involved in disaster reduction in developing countries.

DRLC is committed to making full use of Japan's disaster experiences, lessons we have learned from them and the expertise in disaster reduction/prevention we have accumulated with an aim of effectively fostering international personnel in the field of disaster reduction/prevention.

World Association of Community Radio Broadcasters (AMARC) Japan Working Group

Through service to members, networking and project implementation, the World Association of Community Radio Broadcasters AMARC, brings together a network of more than 4,000 community radios, Federations and community media stakeholders in more than 115 countries. The main global impact of AMARC since its creation in 1983, has been to accompany and support the establishment of a world wide community radio sector that has democratized the media sector. AMARC advocates for the right to communicate at the international, national, local and neighborhood levels and defends and promotes the interests of the community radio movement through solidarity, networking and cooperation.

AMARC JAPAN WORKING GROUP was established on June 23, 2007 with its secretariat office located within the office of Radio FM YY (Wai-Wai).

Combine Resource Institution (CRI)

Combine Resource Institution (CRI) is a non-government organization in Indonesia, established in 2001. It works to support the management of community knowledge through community-based information and communication networks. The main activities of CRI include the development of data and information management system for communities, development of appropriate information technology and education on media for the community. The development of community broadcasting networks in Indonesia is one of CRI's concerns. The head office is located in Bantul, Yogyakarta Special Region. Area of operation covers the entire territory of Indonesia. CRI has experiences in the field of disaster management through the utilization of information and communication technology for emergency response and early recovery stages; for instance, after the earthquake and tsunami in Aceh and North Sumatra (2004), earthquake in Nias (2005), eruption of Mount Merapi in Yogyakarta and Central Java (2006), earthquake in Yogyakarta and Central Java (2006), earthquake and tsunami in Mantawai (2007), and the latest earthquake in West Java and West Sumatra (2009).

Handbook for the utilization of DMAM
(Disaster Management Audio Materials)
for Community Based Disaster Management

Contact Information

JICA Hyogo/Disaster Reduction Learning Center (DRLC)
jointly with
AMARC Japan Working Group
Combine Resource Institution