The Booklet of Best Practices of resilient ICT systems in the Philippines

MIC
Ministry of Internal Affairs and Communications

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Contents

Introduction

Purpose

In January 2014, the Ministry of Internal Affairs and Communications (MIC) dispatched a public-private joint mission on the field of information and communications technology (ICT) covering digital terrestrial broadcasting and disaster management to the Republic of the Philippines. Following the discussions between the mission and the major cabinet members of the Philippine Government, the MIC agreed that the Government of Japan would enhance the partnership with the Philippines in the entire field of ICT that would also contribute to disaster management. Accordingly, the Minister of MIC and the Philippines' Secretary of Science and Technology signed a joint statement on cooperation and promotion of ICT in the Philippines and agreed on implementation of an "International Joint Program for resilient ICT".

Under the Program, Japan and the Philippines will jointly develop the best practices through a joint study on the resilient ICT system which takes advantage of the countries' experience and knowledge of natural disasters particularly the Great East Japan Earthquake (GEJE) and the Philippines' typhoon damages with an eye to the possibilities that Japan will assist the Philippines to adopt a resilient ICT system and that the countries will work together to encourage ASEAN countries to adopt similar ICT systems.

Based on the experiences of earthquakes, floods, volcanoes, tsunamis, typhoons and other natural disasters that are frequent in both countries, the Program aims to compile exemplary uses of resilient ICT systems and produce a booklet of best practices that can be referred to when both the governments of Japan and the Philippines consider policy development.

【Reference】

International Joint Program for Resilient ICT system

* tentative translation

1. Principles

- Co-developing best practices by collaborating study in the ICT for resilient Society (***Resilient ICT system***), by concentrating experience and knowledge of disasters in Japan and the Philippines, such as the Great East Japan Earthquake and Typhoon Yolanda (Haiyan)
- Supporting its introduction into the Philippines, and facilitating the development into other ASEAN countries with the cooperation of the both countries

2. Joint pilot project for Resilient ICT system with ISDB-T standard

(1) Trial of practical operation of Emergency Warning Broadcast System (EWBS)

- Operating EWBS practically through a trial ISDB-T broadcasting by the broadcasting company (PTV), aiming at preparing for the next typhoon season in the Philippines.
- Supporting the practical use of EWBS in the Philippines through its operation.

(2) Transmission of weather forecast diagram using Data broadcasting (BML) by ISDB-T

- Transmitting information of weather forecast diagram and various alarms utilizing Data broadcasting mechanism by which it is possible to send characters and illustrations to TV receivers , in addition to (1) above,

3. Feasibility Study for introduction of other Resilient ICT systems

- Examining the development and introduction of the systems (J-ALERT, area mail, etc.)

4. International Seminar on Resilient ICT system (for fiscal year 2014)

- International seminars in the Philippines (twice) and Tokyo & Sendai (once) in Japan (invitation to Japan for the Filipino government officials) hosted by the both countries.

Resilient ICT Systems in the Philippines

Resilient ICT Systems in the Philippines

The Philippines has experienced a wide range of disasters not just the typhoon Yolanda but also other typhoons, earthquakes, floods and other natural disasters, and thus has knowledge and experience about which systems were effective for disaster management, and what should be kept in mind when these systems are actually used. This report will introduce the best practices of the Philippines' resilient ICT systems that have been established and enhanced through the experience of past natural disasters.




Types of the resilient ICT systems to be introduced

This report classifies resilient ICT systems in terms of how they are used: that is, services which users passively use and those which users actively use.

- Passive services ⋯ services which enable users to obtain information even if they take no particular action (services that automatically releases information).
- Active services ⋯ services which users actively use to obtain information.

Resilient ICT systems are also classified according to the disaster phase they are used.

- Prevention/preparedness phase
- Response phase
- Rehabilitation phase

● How to view the information

Name of the resilient ICT system

This section indicates phases in which the resilient ICT system is expected to be used.
- Prevention/preparedness phase
- Response phase (within 72 hours after a disaster strikes)
- Rehabilitation phase (after 72 hours after a disaster strikes)

This section indicates the user of the resilient ICT system.
- General Public
- Govement Agency

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

This section indicates whether the system is used actively (for example, users actively use the system to find out something) or passively (for example, users perceive a siren of the system).

Overview

● This section summarizes the resilient ICT system and its features.

【Utilized ICT System】 This section lists devices, etc. to be used for the resilient ICT system.

Owner of the System

● This section provides information on the owner of the system.

Effectiveness of the System

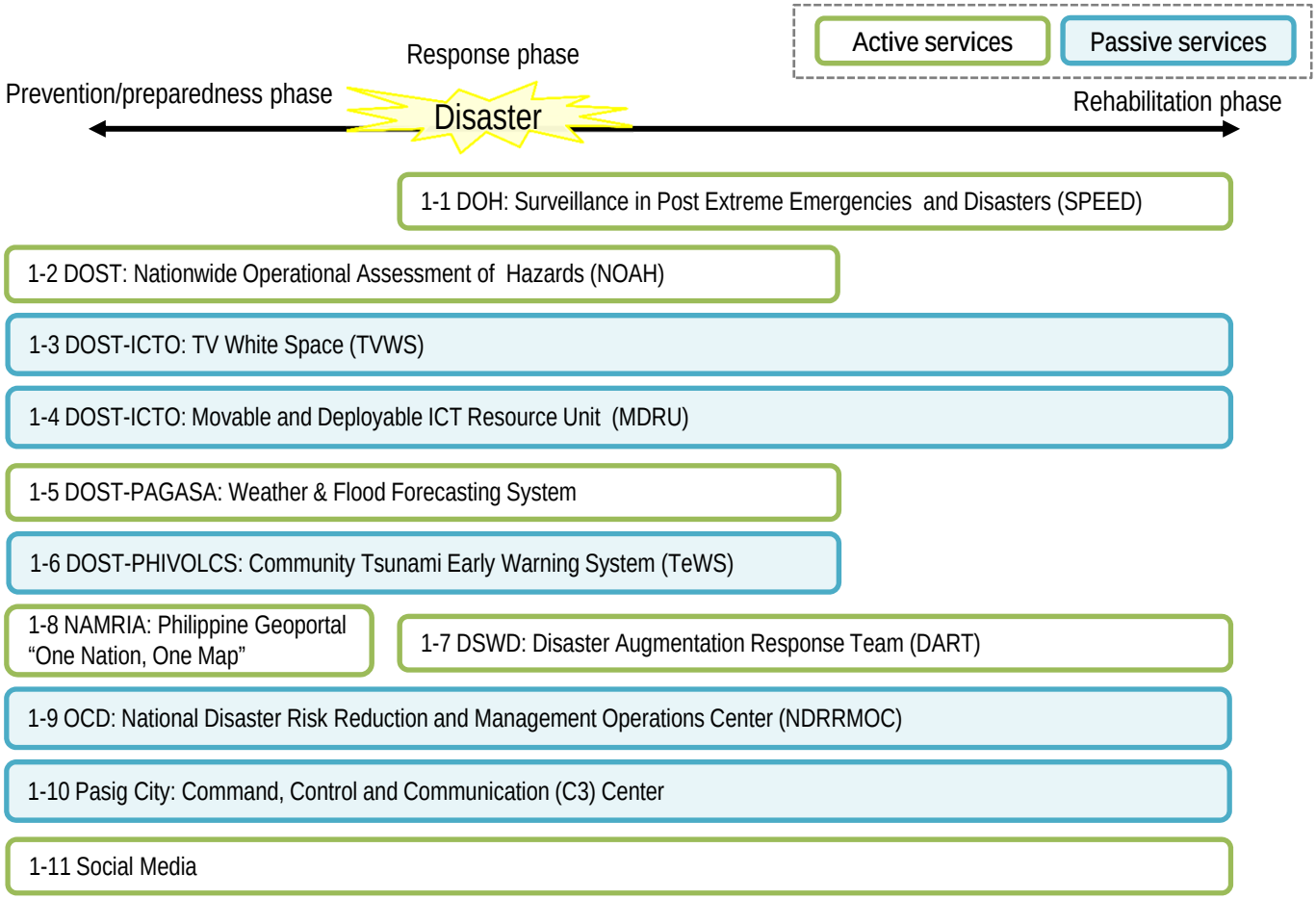
● This section provides effectiveness of the system based on the actual use of the system at the time disasters strike.

Future Development Plan

● This section describes the future development plans or capacity building plans on the resilient ICT system.
● This section also provides the aspects of the resilient ICT system which should be rectified or improved.

Resilient ICT Systems in the Philippines

No.	Service name	Form of use	Phase where the system is used
1-1	DOH: Surveillance in Post Extreme Emergencies and Disasters (SPEED)	Active	Response and rehabilitation phases
1-2	DOST : Nationwide Operational Assessment of Hazards (NOAH)	Active	Prevention/preparedness and response phases
1-3	DOST-ICTO: TV White Space (TVWS)	Passive	Prevention/preparedness, response and rehabilitation phases
1-4	DOST-ICTO: Movable and Deployable ICT Resource Unit (MDRU)	Passive	Prevention/preparedness, response and rehabilitation phases
1-5	DOST-PAGASA: Weather & Flood Forecasting System	Active	Prevention/preparedness and response phases
1-6	DOST-PHIVOLCS: Community Tsunami Early Warning System (TeWS)	Passive	Prevention/preparedness and response phases
1-7	DSWD: Disaster Augmentation Response Team (DART)	Active	Response and rehabilitation phases
1-8	NAMRIA: Philippine Geoportal “One Nation, One Map”	Active	Prevention/preparedness phase
1-9	OCD: National Disaster Risk Reduction and Management Operations Center (NDRRMOC)	Passive	Prevention/preparedness, response and rehabilitation phases
1-10	Pasig City: Command, Control and Communication (C3) Center	Passive	Prevention/preparedness, response and rehabilitation phases
1-11	Social Media	Active	Prevention/preparedness, response and rehabilitation phases



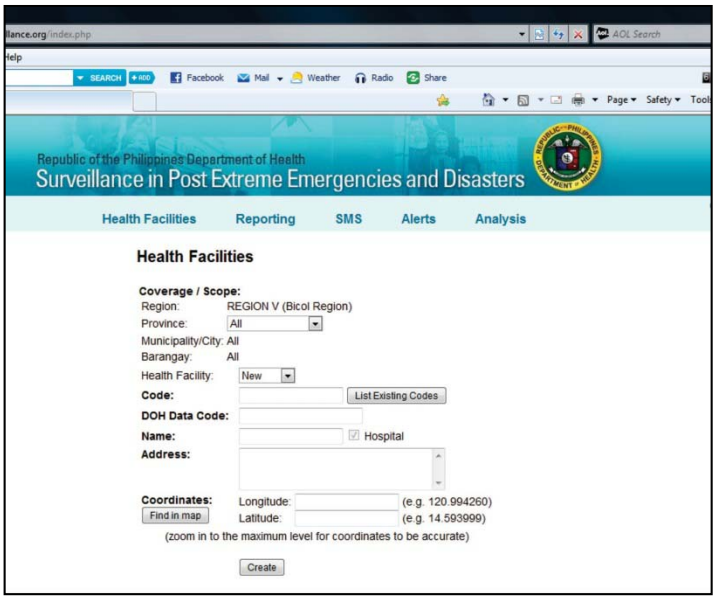
1-1 DOH Surveillance in Post Extreme Emergencies and Disasters (SPEED)

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- SPEED is an early warning surveillance system that when activated in post-disaster and extreme emergency situations:
  - Ensures early detection of increase in both communicable and non-communicable diseases;
  - Monitors trends of health conditions; and
  - Enables identification of appropriate response in preventing diseases and averting deaths.
- It can capture data and generate information relevant to health emergency managers from the grassroots up to the national level in a timely manner.
- The system can guide emergency managers in planning interventions including allocation of scarce resources in disaster situations.
- SPEED monitors a total of 21 identified disease entities (15 communicable diseases as syndromes and 6 non-communicable disease conditions) in evacuation centers and affected communities, while it monitors the same with the corresponding initial diagnoses in hospitals.
- SPEED focuses only on descriptive analysis and is not confirmatory to warrant the declaration of outbreaks.
- Since SPEED is only activated during emergencies and disasters, the following criteria should be present for its activation:
  - Official declaration of State of Calamity; or
  - Active evacuation centers are projected to last more than 2 days
  - In the absence of the 2 mandatory criteria stated above, any 2 of the following conditions should be present:
    - Any hazard with public health consequences that is affecting a significant population;
    - Increasing number of hospital consultations and admissions related to a disaster;
    - Occurrence of diseases with a potentiality for outbreak;
    - Isolation of a community brought about by damaged lifelines or a threat to security exists; and
    - Disrupted health services and/or response among the affected population.

【Utilized ICT System】 Web, SMS



Display of SPEED

Owner of the System: Department of Health (DOH)

Responsible for ensuring access to basic public health services through the provision of quality healthcare and the regulation of providers of health goods and services.

1-1 DOH Surveillance in Post Extreme Emergencies and Disasters (SPEED)

Effectiveness of the System

SPEED has been used by the Department of Health since 2010 to monitor disease conditions in different health facilities during emergency and disasters. Some of the documented usefulness of SPEED are the following:

Events	Advantages
Navotas Fire Incident	Mobilization and allocation of Tetanus Toxoid vaccine for identified cases of injuries.
Typhoon Megi in Tarlac	Immediate interventions instituted to control cluster of conjunctivitis among displaced population.
Mt. Bulusan, Irosin, Sorsogon	Provision of support to counter the increase in respiratory infection and the exacerbation of bronchial asthma.
Flooding incident in Region 12 and ARMM	Early detection of and/or intervention to malnutrition and communicable diseases such as acute watery diarrhea, acute respiratory infection and conjunctivitis.
Typhoon Pedring and Quiel (Region 3)	Provision of early warning on diseases with outbreak potential; leptospirosis and acute watery diarrhea; Immediate referral of suspected leptospirosis, acute malnutrition and other health condition with outbreak potential;
Tropical Storm Sendong, Cagayan de Oro and Iligan City	Detection of cases of leptospirosis that prompted immediate intervention and containment of outbreak; Immediate access to information in relation to the health condition at the affected community.
Typhoon Yolanda	No outbreak was reported because of the identification of health conditions with alert threshold that led to prioritization of cluster response and resources.

The Pigkawayan Mayor visited the Rural Health Unit (RHU) where SPEED was activated. The Municipal Health Officer (MHO) showed health conditions of Internally Displaced Persons (IDPs) monitored (Reg. 12 Flooding, June 2011)

Code Book for SPEED

Future Development Plan

- Country team strengthening as part of preparedness activities and enhancement of capacity to assist other countries affected by major disasters.
- Sharing of best practices with local and international partners.

Source: DOH

1-2 DOST-NOAH Nationwide Operational Assessment of Hazards

User		Disaster Phase			Utilization	
Private Citizen	Public Official	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

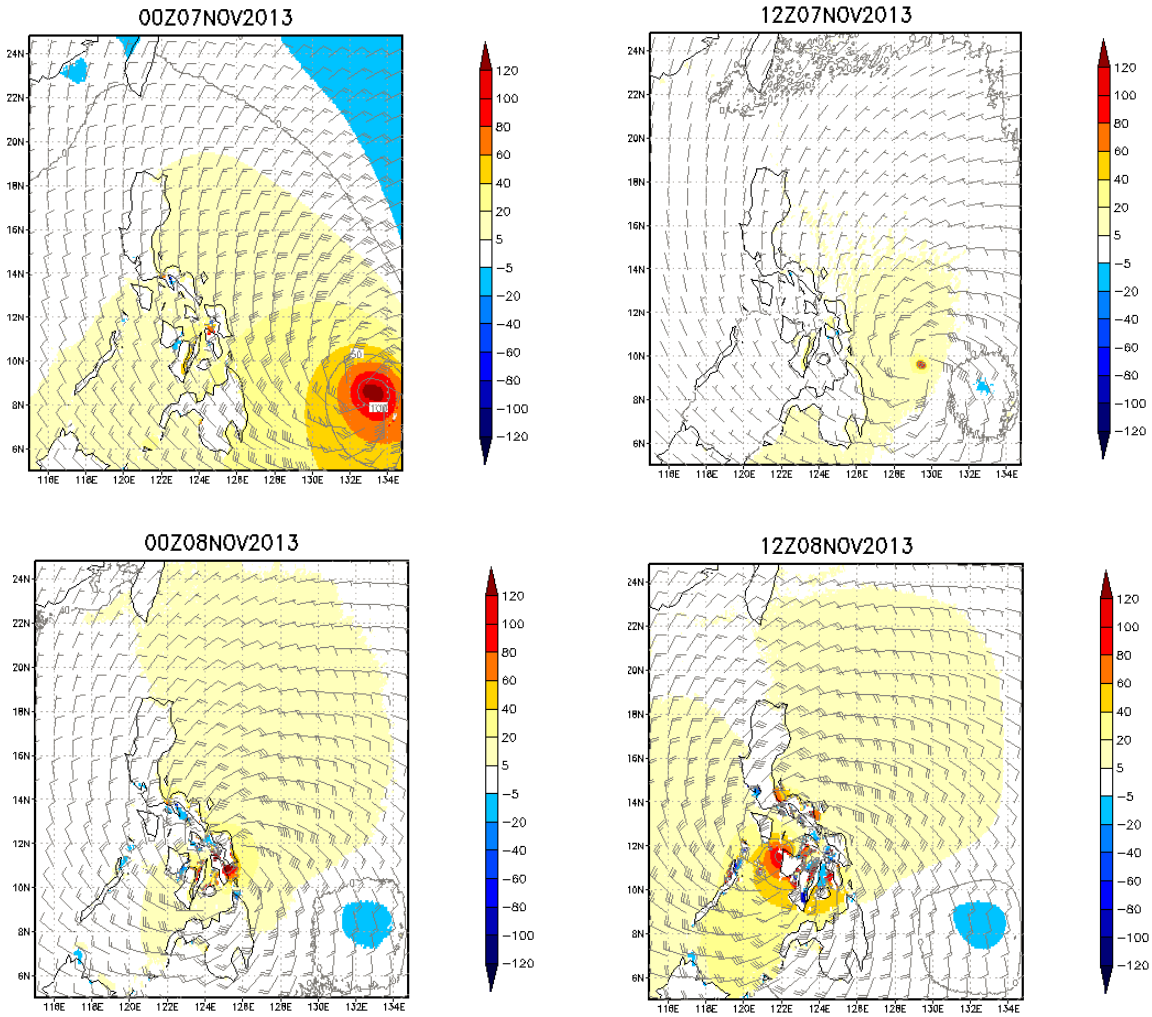
- The Nationwide Operational Assessment of Hazards (NOAH) was launched by the Department of Science and Technology last July 2012.
- It is a responsive disaster management program that makes use of advanced scientific research and cutting-edge technology to reduce risks in highly vulnerable communities.
- Its main objective is disaster prevention and mitigation, specifically, for the Philippines' warning agencies, to enable them to provide a 6-hour lead-time warning to vulnerable communities against impending floods .

【Utilized ICT System】Internet

Owner of the System: Department of Science and Technology (DOST-NOAH)

To provide central direction, leadership and coordination of scientific and technological efforts and ensure that the results therefrom are geared and utilized in areas of maximum economic and social benefits for the people

Effectiveness of the System



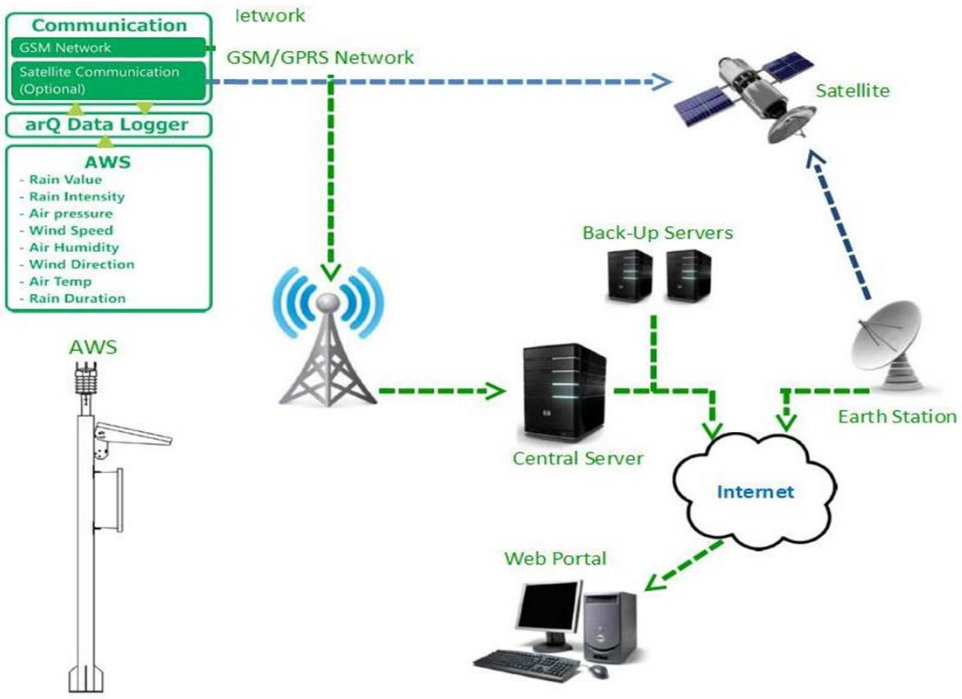
Project NOAH provided Typhoon Yolanda 's highest predicted storm surge and tide 2 days before landfall which was an essential information for citizens to prepare/evacuate.

1-2 DOST-NOAH Nationwide Operational Assessment of Hazards

User		Disaster Phase			Utilization	
Private Citizen	Public Official	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Emergency Distribution of Hydrometeorological Devices In Hard-hit Areas in the Philippines

The project, which is ongoing, will deploy approximately 1,000 units of flood monitoring devices consisting of Automated Rain Gauges (ARG) and Water Level Monitoring Sensors (WLMS) in the 18 Philippine Major River Basins. This is to complement the currently installed hydromets and the need to put in place additional ARG and WLMS based on PAGASA's study entitled "Assessment of Automatic Weather Stations, Automatic Rain Gauge and Water Level Site Selection Criteria."



System Flow

Future Development Plan

Project NOAH has the following components :

- Sensors Development-Sensors development and deployment of 1500 automated weather stations (AWS), automated rain gauges (ARGs) and automated water level sensors (AWLS).
- Disaster Risk Exposure Assessment for Mitigation – Light Detection and Ranging (DREAM-LIDAR) Project that aims to produce more accurate flood inundation and hazard maps in 3D for the country's flood-prone and major river systems and watersheds.
- Enhancing Geohazards Mapping through LIDAR shall use LIDAR technology and computer-assisted analyses to identify exact areas prone to landslides.
- Coastal Hazards and Storm Surge Assessment and Mitigation (CHASSAM) that will generate wave surge, wave refraction, and coastal circulation models to understand and recommend solutions for coastal erosion.
- Flood Information Network (FloodNET) Project that is a flood center that will provide timely and accurate information for flood early warning systems. The FloodNET Project will come up with computer models for the critical RBs, automate the process of data gathering, modeling and information output, and release flood forecasts.
- Local Development of Doppler Radar Systems (LaDDeRS) that seeks to develop local capacity to design, fabricate, and operate sub-systems of Doppler radars for remotely sensing the dynamic parameters of sea surface such as wave, wind field, and surface current velocity.
- Landslide Sensors Development Project. This project is a low-cost, locally developed, sensor-based early monitoring and warning system for landslides, slope failures, and debris flow.
- Weather Information –integration for System Enhancement (WISE) that aims to enhance the weather predicting capabilities of the country. Using High-Performance Computing (HPC) and smart analytics.

Source: Project NOAH

1-3 DOST-ICTO TV White Space (TVWS)

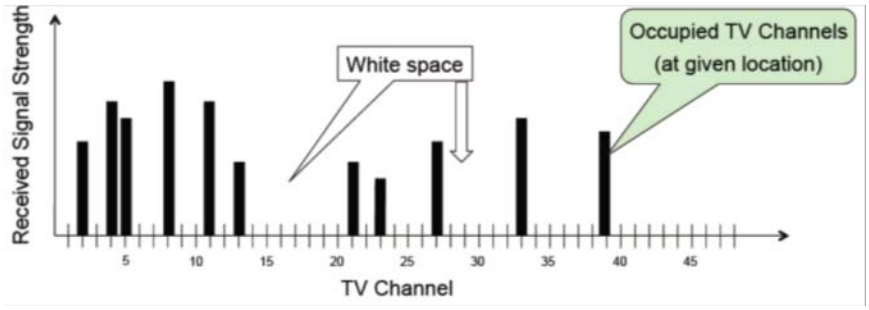
User		Disaster Phase			Utilization	
Private Citizen	Public Official	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- There are many TV broadcast channels that are unused in nearly every location in the world. These empty channels (blocks of spectrum) are known as “white spaces”.
- TVWS’s capability of penetrating walls and thick foliage and long range propagation characteristics over land and water makes it an ideal medium for data applications in an island nation like the Philippines.

【Utilized ICT System】 Unused broadcasting frequencies

In a typical home, a Wi-Fi signal can penetrate up to two walls. At the same power, a TV white spaces can penetrate more walls and obstacles, enabling whole home media.
The available TVWS equipment can deliver up to 12 megabits per second of data throughput at a maximum range of 10 kilometers.



Concept of TV White Space

Owner of the System: Department of Science and Technology (DOST-ICTO)

To provide central direction, leadership and coordination of scientific and technological efforts and ensure that the results therefrom are geared and utilized in areas of maximum economic and social benefits for the people

Effectiveness of the System

Pilot testing of the technology after the Bohol earthquake and the destruction by Typhoon Yolanda (Haiyan) in the Visayas had provided efficient communications for relief and disaster efforts. This also helped both the local and foreign governments and organizations perform the necessary services. In addition, more than 3,000 students in 20 schools had internet access via the TV white space for their computer classes, and academic researches.

The Second TVWS Pilot Program in the Municipality of Pulilan in Bulacan Province had its MOU signed on February 10, 2015. In this pilot area, the initial batch of recipients were 13 Public Elementary Schools, 3 Public High Schools and the Municipal Hall. The specifications for this program are as follows:

- Bandwidth allocation: ES-2 mbps each; HS-4 mbps each; Municipal Hall-2 mbps;
- Free Wi-Fi access services will also be available in all public schools, the municipal plaza, the whole municipal building and at the ICT Office Cluster Center, City of Malolos (4 mbps);
- The TVWS facilities (network) will be provided and managed by FILASIA, a partner of DOST;
- Bandwidth will be provided by iGov Phil (from its Roces Terminal); and
- Free Wi-Fi access services for public school recipients are available during school hours and for the general public after school hours.

Future Development Plan

- Since connectivity was established in April 2014, more than 6,000 fisherfolk have registered in the pilot municipalities. Government counterparts have begun to utilize the new registration data to design and deploy better fisheries management interventions that can address overfishing, as well as provide alternative livelihoods.
- TVWS is expected to be the next generation of weather and environment sensors.
- Issuance of TVWS policy guidelines for commercial operations.

Source: DOST -ICTO

1-4 DOST-ICTO Movable and Deployable ICT Resource Unit (MDRU)

User		Disaster Phase			Utilization	
Private Citizen	Public Official	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- MDRU provides ICT services such as telephone service and information sharing system to meet communication demand in a disaster affected area soon after a disaster occurs by establishing local wired/wireless network.
- MDRU enables central/local governments and public agencies such as police and fire department to communicate easily.
- DOST-ICTO together with the international and local partners launched and turned over the MDRU to the municipality of San Remigio, Cebu on February 10, 2015.

【Utilized ICT System】 Wi-Fi, satellite and/or a fiber optic communication links, IP-base devices

There are two types of MDRU: a container type; and a car type.

Each MDRU accommodates equipment for ICT services such as switches/routers, wired/wireless transmitters/receivers, servers, storage devices, power distribution unit, and air conditioner.

By transporting and installing MDRU in a disaster-stricken area, we can promptly establish a Wi-Fi area with a radius of 500 m assuming an unobstructed visibility to provide afflicted people in the ravaged area with communications access.

The MDRU donated by Japan in the Philippines comes in two configurations:

a. *5m x.5m box* that contains the necessary equipment and software to provide basic voice and data communications within a small area for up to 500 concurrent users; and

b. A*ttaché case* version that can do the same for a much smaller area.

Car type MDRU

Battery

Small size Phone system

Smartphones and IP-base devices

Attaché case size ICT BOX

Access Point for WiFi based access network

The Ceremonial Launch and Turn-over of MDRU in San Remigio, Cebu City with DOST Sec. Montejo, MIC, NTT, ITU, CVISNet, and PDRRM

The photos inset are the two versions of the MDRU

(Photo courtesy of DOST-ICTO)

Owner of the System: Department of Science and Technology (DOST-ICTO)

Effectiveness of the System

- Nippon Telegraph and Telephone (NTT) group has conducted the feasibility study on restoring telecommunication and ICT infrastructure damaged by typhoon Haiyan through the use of the MDRU since December 2014.
- The effectiveness and key performance indicators of the MDRU will be monitored and evaluated by International Telecommunication Union (ITU) through the use of the applications deployed on the MDRU.

Future Development Plan

- DOST and NTT Group are going to brush up the functional capability and the usability of MDRU based on the result of this feasibility study.
- Formulation of rules and organization for using MDRU.

Source: DOST-ICTO & NTT Communications Corporation

1-5 DOST- PAGASA Weather & Flood Forecasting System

User		Disaster Phase			Utilization	
Private Citizen	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

As the mandated agency for the safety, well-being and economic security against meteorological and hydrological hazards, PAGASA undertakes the following:

- Provides continuous monitoring, analysis and prediction of atmospheric conditions, and issues forecasts daily for the general public, shipping and civil aviation.
- Issues warnings and bulletins on tropical cyclones and other potential dangerous meteorological conditions for the welfare of society and the country.
- Has established a flood forecasting system in the Philippines. Among them is the Community Based Flood Early Warning System (CBEFEWS) which empowers the local government units (LGU's) and the communities to protect themselves against floods.

【Utilized ICT System】 Internet, Satellite Network, Doppler Radar, SMS, Social Network

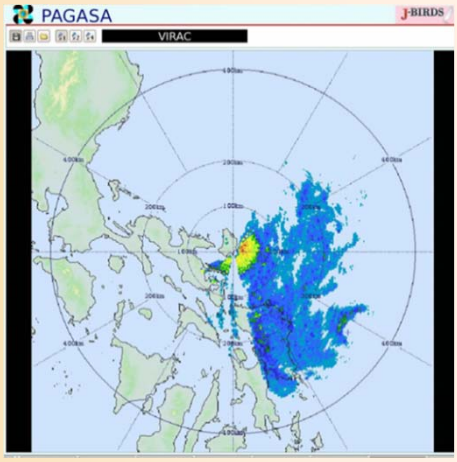
Owner of the System: Philippine Atmospheric Geophysical and Astronomical Services Administration (DOST-PAGASA)

Real time collection of high-quality meteorological data for effective use in the provision of weather information, the issuance of timely and accurate forecasts and warnings for the general public, shipping and civil aviation.

Weather Forecasting System

The following observation networks and analysis tools are utilized nationwide for weather forecasting.

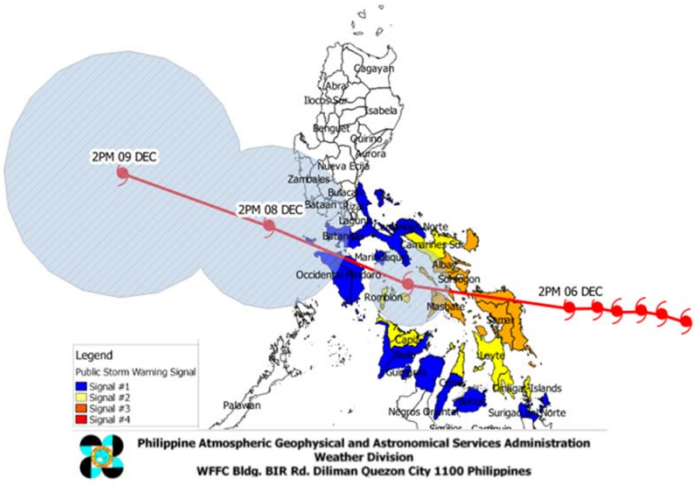
- Surface Synoptic Stations: 58 stations
- Satellite Data Receiving Facility: 4 receivers at present
- Doppler Radar: Total of 10 Operational radars
- Upper Air Station: 6 Upper air stations
- Wind Profiler: 1 wind profiler
- River Sensor: 13 River basins (On-going), 75 AWS and 87 ARG
- VSAT Communication Network: Used as communication link for radar station
- Numerical Weather Prediction: WRF, COSMO, GSM



Doppler Radar Image of TY Ruby

Effectiveness of Weather Forecasting System

- Actual movement of Typhoon Ruby was predicted accurately.
- Location and intensity of the typhoon through PTV 4, PAGASA's website, Twitter and Facebook accounts and through SMS was issued hourly .



Prediction of Track of Typhoon Ruby

Weather Forecast Using Social Media

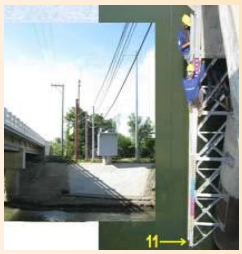
1-5 PAGASA Weather & Flood Forecasting System

User		Disaster Phase			Utilization	
Private Citizen	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Flood Early Warning System

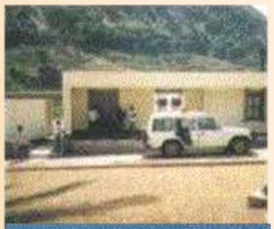
- Flood Early Warning Systems have been installed in major river basins in Luzon, namely; the Pampanga, Agno, Cagayan and Pasig-Marikina river basins.
- Flood Forecasting and Warning System for Dam Operation (FFWSDO) for the telemetered Angat, Pantabangan, Ambuklao/Binga/San Roque and Magat dams/catchments.

Rainfall station



Water level gauge

Operation Center



Fixed and mobile warning facilities

Data Collection → Data Transmission → Flood Forecast → Warning Preparation → Warning Dissemination → Receipt and Action

Community Based Flood Early Warning System (CBEFEWS)

- A Community-Based Flood Early Warning System (CBFEWS) has been installed for some other river systems.
- This system empowers local government units (LGU's) and the communities to protect themselves against floods.
- It is one way of addressing the need for an EWS in small communities that are not covered by the conventional (telemetered) flood forecasting and warning system.
- It is economical and easy to maintain.

Setup of Digital Rain Gauge

Installation of Flood Signages

Future Issues

- The ability to send data or warning signal to areas that will be affected is still a challenge at present. An example of this challenge is informing the fisher folks that have already set out for fishing for weeks prior to the arrival of typhoon. The only medium that can be used is the AM radio.
- Making people understand the warning signal and translating the warning signals and/or the local dialect into layman's term for easier understanding of the residents.
- Slow speed of internet in the agency.
- Power shortage before and after the disaster.
- Lack of technical personnel to operate the system.

Source: DOST - PAGASA

1-6 DOST-PHIVOLCS Community Tsunami Early Warning System (TeWS)

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

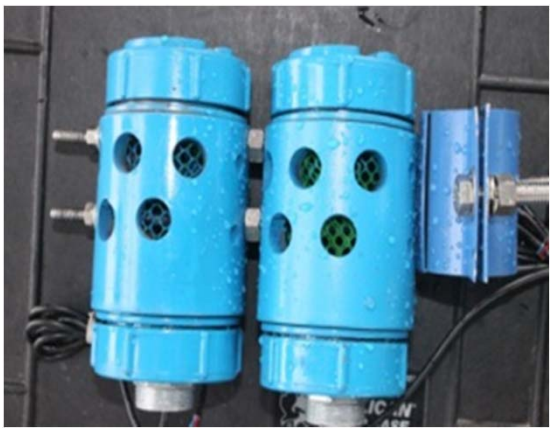
- Tsunami Early Warning System (TeWS) is intended for providing quick and timely warning to coastal communities that are vulnerable to tsunami
- The system is composed of Detection Stations emplaced at the mouth of a bay or farther out before the communities to be protected; and Alerting Stations installed in the communities for near real-time activation of sirens.
- Each Detection Station is installed with Ultrasonic Tide Sensor for continuous recording of the rise and fall in the sea level. This is complimented with dry sensor for the confirmation of water retreat and wet sensors for recording various heights of tsunami. This information are seen and communicated to the communities using a GSM-communication module.

【Utilized ICT System】 Internet, SMS, Siren

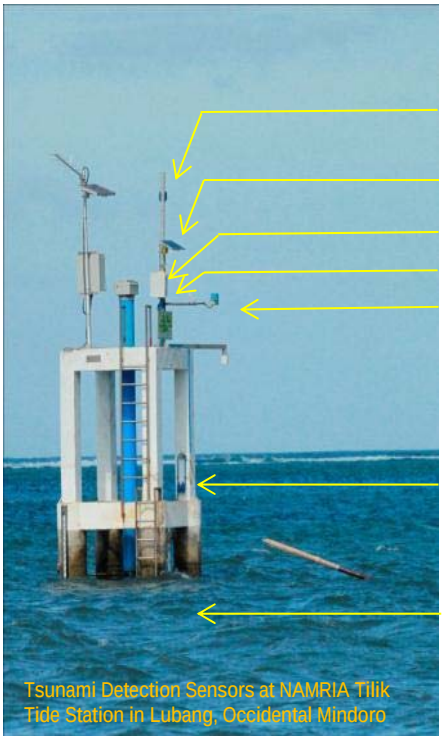
Owner of the System: Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS)

Responsible for disaster preparation, especially for Volcano, Earthquake and Tsunami

Mounted Ultrasonic Tide Sensor to continuously record the tide level



Fabricated wet and dry sensors installed at varying heights of 10 meters, 5 meters, 1 meter above sea-level and at least a meter below low tide level



Tsunami Detection Sensors at NAMRIA Tilik Tide Station in Lubang, Occidental Mindoro

Effectiveness of the System

- The effectiveness of this system requires 3 significant rudiments:
  1. Ready Evacuation Procedures of the Communities and Tsunami Alerting Stations;
  2. Data Visualization and LGU's Tsunami Emergency Decision Tool for alerting the Communities; and
  3. Tsunami Detection System that can be checked on real-time or simultaneous with a very strong ground shaking.

Tsunami Evacuation Map Sta.Rita Aplaya, Batangas City showing routes to Evacuation Area, location of Alerting Sirens and Tsunami Inundation Area

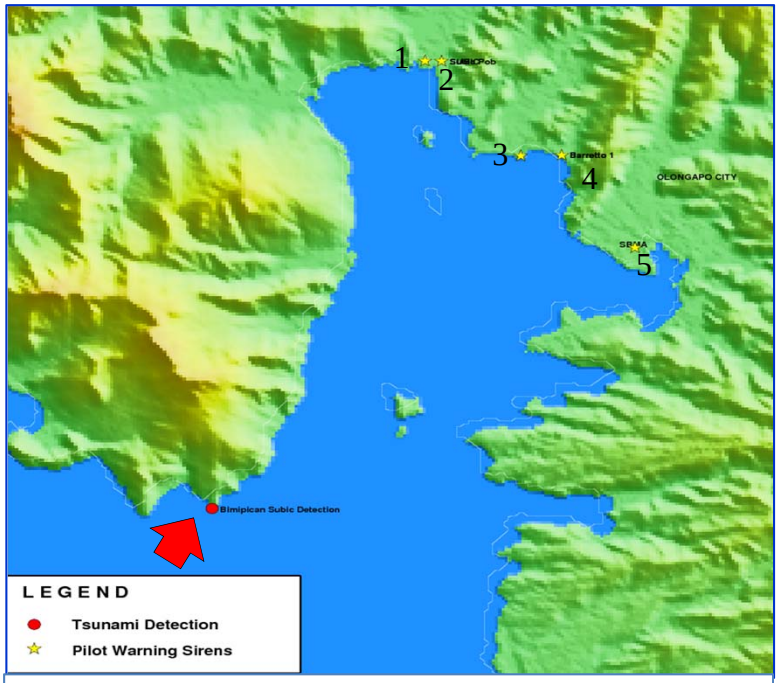
Pilot Tsunami Alerting Siren at the Poblacion, Lubang, Occidental Mindoro with tsunami information materials

- It includes appropriately planned and practiced Tsunami Evacuation Procedure showing the shortest routes to safe grounds incorporating the proper response and the use of Tsunami Alerting Sirens.

- It uses a good connectivity for internet-based visualization of the information provided by tsunami sensors in detection sites.

- Through the information generated by the tsunami detection system, a prompt decision can be made by the LGUs in alerting highly-populated coastal communities through activation of GSM-triggered sirens deployed in high-risk communities.

- To date, there are 10 Tsunami Detection Stations in the country for 35 pilot Alerting Stations and Communities. The number of Tsunami Detection Stations shall be increased in the succeeding years with 19 additional sites in the country.



Ideally, Tsunami Detection Station is located far out the bay to provide more lead time to coastal communities like for Pilot Areas at Subic Bay: (1&2)Wawandue and Poblacion, Subic, Zambales, (3&4) Barretto, Olongapo City, and (5) SBMA.

Future Development Plan

- TeWS enhancements shall include the activation of sirens using mobile phones - the data communication will utilize a VSAT system and wet/dry sensors shall be upgraded to better weather-resistant types. The PH-Alert, which is able to transmit information instantaneously via satellite network' can be very useful for the tsunami alert.
- There will be an expansion of tsunami detection stations to other areas which are fronting tsunami genic earthquake source in the Philippines.
- A harmonization will be undertaken with other Tsunami detection sites including the new detection system to be deployed by PHIVOLCS in 19 sites in the country.
- Encourage more LGUs to add alerting stations in their coastal communities.

Source: DOST - PHIVOLCS

1-7 DSWD Disaster Augmentation Response Team (DART)

User		Disaster Phase			Utilization	
Private Citizen	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- The Department of Social Welfare and Development (DSWD) established the Disaster Augmentation and Response Team (DART) during TS Sendong in 2011.
- DART was established to provide augmentation and technical assistance support to the ICT needs and requirements of disaster response operations being undertaken by the department and its field offices.
- Composed of at least 5 ICTMS staff volunteers to respond after a disaster event and to be tour of duty for 3 days onsite on a self-sustained basis. A relief DART will succeed the previous one after its tour of duty.

【Utilized ICT System】 VSAT, UHF/VHF Radios, Satellite Phones, Wi-Fi, Web-GIS

Owner of the System: Department of Social Welfare and Development (DSWD)

Responsible for Disaster Response activities.

Utilized ICT SYSTEM

DART utilizes the following ICT Systems.

Manpack Broadband VSAT

UHF/VHF Radios

Satellite Phones

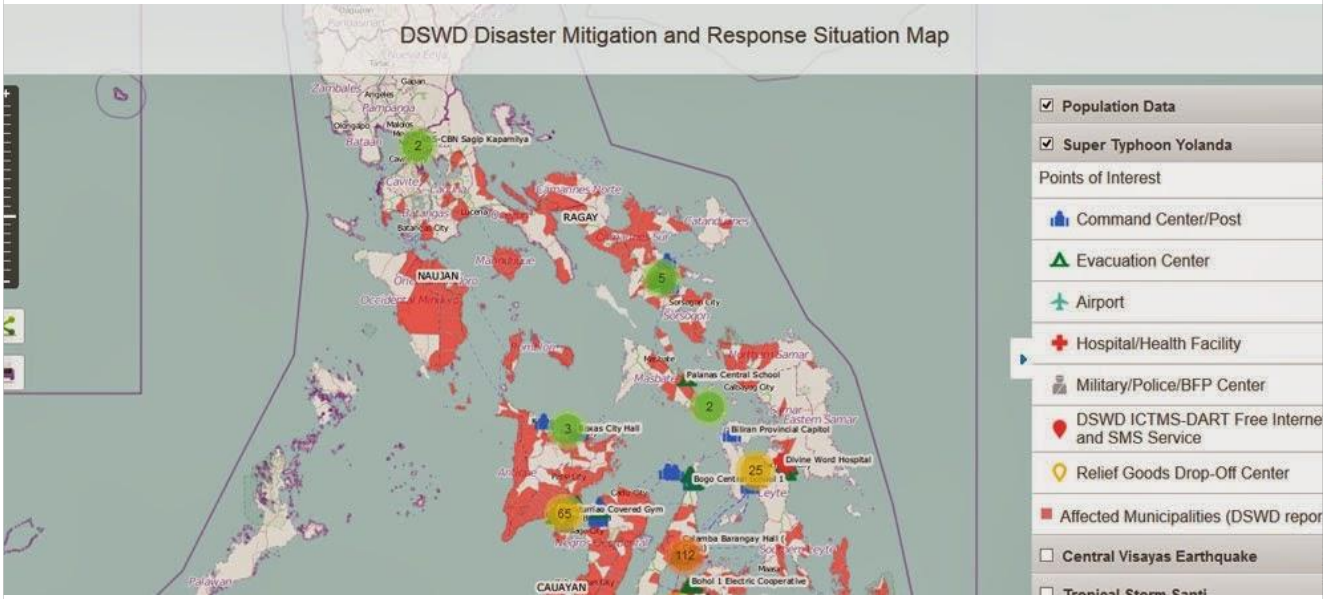
2.4 Ghz Long range wifi

1-7 Disaster Augmentation Response Team (DART)

Utilized APPLICATION

Disaster Mitigation and Response Web-GIS

- This map is used to guide relief efforts and visualize the location of evacuation centers set-up during disasters.
- During Typhoon Yolanda, DSWD collected information related to damages to people and reported the situation, which helped central/local governments or NGOs conduct rescue/rehabilitation operations.



Display of Disaster Response Situation Map

Effectiveness of the System

- Since 2011, DART has been deployed in the field to provide multi-modal emergency telecommunications support and rapid disaster mapping to the DSWD Disaster Response and Relief Operations.
- Has connected more than 6,000 victims and stakeholders in the field and supported 7 DSWD Disaster response operations.

Future Development Plan

- Institutionalizing the DART in all DSWD Field Offices
- Deployment of resilient emergency communication systems in all DSWD Field Offices
- Interoperable Web-GIS compliant with Open Geospatial Consortium standards for data sharing
- Expansion of the SMS and USSD based reporting system to capture real-time data from the field

Source: DSWD

1-8 NAMRIA Philippine Geoportal “One Nation One Map”

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- The Philippine Geoportal provides an online service for one multi-scale standard base map that can be used by various stakeholders for their thematic data integration.
- It provides a platform for ICT and GIS-based project collaboration, resource optimization and R&D initiatives.
- Provides a customer-friendly portal 24/7 web/online access to geospatial information.

【Utilized ICT System】 Internet, WEB-GIS

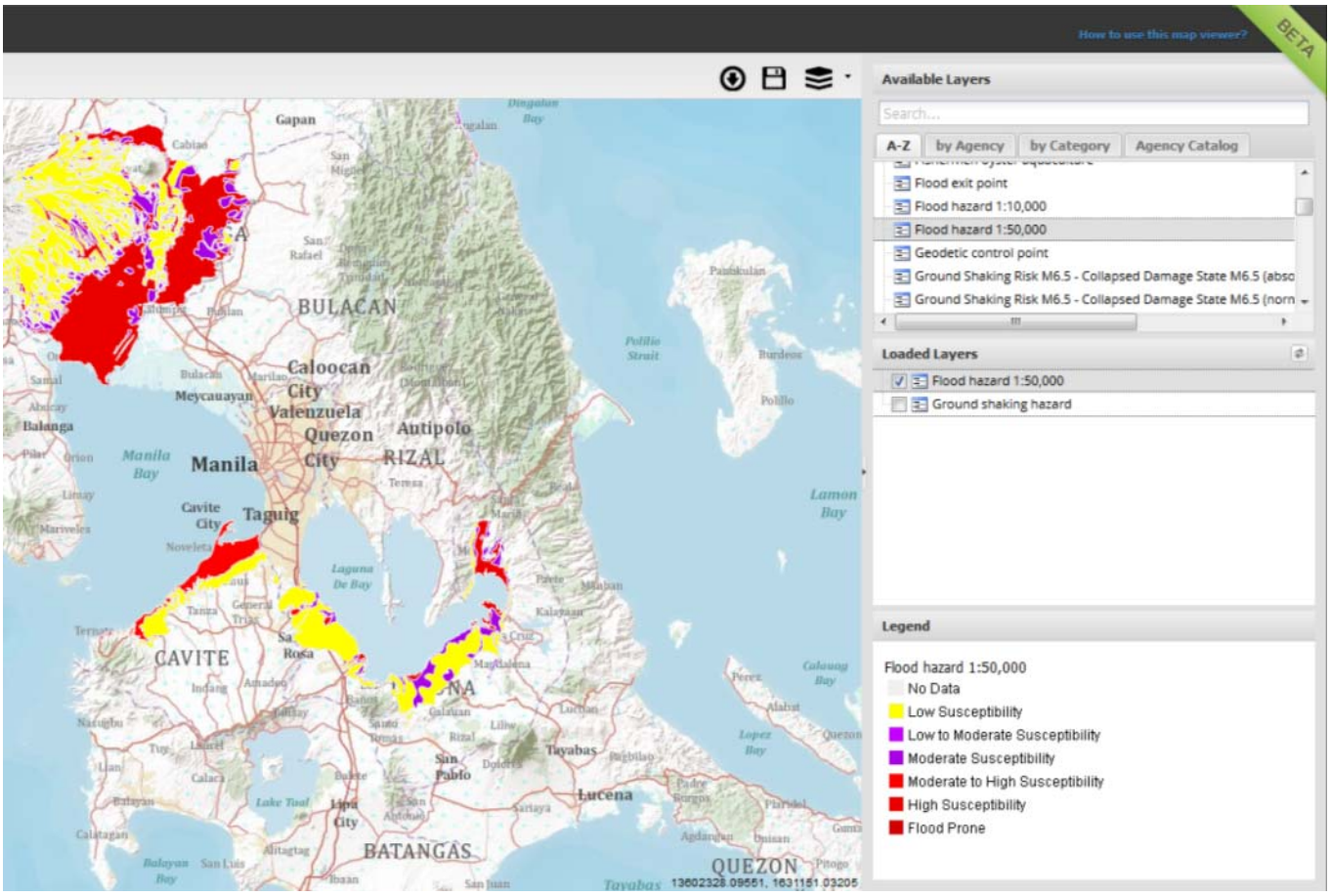
Owner of the System: National Mapping and Resource Information Authority (NAMRIA)

Responsible in providing both the public and private sectors with mapmaking services as well as geographic and resource information.

Effectiveness of the System

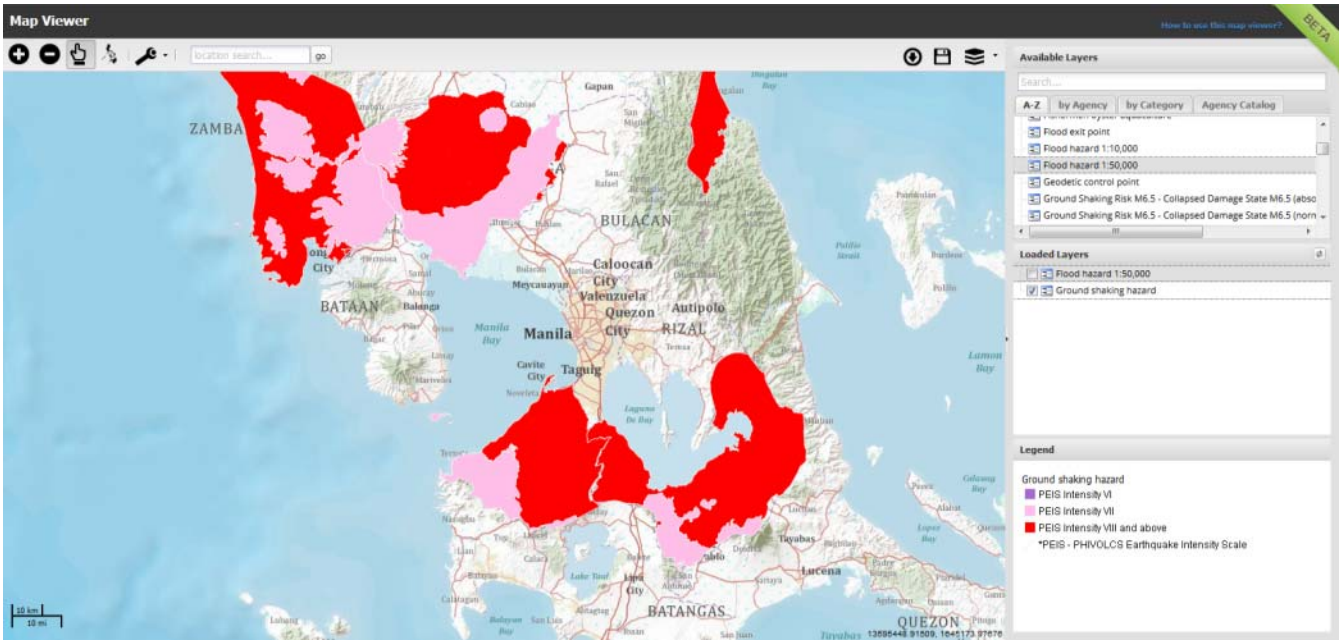
- The multi-scale standard base map available in the Philippine Geoportal contributes to the enhancement of Disaster Risk Reduction & Management (DRRM) and Climate Change and Adaptation (CCA) related projects and activities undertaken by national government agencies and local government units.
- As of 2014, there are 50 stakeholder member agencies and 181 geospatial datasets that have been uploaded to the system.
- The Philippine Geoportal maps are being utilized by the various users including the academe, media outfits and NGOs.
- The visitors of the Philippine Geoportal are more than 70,000 as of November 2014.

Users can easily browse the various kinds of geospatial information via WEB-GIS including disaster hazard information which are provided by partner agencies.

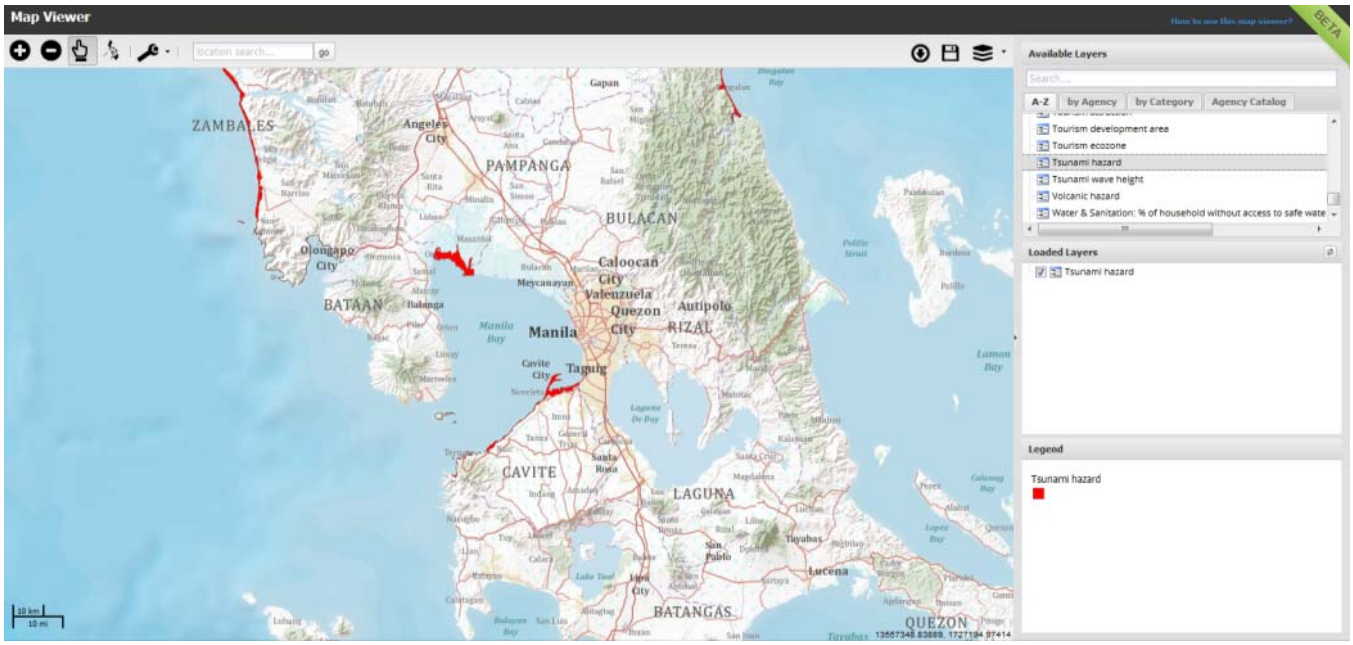


Flood Hazard Map

1-8 NAMRIA Philippine Geoportal “One Nation, One Map”



Ground Shaking Hazard Map



Tsunami Hazard Map

Future Development Plan

- For the Phase III, 32 additional datasets are being processed for uploading, 26 additional stakeholder agencies are identified and invited to join, cadastral and statistical data will be the bulk of data buildup, and 3D viewer application will be developed.
- GIS training will be conducted for the additional stakeholder agencies. IEC campaigns will continue.
- Data sharing will be enhanced through the development of agency node portals.
- ISO-compliant data licensing/downloading procedures and tracking the number of visits/sessions will be enhanced.

Source: NAMRIA

1-9 National Disaster Risk Reduction and Management Operations Center (NDRRMOC)

User		Disaster Phase			Utilization	
Private Citizen	Public Official	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- Maintained and Operated on a 24/7 basis (24 hours a day, 7 days a week)
- Principal facility responsible for monitoring potential and ongoing emergency
- Central command and control facility
- Provides and disseminates alerts, warnings, reports, and other information/communications
- Coordinates/collaborates with National Disaster Risk Reduction and Management Council (NDRRMC) Member Agencies, Regional DRRMCs, Local DRRMCs, and other Stakeholders

【Utilized ICT System】 Internet, FAX, Satellite Phone, SMS, Email

Owner of the System: Office of Civil Defense (OCD)

Responsible for administering a comprehensive national civil defense and disaster risk reduction and management program

Effectiveness of the System

NDRRMOC Core Function

- Alert, Monitoring and Pre-Disaster Risk Assessment (PDRA)
- Multi-Agency Operational Coordination
- Response Resource Mobilization, Rapid Damage Assessment and Needs Analysis (RDANA)
- Information Management
- Operations Capability Upgrade for Effective Program Coordination

Tools Used

- Phone / Facsimile (landline, mobile phones) and Radio
- Short Messaging System (OCD InfoBoard)
- Mobile Application (Batingaw)
- Website (ndrrmc.gov.ph)
- Email (dopcenbackup@gmail.com)
- Social Media (Facebook and Twitter)
- Telecommunications Equipment as back-up communications during disaster (satellite-based communications capable on voice, text messaging, facsimile, and internet access)

Equipment for Emergency Telecommunication

Future Development Plan

- Establishment of Intelligent Operation Center (IOC) which aims to enhance the information sharing, coordination and collaboration during disaster operations.
- An All Weather Communications System will be installed in the IOC which is capable of integrating all means of available communication through its Integrator System.

Image of Intelligent Operation Center (IOC)

IMS for DRRM

- The Prototype IMS (Information Management System) has been developed by OCD and the JICA Team in an effort to support disaster risk reduction management activities in OCD and the Operations Center.
- This system consists of Web-GIS Module for real-time situation mapping, System Management Module and DBMS (Database Management System) for managing three main databases ("Emergency Responders Database", "Disaster Incident Database" and "Historical Disaster Database").
- This system was designed to be user-friendly and to correspond with existing activities in OCD and NDRRMC-Operation Center.

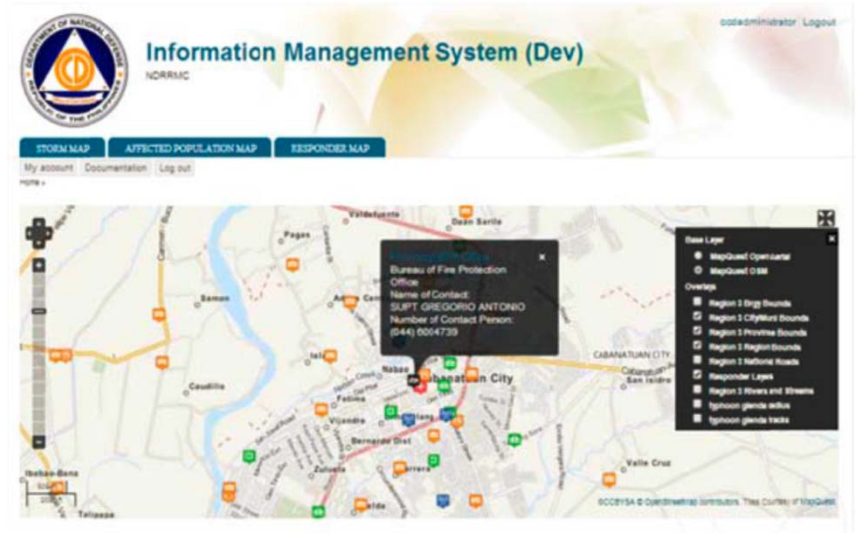
<Web-GIS Module>
Using Web-GIS module, latest warning report and some types of situation data based on NDRRMC Situation Report are shown on the Web-based digital map.

<Emergency Responders Module>
The Emergency Responders Module unifies coordinates and attributes such as responder's name, contact person name, contact number of each responder stored in the Responders DB.

<Disaster Incident Module>
The Disaster Incident Module supports mapping of real-time disaster situation regarding affected population, causalities, damaged houses and other status based on NDRRMC Situation Report.

<Historical Disaster Module>
The Historical Disaster Module manages all types of historical disaster records which includes inventory of existing Database such as Calamidat.ph.

Web-GIS Module



Emergency Responders Module

Future Activities for IMS

- Updating Emergency Responders database based on current responders inventories provided by OCD-ROs.
- Implementation of IMS training for Administrator.
- Implementation of IMS & GIS training for Regional OCD users, especially the processing way to update responders database.

Source: OCD

1-10 Pasig City Command, Control and Communication (C3) Center

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

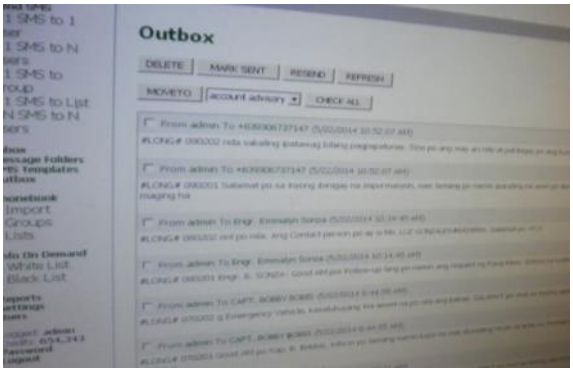
Overview

- The Command, Control and Communication (C3) Center was established to monitor and coordinate disaster response and rescue operations using state-of-the-art technology.
- It brings together vital aspects of communication, information, warning and alerting, situation assessment and monitoring, tasking allocations and coordination of efforts. Guided by Computer-Aided Dispatch (CAD) System.
- The C3 is composed of monitoring cameras, text information system, container van for back-up of ICT office and generator set for the Pasig City Hall.

【Utilized ICT System】 CCTV, SMS

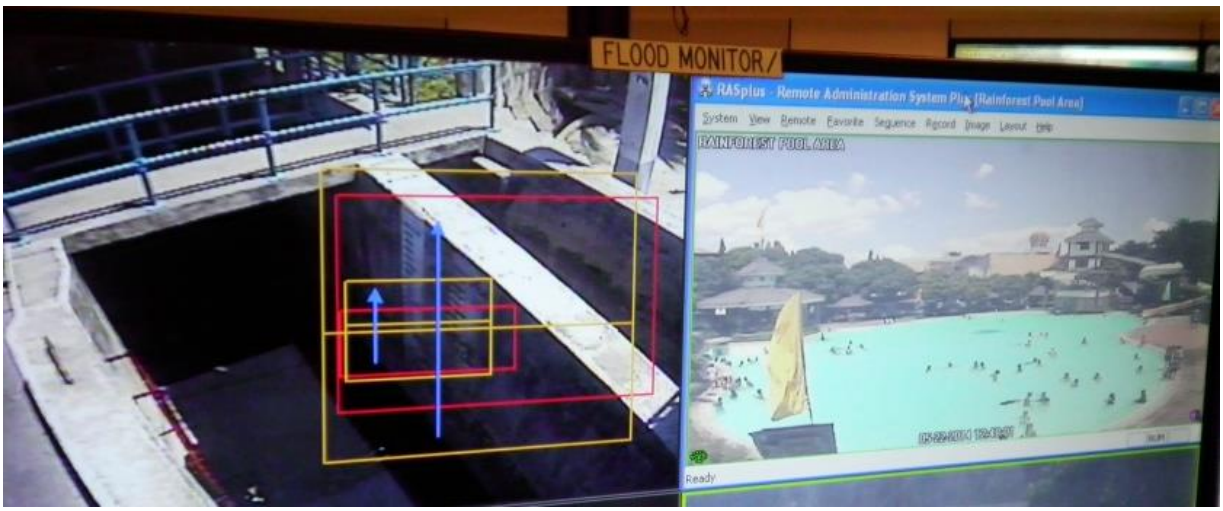
Owner of the System: Pasig City

Responsible for disaster preparedness in Pasig City.



Infotext System

Monitoring Cameras



Flood Monitoring

1-10 Command, Control and Communication (C3) Centers

Wide Area Alarm Siren System

Effectiveness of the System

Computer-Aided Dispatch

The Infotext System that is based on SMS text blast and Wide Area Alarm Siren system are used as the Early Warning systems whenever typhoons hit Pasig City.

The operations center (OpCen) where the Emergency Team can monitor from crimes and emergencies to flooding and rescue needs, and coordinate response actions with available responders on the ground.

All areas in Pasig City can be monitored by C3 from the least developed barangays to the central business district.

Future Development Plan

- To provide an antenna that can capture all the cell numbers within its range similar to what China and Malaysia is using.
- To integrate and link with other government agencies for quick transfer of information.
- To explore other channels of communication that are not dependent to telecommunication companies.

Source: Pasig City DRRMO

1-11 Social Media

User		Disaster Phase			Utilization	
General Public	Government Agency	Prevention Preparedness	Response	Rehabilitation	Active	Passive

Overview

- Social media has become useful tools in coping with natural disasters.
- The use of the social media network also allows for instant and massive reporting of disaster situation.
- It should be noted that users make their own judgment as to the accuracy and reliability of the information.

【Utilized ICT System】 Social Media (Twitter, Facebook, Skype, Youtube, and Others)

Effectiveness of the System

YouTube

- Some of the video images from YouTube that captured the magnitude of Yolanda's devastation shared to people around the globe

Batingaw

- Developed by OCD.
- A mobile app that provides early warning from warning agencies to the public which can be utilized for preparation at the time of emergencies.
- Provides Safety Tips (Before, During and After Disasters)
- Equip with digital tools (siren, flashlights, compass, strobe lights, maps, FM radio)
- Has an E-library (RA 10121, NDRRM Plan, National Disaster Response Plan, etc.)
- Provides location of the nearest responders, evacuation centers, hospitals, etc.

Skype

- Skype offered a free 60-min call credits for Yolanda-affected users .
- A credit voucher is given that will allow the victims to make up to 60 minutes of calls to friends and loved ones.

Facebook

- During the aftermath of Typhoon Yolanda, Facebook became an important alternative form of communication.
- Facebook also serves as a quick and efficient communication platform for government officials to coordinate and check on one another.

- Some agencies have their own social media page which is utilized as information board.

Summary & Next Step

Summary

＜ICT systems being utilized in every disaster phase＞

- There are sophisticated ICT systems which play an important role in each stage of DRRM activity, namely; Prevention/Mitigation, Preparedness, Response, and Recovery/Rehabilitation. These were effective in the past disasters.

＜User-friendly systems with Web-GIS＞

- Many of the ICT systems are designed to be easy-to-handle. Among them, Web-GIS is widely utilized for weather/flood forecasting systems, database of evacuees or patients. These user-friendly systems greatly help not only government agencies but also residents to prepare and respond to disasters.

＜Development of resilient ICT systems that utilize Social Media and advocate empowerment of communities＞

- Social media has provided a platform for government agencies to share vital information to residents and vice versa for DRRM activities. In addition, there are the community-based disaster ICT systems such as TeWS whose community-based activities will contribute to capacity development of communities for DRRM.

Challenges to be Tackled

＜Regulation＞

- Improvement of data sharing/exchange function both in the infrastructure and policy aspects such as establishment of dedicated line/s and regulation among agencies, respectively. To date, some activities that are similar to this practice is the “One Nation, One Map Project”.
- A framework should be established to ensure the budget for Operation/Maintenance of ICT systems.

＜Human Resources＞

- Knowledgeable staff/s and applicant/s who are familiar with ICT systems is urgently needed.
- The knowledge/technology gained and established in the central office should be cascaded to the regional/local level.

＜System＞

- There is a need to avoid confusion and chaos such as those during Typhoon Yolanda that contributed to the damage of most of the communication lines. The development of a two-way communication system should be considered. In addition, a system that is capable of integration of data collected and sharing is required.
- The dedicated lines connected to the data system among government agencies is a requirement in order to exchange data promptly and accurately.
- The redundancy of data transmission should be enhanced considering the experience from Typhoon Yolanda.
- There is a need for a system that can restore the communication network promptly when all the communication networks are down due to damages brought by a disaster.

Action Plan Toward Further Development of Disaster Resilient Society

(1) Enhancement of ICT System Division of OCD and other NDRRMC Member Agencies

- Enhancement of the ICT System Division of OCD and other NDRRMC member agencies that play the essential role of DRRM activities is necessary. Japan's technological assistance can be useful in the operation/maintenance of the upcoming Intelligence Operation Center (IOC), the capacity development of the division staff of related agencies, and the transfer of technology from the central office to the regional/local offices.

(2) Nationwide Deployment of Terrestrial Digital Broadcasting System with EWBS

- To enhance the resiliency and redundancy of data transmission before, during and after disaster, the nationwide deployment of terrestrial digital broadcasting should be promoted. The ODA loan project is one of the schemes that can support this activity.

(3) Development of Cloud-based Information Management System

- For OCD and other related agencies to gather information accurately and efficiently, the development of a Cloud-based Information Management System should be considered.

(4) Strengthening of Coordination among Related Agencies

- To boost the comprehensive DRRM activities, the establishment of regulation/s for the strengthening of coordination among related agencies is necessary. In addition, it will also be beneficial to undertake technology and knowledge sharing with the Government of Japan.

(5) Promotion of DRRM Education and Training

- Technology and knowledge transfer to operate the system and to conduct technical analysis should be a practice.
- In the regions and local communities, education and training on DRRM is not only for residents but also for government employees to better understand DRRM and be equipped in releasing appropriate issuances, instructions and evacuation advisories for the different disaster phases.

(6) Continuous Enhancements of Monitoring System of Warning Agencies

- There shall be continuous enhancements of monitoring systems of warning agencies for meteorological disasters such as typhoon, flood, and debris flow, and seismic disasters such as earthquake, tsunami and volcanic eruption.
- In addition, the enhancement of communication networks is essential. The Japan's technological assistance can be useful in this area.