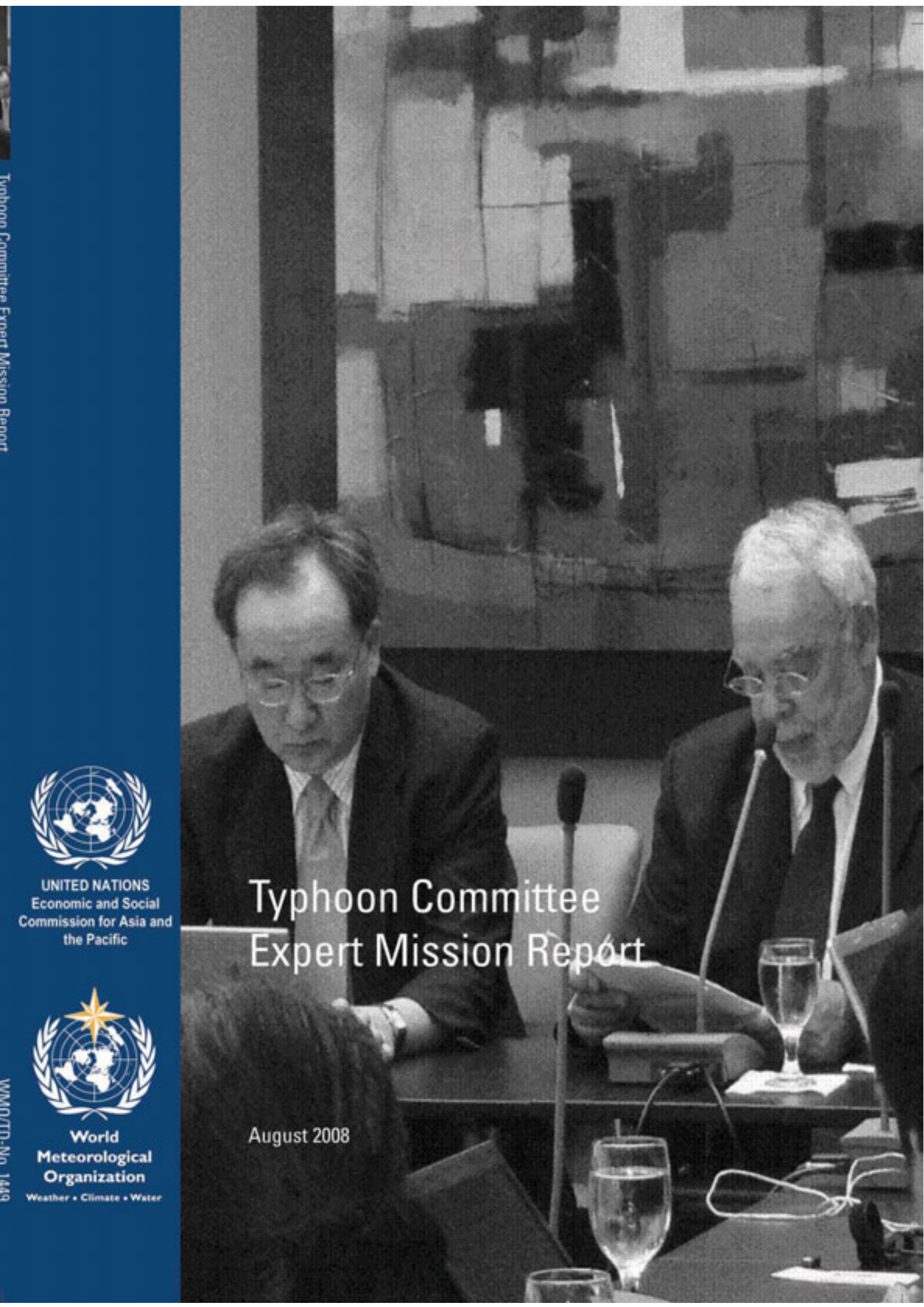

Typhoon Committee Expert Mission Report

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Typhoon Committee Expert Mission Report

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By National Institute for Disaster Prevention (NIDP)
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Cover illustration: Scene of the expert mission meeting in Philippines; Waonho Yi and Rasquinho Olavo (from left).

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FOREWORD

World Meteorological Organization (WMO) organized an inter-governmental body, Typhoon Committee (TC) to promote and coordinate the planning and implementation of measures for mitigating human and property damage from typhoon in Asia and the Pacific under the joint auspices of Economic and Social Commission for Asia and the Pacific (ESCAP) in 1968. As an inter-governmental body for meteorology, hydrology and disaster prevention and preparedness, part of the Typhoon Committee's (TC) role is to coordinate exchange of regular and updated typhoon disaster information on the status of the Typhoon Committee Disaster Information System with its members, international agency and global and regional meteorological agency. In particular, the Working Group on Disaster Prevention and Preparedness (WGDPP) interacts with the Working Group on Meteorology and Working Group on Hydrology analyze and produces national and regional disaster and typhoon reports on major typhoon events affecting their counties and reports on national disaster management system and national early warning system. The WGDPP produces the Typhoon Com-mittee Disaster Information System (TCDIS) to exchange of regular and updated typhoon trajectory and disaster information for mitigating human and property damage from typhoon related disaster in Asia and the Pacific area.

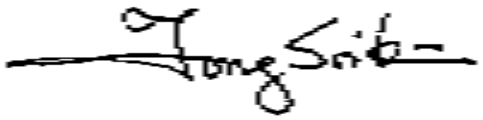
Early in the every year, the WGDPP issues an press release on the state of the priority activities and their own projects results and summarizing special emphasis relevant to coping with disaster prevention and preparedness. In December of each year, TC issues an annual press release on the state of the priority activities of each Working Group in the Strategic Plan and Annual Operating Plan, summarizing special emphasis relevant to coping with the climate change and major climate events in Asia and the Pacific area that have occurred during the outgoing year. Early in the following year, TC expands that information in a WEB-GIS based TCDIS on the status of the global disaster management system, featuring updated information, graphs, maps and charts. This disaster information is aimed at Members, international agencies, research institutions and other users interested in receiving disaster information.

Over the years, the WGDPP has been promoting the importance of disaster prevention and preparedness measures including regional and national planning, risk management, early warning systems and disaster management system to reduce the impacts of typhoon related hazards. With a view to improve the organization's disaster management system and early warning system and to identify and implement high priority activities for typhoon risk mitigation and commissioning of technical assistance and studies to sustain these initiatives, the data and information collected from member countries were implemented in the comprehensive disaster information system namely the TCDIS. In this regard, the collaborative work achieved by the ESCAP/WMO Typhoon Committee during recent years is highly valued by the WMO communities. Through the coordinated networks of the TC of its Members, the WGDPP supports the platform of a wide range of information and services based on disaster information analysis, forecasting of typhoon trajectory and local or regional damages and warnings. The Working Group of Disaster Prevention and Preparedness (WGDPP) of TC had launched its first project that develops Typhoon Committee Disaster Information System (TCDIS) in 2005, which is a tool for sharing of typhoon disaster information with TC members. TCDIS was growing and more and more advanced with Web-GIS based typhoon and risk analysis.

The timely and authoritative disaster information, assessments and reviews and their historical perspective provide crucial information on the state of the typhoon related disaster which helps to address the challenges related to typhoon and climate variability, since timely and high priority weather-, climate-, geology- and water-relate data and member's activities for typhoon risk mitigation and disaster prevention and preparedness and its related information are prerequisites to

the successful formulation and implementation of adaptive response policies and measures especially to typhoon trajectory and forecasting. For the collecting of high priority data and technical assistance how they do input member countries' data into the Web-GIS based TCDIS and estimate typhoon trajectory and damages from estimated typhoon trajectory, ESCAP/WMO TC Secretariat announced the launch of the first WGDPP Expert Mission at the 3rd Workshop of WGDPP on 11-13 April, 2008. Four Typhoon Committee members, namely, Lao People's Democratic Republic; Philippines; Thailand and Viet Nam were selected as recipient members of the Expert Mission in 2008. The Expert Mission was conducted in the 7-day period from 12 May to 19 May, 2008 to build capacities for mitigation of typhoon related disasters by analyzing typhoon information on the Web-GIS based Typhoon Committee Disaster Information System.

WMO programmes, and particular the Working Group on Working Group on Disaster Prevention and Preparedness of TC, help to build capacities by promoting the development of comprehensive disaster information system as the Web-GIS based Typhoon Committee Disaster Information System, ensuring that high quality typhoon related disaster information are readily available to TC members, and assist them by the Expert Mission. In addition, WMO co-sponsors major international observing and research programmes and projects, such as the Working Group on Hydrology and Working Group on Meteorology to help improve our understanding of the basic processes of disaster management.



Fong Soi Kun
Chairman, Typhoon Committee

EXECUTIVE SUMMARY

The Typhoon Committee (TC) was established in 1968 under the joint auspices of the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) and the World Meteorological Organization (WMO) to promote and coordinate the planning and implementation of measures required for minimizing the loss of life and damage caused by typhoons in Asia and the Pacific area. In order to coordinate efforts on the implementation of various projects under the Disaster Prevention and Preparedness (DPP) components to better support the socio-economic development process in the Typhoon Committee Area and help accomplish the DPP related goals and objectives the RCPIP (Regional Cooperation Plan Implementing Program), the Typhoon Committee has established the Working Group on Disaster Prevention and Preparedness (WGDPP) at the 38th Session held on November 2005, in Hanoi, Viet Nam. Dr. Sam-Kew Roh, Republic of Korea and Dr. Ming-Chung Wong, Hong Kong, China were appointed as first Chair and Vice-Chair of WGDPP respectively by members of WGDPP and now chairperson was substituted by Dr. Waon-Ho Yi, Republic of Korea.

The WGDPP developed a Typhoon Committee Disaster Information System (TCDIS) to share disaster related information and reduce damages from tropical cyclones of 14 committee member countries in Asia and Pacific area, namely, Cambodia; China; Hong Kong, China; Japan; Lao People's Democratic Republic; Macao, China; Malaysia; People's Democratic Republic of Korea; Philippines; Republic of Korea; Singapore; Thailand; USA; Viet Nam. One of main WGDPP projects is to support committee members and to identify and implement high priority activities for typhoon risk mitigation and commissioning of technical assistance and studies to sustain these initiatives. It is envisaged that the project of the TCDIS and the WEB-GIS based TCDIS would draw up proposals to suit their local needs for effective mitigation of tropical cyclone risks.

In order to assist and guide in data input and database implementation of comprehensive disaster information systems such as the TCDIS and the WEB-GIS based TCDIS, an expert mission was suggested at the third workshop of WGDPP at Seoul, Republic of Korea. The objectives of the expert mission are: (i) introduce the TCDIS and the WEBGIS based TCDIS, (ii) introduce the method for data input in the both systems and practice with sample data, (iii) collect disaster related information and input data needed for the WEB-GIS based TCDIS, (iv) promote the use of the TCDIS by the governments of the participating members; (v) identify the needs and gaps of participating members in relation to the implementation of the EWS and acquisition of the necessary information to TCDIS, and (vi) explore whether there is a need for public outreach projects in relation to the EWS and disaster risk reduction in the participating members.

The Expert Mission in 2008 was conducted in the 7-day period from 12 May to 19 May, 2008 Four Typhoon Committee members, namely, Lao People's Democratic Republic; Philippines; Thailand and Viet Nam were selected as recipient members of the Expert Mission in 2008. An expert team comprising six experts from the Republic of Korea and the Secretary of the Typhoon Committee, Dr. Olavo Rasquinho, was formed to undertake the mission.

The mission was successfully completed and the objectives were fully accomplished. The mission also indentified the need to organize regular meetings and briefings to public officials responsible for disaster prevention and preparedness in the respective member countries, as well as implement public out-reach projects on Early Warning System (EWS) and the Disaster Information System (DIS).

I. BACKGROUND

1. TYPHOON COMMITTEE

Effective response to typhoon calls for regional cooperation among the affected countries. A key element in such a response is an efficient typhoon warning system which involves the rapid and frequent exchange of information between countries and areas based on extensive observations and close monitoring of the storm's development and movement. Obviously such activities cannot be effectively performed on ad hoc or informal thus, a regional collaboration mechanism is necessary.

The Typhoon Committee (TC) is an inter-governmental body organized under the joint auspices of the Economic and Social Commission for Asia and the Pacific (ESCAP) and the World Meteorological Organization (WMO) in 1968 to promote and coordinate the planning and implementation of measures required for minimizing the loss of life and material damage caused by typhoons in Asia and the Pacific. The founding members of the committee were China; Hong Kong, China; Japan; Republic of Korea; Lao People's Democratic Republic; Philippines; and Thailand. More recent members include, Cambodia since 1972, Malaysia since 1976, Viet Nam since 1979, Macao, China since 1993, People's Democratic Republic of Korea since 1993, Singapore since 1997, and the USA since 1998 raising TC membership to fourteen.

The TC aims to reduce the damage caused by tropical cyclones and floods in the region by:

(i) reviewing regularly the progress made in the various fields of typhoon damage prevention;
(ii) recommending to the participating governments concerned plans and measures for the improvement of meteorological and hydrological facilities needed for typhoon damage prevention;
(iii) recommending to the participating governments concerned plans and measures for improvement of community preparedness and disaster prevention;
(iv) promoting the establishment of programs and facilities for training personnel from countries in the region in typhoon forecasting and warning, hydrology and flood control within the region and arrange for training outside the region, as necessary; .
(v) promoting, preparing and submitting to participating governments and other interested organization plans for coordination of research programs and activities concerning typhoons;
(vi) considering, upon request, possible sources of financial and technical support for such plans and programs;
(vii) preparing and submitting, at the request and on behalf of the participating governments, requests for technical, financial and other assistance offered under the United Nations Development Programme (UNDP) and by other organizations and contributors.

In carrying out these functions, the TC maintains and implements action programs under three components such as logical, hydrological, disaster prevention and preparedness with supported by Advisory Working Group (AWG) and Training and Research Coordination Group (TRCG), and Resources Mobilization Group (RMG) and also with contributions by its members and their cooperation and the assistance provided by the UNDP, ESCAP, WMO, and other agencies. In general, the members are responsible for implementing those parts of the program within their national jurisdiction with assistance, if necessary, from the TC staff or consultants.

1.1 Vision

The vision of the Typhoon Committee is to be the world's best intergovernmental, regional organization for improving the life quality of the populations in country of members through integrated cooperation to mitigate impacts and risks of typhoon-related disasters and to enhance beneficial typhoon-related effects.

1.2 Mission

The Typhoon Committee's vision is to integrate and enhance regional activities in the areas of meteorological, hydrological, and disaster prevention and preparedness of members within international frameworks to reduce the loss of lives and minimize the social, economical, and environmental damages by typhoon-related disasters and to enhance beneficial typhoon-related effects.

1.3 Key Results Areas and Strategic Goals

The key results areas are defined as the critical, overarching, priority areas of special interest for the Typhoon Committee. The committee must complete the strategic goals associated with these key results areas for it to achieve its vision and mission through regional, integrated actions. The committee has identified seven key results areas for special emphasis in the next five years. It should be noted that the TC along with its working groups can make major contributions key results areas, but there are many other factors and influences which are not under the direct control of the TC and the committee sources. Table 1 shows the key results areas and strategic goals of the TC. A chronology of the Typhoon Committee is given in Appendix I.

The success of the Typhoon Committee demonstrated the effectiveness of regional cooperation in mitigating the impacts of tropical cyclone to members and prompted the establishment of similar organizations in other tropical cyclone basins around the world, namely, the Panel on Tropical Cyclones, RA I and RA V Tropical Cyclone Committees, and RA IV Hurricane Committee.

Table 1. The key results areas and strategic goals of the Typhoon Committee

Key Results Areas	Strategic Goals
Reduced loss of life from typhoon-related disasters	To reduce the number of deaths by typhoon-related disasters by half using the decade 1990-1999 as the base line to compare with the decade 2006-2015 in the TC region
Minimized typhoon- related social and economic impacts	To reduce the socio-economic impacts of typhoon-related disasters per GDP per capita by 20% using the decade 1990-1999 as the base line to compare with the decade 2006-2015 in the TC region
Enhanced beneficial typhoon-related effects for the betterment of quality of life	To improve the beneficial use of typhoon-related effects of typhoons by 10% in water management by selected members using the decade 1990-1999 as the base line to compare with the decade 2006-2015 To promote increasing use of the typhoon-related beneficial effects among the Members in many different sectors
Improved typhoon- related disaster risk management in various sectors	To provide reliable typhoon-related disaster information for effective policy making in risk management in various sectors To strengthen capacity of the members in typhoon-related disaster risk management in various sectors To enhance international and regional cooperation and assistance in the field of disaster risk reduction
Strengthened resilience of communities to typhoon-related disaster	To promote and enhance culture of community-based disaster risk management among the members To promote education, training and public awareness of typhoon-related disasters among the members
Improved capacity to generate and provide accurate, timely and understandable information on typhoon-related threats	To strengthen RSMC capacity to respond to the needs of the members in forecasting and capacity building To improve capacity of members to provide timely and accurate user-oriented and friendly TC products and information To enhance capacity of members' typhoon-related observation and monitoring
Enhanced typhoon committee's effectiveness and international collaborations	To strengthen the capacity for resources mobilization for the implementation of the strategic goals To strengthen the capacity of the TC to effectively discharge its responsibilities and functions

2. THE WORKING GROUP ON DISASTER PREVENTION AND PREPAREDNESS

In order to coordinate efforts on the implementation of various works under the disaster prevention and preparedness (DPP) components, the Typhoon Committee established the Working Group on Disaster Prevention and Preparedness (WGDPP) in 2005 with the terms of reference described in the following section. The primary efforts of WGDPP are to better support the socio-economic development process in the Typhoon Committee area and to help accomplish the DPP-related goals and objectives the Regional Cooperation Plan Implementing Program.

2.1 Terms of Reference of WGDPP

The WGDPP will promote cooperation among members of activities under the disaster prevention and preparedness component with the aim to support the socio-economic development process and enhance cooperation among the members in all three components such as hydrology components, meteorology component, and DPP component. Towards this end, the WGDPP is expected to advise and assist the TC in: (i) identifying priority issues and areas of cooperation in the DPP component; (ii) promoting and facilitating the exchange of experiences and knowledge on latest developments and techniques related to the above issues and areas; (iii) coordinating and implement priority activities and programs of the committee aiming at strengthening capacity of the members in disaster prevention and preparedness; (iv) mobilizing resources to carry out priority activities of the committee related to the DPP component; (v) reporting overall progress in the implementation of the DPP component of the RCPIP; and (vi) recommending to the committee priority areas, programs, and activities for cooperation in disaster prevention and preparedness research by related experts of the members.

2.2 Members

The WGDPP will consist of the following members: (i) chairperson, (current post holder: Dr. Waon-Ho Yi); (ii) vice chairperson, (current post holder: Dr. Ming-Chung Wong; and (iii) members' representatives as appointed by the Committee. The Committee also requests other interested members to take part in the working group and invite ESCAP and WMO representatives to be involved in the work of this Working Group. The term of service on the WGDPP is 1 year subject to extension authorized by the TC.

2.3 Activities of WGDPP

The 38th Session of Typhoon Committee on Hanoi, Viet Nam, 14-19 November, 2005

The WGDPP was established at the 38th Session, November 2005, in Hanoi, Viet Nam. The members of WGDPP appointed Dr. Sam-Kew Roh, Republic of Korea and Dr. Ming-Chung Wong, Hong Kong, China as Chair and Vice-Chair of WGDPP respectively. It also invited the members to nominate their respective focal points to participate in the work of WGDPP. The members reviewed the activities in 2005 and the main features of presentations of 12 members are summarized following as: (i) Information collection system using remote sensing technology including satellite imagery can be a powerful tool for disaster prevention and preparedness component; (ii) Hazard zoning and mapping is one of the key foundations for an effective disaster management system; (iii) Flood and landslide mapping are the ones to start with; (iv) Town watch mapping introduced by ADRC would help understand the use of hazard map at community level; (v) Disaster database system such as GLIDE proposed by ADRC needs to be promoted for more systematic information sharing; (vi) Experiences regarding evacuation schemes and related legal systems need to be reviewed and shared at the regional level; (vii) Integration of disaster risk reduction concepts into actual policy in development planning and recovery process using legislative system is essential to mitigate

and minimize the consequences of typhoon-related disasters; (viii) Modified environmental impact assessment or disaster impact assessment can be adopted in developing member to reduce reckless and uncontrollable development; (ix) It is important to conduct drills and exercises involving the public and to raise awareness of the community based warning and response system; (x) It needs to conduct capacity building training for trainers or volunteers who are responsible for disaster management at the local/community level; (xi) It is also desired to provide information on typhoon disasters to the education sector and encourage them to be integrated in school curriculum; (xii) Regional detection and monitoring systems used in tsunami detection and warning can be reviewed to take advantage of already available technologies which may be mobilized for typhoon related disaster, or vice versa; (xiii) International sharing on the standard operational plan or manual for multi-hazard warning response is desired; (xiv) Tools such as PDA, radio, TV, Cell Broadcasting Service, town speakers, and handy loud speakers are needed to be recognized and promulgated for early warning communication; (xv) Sharing of information and experience on the operation of early warning system is highly desirable and should be promoted.

Based on these reviews, to implement the DPP projects starting from 2006, the committee attached priority as followings: (i) develop and implement a database on the DPP component focusing on the compilation and publication of an inventory of early warning systems operated by members in which the database can be expanded to include other information as the project progress; (ii) link hazard mapping on flood and landslide with local actions and implementations to enable the local community to produce and use relevant hazard maps; (iii) promote the importance of application of remote sensing technology, especially satellite technology, in DPP; (iv) provide opportunities that DPP experts and media representatives work together on disaster communication; (v) offer an experience sharing network on disaster impact assessment as a tool in disaster risk reduction; (vi) other socio-economic issues still need to be discussed.

On the basis of the information provided by the members and findings of parallel session of the DPP, the following conclusions were reached: (i) The Committee recognized the need to enhance coordination and interaction among all the working groups; (ii) In this connection, it encouraged WGDPP to advance progress expected from the key activities of WGDPP, especially those related to the inventory of early warning systems in the TC members and the establishment of socio-economic database of typhoon-related disasters in the region (iii) In this connection, it recognized the importance of close collaboration between WGDPP and ADRC in the development of the database; (iv) The Committee expressed its appreciation to Republic of Korea and Hong Kong, China for various initiatives to further enhance the important role of DPP in promoting visibility of the committee and in facilitating mobilization of resources to support the operations of the committee; (v) The Committee recognized the need to implement activities of the DPP component of RCPIP in close collaboration with Working Group on Meteorology (WGM) and Working Group on Hydrology (WGH); (vi) The committee recognized the benefit of synergy in implementing DPP activities of the RCPIP projects in collaboration with ongoing DPP activities of ADPC and ESCAP projects, including those related to early warning, community based disaster risk management and enhanced participation of the media in disaster reduction.

The 1st Meeting of WGDPP on Seoul, Republic of Korea, 25-26 May, 2006

The 1st Meeting of WGDPP was held in Seoul, Republic of Korea from May 25 to 26, 2006. 16 experts from 10 member countries such as China; Hong Kong, China; Japan; Lao People's Democratic Republic; Macao, China; Malaysia; Philippines; Republic of Korea; Thailand and USA, and 4 delegates from international and regional organizations such as WMO, UNESCAP,

UNISDR, and ADRC, discussed about the database project and future activities of four topics such as vision of DPP, Early Warning System in Hong Kong, China, last miles of EWS, introduction of Macao, China civil protection were presented in this meeting and specific presentations regarding database setup project such as TC database setup for EWS, remarks on TC database setup for EWS and database of EWS in the TC region were also presented. The specific descriptions discussed about vision and future activities of the DPP, purpose of the database, items to be included, database implementation process and methodology, and who will be doing what in the future. During the meeting, the WGDPP also determined the TC DPP database work plan. The committee expressed its appreciation to the Republic of Korea and Hong Kong, China for various efforts to promote visibility of the committee and for resources mobilization including the first meeting of WGDPP in Seoul and the Typhoon Committee Disaster Information System (TCDIS) project. The committee also expressed its appreciation to UNISDR and ADRC for the support it provided to the WGDPP and especially to the TCDIS project.

The 39th Session of Typhoon Committee on Manila, Philippines, 4-9 December, 2006

At the 39th session of Typhoon Committee, the WGDPP session reviewed about activities of the committee members. Priority activities within the DPP component among the members were included following as: (i) the TC database set up as the first RCPIP project of WGDPP and (ii) collaboration for the formulation of the committee's strategic plans between 2007-2011, and annual operation plans for 2007. The committee noted with interest that the Hong Kong, China observatory conducted several courses on weather and geophysics, including courses on tropical cyclones, for members of the public in 2006 and that they were well received. The committee also noted that the year long public education campaign "Safer Living - Reducing Natural Disasters" held in Hong Kong, China ended in April 2006 with a one month exhibition and rescue drill demonstrations, and requested Hong Kong, China to share its experience with other members.

The committee decided to make a report on the Parallel Session of the Working Group on DPP and recognized that an efficient data sharing system or data management tools for various disasters for TC members pursuing an accurate, rapid, and economic system which can be expanded to include damage prediction, damage survey, and recovery support functions were needed. For this reason, among the 6 items to be implemented as DPP projects decided in the 38th session, the database setup has been selected as the first project. The final objective of the database is to establish disaster related data sharing system among the members and in the region. The committee selected an appreciation note for the enhanced coordination and interaction among all the working groups during 2006 especially in the Macao, China workshop. During the Macao, China workshop, the WGDPP discussed? the contents of database and strategies for DPP plans such as (i) The committee named the database as the TCDIS and reviewed TCDIS draft formats. (ii) For the 7 Key result areas, strategic goals and associated activities were proposed for DPP by the members for the formulation of the Typhoon Committee Strategic Plan 2007-2011.

The committee agreed that enhanced interaction not only among WGDPP members but also with other Working Groups to establish and operate TCDIS effectively were needed. The Committee also agreed that focal points for TCDIS would be required for this. The operation plan for 2007 was reviewed and finalized in this meeting. On the basis of the information provided by the members and findings of the parallel session on WGDPP, the following conclusions were selected that the WGDPP is needed to make plan of the TCDIS in two phases following as (i) The committee agreed to set up the TCDIS using database equipment for disaster status analysis and response to input disaster information of the members, and to support the decision-

making process and status judgment through database construction using various disaster information in phase 1; (ii) The committee also agreed to expand the TCDIS and to make network with other organizations and related systems in phase 2.

The committee recognized the need to implement activities of the DPP component of the strategic plan in close collaboration with WGM and WGH. On the basis of the information provided by the members and deliberations, the committee made the following decisions: (i) Conduct coordination meeting to finalize the TCDIS concept, design layout, application method, and enter statistics from 2005 and 2006 in the first and second quarter of 2007; (ii) Support the experts to National Institute for Disaster Management (NIDP) and National Emergency Management Agency (NEMA), Republic of Korea to help develop the TCDIS; (iii) Start collecting and compiling disaster management information of the members, especially concentrate on the early warning systems, then develop and implement pilot web site; (iii) Implement Expert Mission by dispatching 2-3 experts to help 2-3 member countries to set up the TCDIS, after the coordination meeting and before 40th session in 2007; (iv) Participate in a focused, integrated WGM, WGH, WGDPP, TRCG, and AWG workshop with specific deliveries defined and review progress of the TCDIS project to determine future actions and timeline; and (v) make presentation on the TCDIS project and web site to the 40th session of the Typhoon Committee.

The 2nd Meeting of the WGDPP on Seoul, Republic of Korea, 22-24 August, 2007

The second meeting of the WGDPP was held in Seoul, Republic of Korea from 22 to 24 August 2007. Twenty participants from member countries and international organizations discussed about DPP projects including the TCDIS. During the DPP meeting, the participants agreed on the following points: (i) completing the TCDIS is a priority of the DPP; (ii) a focal point person and organization in each country is identified or will be identified by the end of August 2007; (iii) the NIDP provides a manual for the TCDIS; and (iv) The participants finalized the design of the TCDIS and agreed to provide inputs to the TCDIS by early September before the IWS to be held in Bangkok, 10-15 September. The participants also discussed vision and future activities of the TCDIS.

The 40th session of Typhoon Committee on Macao, China, 21-26 November, 2007

In this session, the activities of the members, UNESCAP, WMO and other collaborating organizations in 2007 were reviewed. Priority activities within the DPP component among the members were following as: (i) progress on the TCDIS project; (ii) the 2nd DPP meeting on Seoul in August 2007; and (iii) the integrated workshop on Bangkok in September 2007.

The Committee decided to make a report for the Parallel Session of the Working Group on DPP. The officers was elected in the meeting of Working Group on DPP. The committee noted the ongoing enhanced project on the TCDIS and expressed its appreciation to the government of Republic of Korea for the provision of $350,000 for the implementation of the TCDIS. The committee noted the closer interaction not only among WGDPP members but also with other Working Groups to establish and operate the TCDIS effectively were needed.

On the basis of the information provided by the members and findings of the parallel session on WGDPP, the following conclusion were reached: (i) the committee appreciated Dr. Sam-Kew Roh for his leadership and efforts during the last two years; (ii) the committee recognizes the importance of the outcomes of the Bangkok workshop in September, Integrated Workshop on Social Economic Impacts of Extreme Typhoon related events as the basis for future activities on the TCDIS; and (iii) future activities of the WGDPP should include joint activities with the WGM and the WGH and rapid economic impacts assessment.

The Committee also made the following recommendations: (i) To appoint Dr. Waon-Ho Yi from the NIDP of the Republic of Korea and Dr. Ming-Chung Wong from Hong Kong, China as Chair and Vice Chair of the WGDPP respectively; (ii) To enhance the ongoing project on the TCDIS to serve as a portal for the TC members on the DPP matters; (iii) To develop a conceptual framework consistent with the Multi-Hazard Early Warning Systems in conjunction with other WGs to make a link with the TCDIS; (iv) To send expert missions on the TCDIS to interested members in April or May 2008; (v) To support the organization of public education events to raise public awareness on the DPP jointly with WMO DPP Program and UNISDR, as well as WGM and WGH, and consider if these would need to be added during the mission; (vi) To organize the third DPP Workshop in Korea in summer 2008; (vii) To conduct a training workshop on the socio-economic impacts of disasters during the integrated workshop in 2008.

The 3rd Meeting of the WGDPP on Seoul, Republic of Korea, 10-11 April, 2008

The third Meeting of the WGDPP was held in Seoul, Republic of Korea from 10 to 11 April 2008. Twenty participants from Members and International organizations discussed about the TCDIS. During the DPP meeting, the participants agreed on the following: (i) The TCDIS and the WEB-GIS based TCDIS are useful tool to make WGDPP a paradigm of TC Working Groups; (ii) providing inputs to disaster information on the TCDIS as soon as possible.

Participants also agreed on the following regarding the Expert Mission: (i) Four members, namely, Lao People's Democratic Republic, Philippines, Viet Nam, and Thailand were selected for recipient countries of first expert mission in 2008; (ii) the WEB-GIS based TCDIS can help improve the quality control of disaster information and link that data to policy decision making of the countries; (iii) the Expert Mission should be considered and focused on presentations of benefits of TCDIS and what WGDPP can offer members as well as exposure of of WGM and WGH; (iv) the NIDP will prepare for an expert mission in May depending on the availability of fund, which other members are invited to contribute; (v) the ISDR will provide directions on archival of statistics on the TCDIS website and suggest the format for an integrated page on the statistics. All participants of three working group meeting on the Disaster Prevention and Preparedness were listed in Appendix II.

II. TYPHOON COMMITTEE DISASTER INFORMATION SYSTEM

During the 38th session of the TC held in 2005, the members of the Working Group on Disaster Prevention and Preparedness (WGDPP) agreed to establish an efficient data sharing tool of various tropical cyclone related disasters for TC members. The members agreed that the objectives of this initiative are to acquire accurate and rapid system to assess damages through damage predictions, damage surveys, and recovery support functions. The members also agreed to establish an integrated information system to share disaster data and information within the TC region.

The DPP implemented its first project in 2006 and established a website (www.tcdis.org) called the "Typhoon Committee Disaster Information System" (TCDIS). The TCDIS contributes to tropical-cyclone- related disaster risk reduction in the region though promoting a timely and efficient way of tropical-cyclone- related disaster information communication via its website. The TCDIS is developed as a platform (i) to exchange the disaster information and experience of members, (ii) for coordination, integration, capacity building, communication, and outreach, and (iii) for identification of hazard and resource mobilization. The system would be able to help decision makers take informed actions during emergency situations of an approaching tropical cyclone. The TCDIS can also be used as a platform for members to share disaster data, knowledge and experiences, good practices, and other information related to tropical cyclone disaster risk reduction.

1. CONTENTS OF THE TCDIS

Information for the TCDIS is categorized under five topics, namely. "About the TCDIS", "Projects", "Early Warning System", "Disaster Management System", and "DPP Meeting". The main page displays a tropical cyclone information map which shows the recent storms in the typhoon committee region (Figure 1). A box of "News & Notice" for TC related news and disaster related information and "DPP Meeting" for information of meeting are also represented at the bottom of main page for quick access to these pages.

1.1 The "About the TCDIS" Page

This page explains the background and purpose of the TCDIS, as well as major functions of the TCDIS such as the Contents, the Early Warning System, and the Disaster Information System (DIS), activities of the WGDPP and members, etc. A sample page is shown in Figure 2.

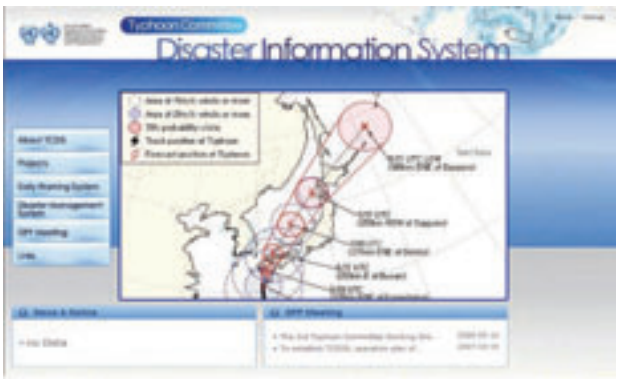


Figure 1. Main page of TCDIS

1.2 The "Projects" Page

In this site, the projects of the Working Group on Disaster Prevention and Preparedness are introduced. At present, the project to develop disaster information system for typhoon committee members is being implemented. This page displays project information and related materials, reports and meeting findings on the development the TCDIS. Future projects planned by the WGTCDPP will be also presented in this site.

1.3 The "Early Warning System" Page

The Early Warning system (EWS) site contains information on each member's early warning system (EWS), including warning criteria and organization, for high-impact weather such as strong wind, heavy rain, and typhoon, and sys-

tem for warning, will be collected and summarized in the TCDIS. An efficient data sharing tool of various in this page could help TC members reduce tropical-cyclone-related disaster risk in the region though promoting a timely and efficient communication of typhoon-related disaster information, thus enabling helps decision makers to make informed decisions and take timely action during emergency situations. Examples showing the "Warning Criteria" and "Inventory Early Warning System" for each member in this site are shown in Figures 3 and 4 respectively.

1.4 The "Disaster Management System" Page

The Disaster Management System (DIS) Website contains disaster management organization of each member as well as disaster statistics such as local and time damage of disaster, damage

Figure 2. Sample page of "About TCDIS"

Figure 3. Example of the warning criteria in the Republic of Korea

Figure 4. Example of the Early Warning System of the Philippines

Figure 5. Example of organization chart of Lao PDR for the disaster management

recovery information in the disaster information system. Disaster Reports containing various disaster related information such as GLIDE Number, period, location, map, cause of damage, casualties, property damage, EWS operation, lessons learned, references, pictures will be compiled by each respective member and contains essential metadata on the tropical cyclone under reference and shown in this website. An example of the disaster management organization with a disaster management organization chart is shown in Figure 5.

Annual total loss of lives and properties damages from tropical-cyclone-related disasters are also summarized and displayed in the form of table and figures. The annual total damages from 1995 to 2007 of the Republic of Korea are shown in Figure 6. Such total damages and casualties statistics are presented by name of

Figure 6. Annual damages of Republic of Korea in the disaster management system

Figure 7. Total damages from typhoon Nari in the disaster management system

Figure 8. The disaster report of Republic of Korea

Figure 9. The typhoon track in the disaster report of Republic of Korea

tropical cyclone together with the year of occurrence. Figure 6 is an example of the damages and casualties caused by typhoon Nari in 2007. Other tropical-cyclone-related information such as the GLIDE number, location, damage information, and maps can also be found in the Disaster Report. An example each of the Disaster Report and the typhoon track in the Disaster Report are shown in Figures 8 and 9.

1.5 The "DPP Meeting" Page

News and new information notified by the WGDPP are presented in this site. Reports published by WGDPP are also presented in this site.

2. WEB-GIS BASED TCDIS

With this active support from TC members, the Republic of Korea has designed and launched the Typhoon Committee Disaster Information System (TCDIS) containing members' disaster warning systems and disaster management systems for tropical-cyclone-related disaster As first proposed in the 3rd meeting of WGDPP in 2007, the Republic of Korea is now working on a more effective next-generation disaster information management system named "WEB-GIS based TCDIS". The WEB-GIS based TCDIS was developed to further promote and coordinate the planning and implementation of measures required for minimizing the loss of life and material damage caused by typhoons in Asia and the Pacific (Figure 10). This next-generation disaster information and management system is required as (i) each member will have growing interest on the economic and environmental aspects of the damages from disasters which may occur with higher frequency and occur across boundaries; (ii) cooperation of each members based on information prepared in normal situation is much cheaper; (iii) the TC will be the main source of climate change information; (iv) establishment of standards for GIS in each region which is being built by PCGIAP (www.pcgiap.org). For the implementation of the WEB-

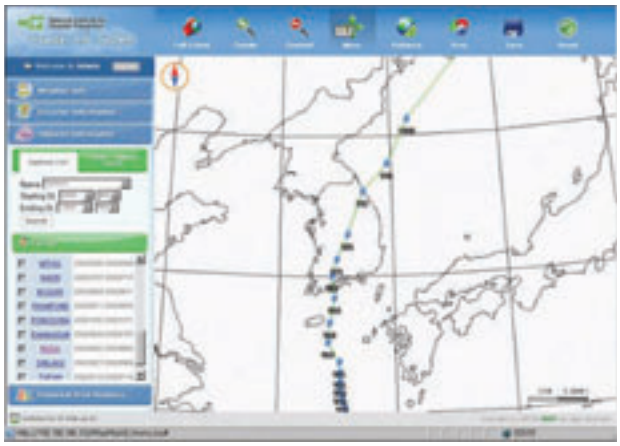


Figure 10. Main of the WEB-GIS based TCDIS

Table 2. Basic data to be obtained from each TC member for prediction and estimation of typhoon trajectory

Information	Information characteristics	Source
Damages	- damage data of each administrative area (e.g. 232 county in the Republic of Korea)	e.g. NEMA, annual disaster report
Population	- population data in each counties - census data	e.g. NSO
Boundaries of administrative areas	- administration boundaries adjusted	Boundary data
Cadastral maps	- e.g. 28 detailed cadastral maps in damaged areas	e.g. Cadastral report
Changes in price rated	- changes in consumer price rate	e.g. NSO
Meteorological data	- characteristics of meteorological data	

GIS based TCDIS, the basic data shown in Table 2 to facilitate prediction and estimation of typhoon trajectory will need to be obtained from each TC member.

2.1 Purpose of the WEB-GIS based TCDIS

The objectives of the WEB-GIS based TCDIS are:

(i) to provide an integrated and comprehensive disaster information system,
(ii) to expand international cooperation and knowledge for disaster management, and
(iii) to improve understandings of typhoon phenomena and of its impact on natural and social environment.

The proposed strategies for the WEB-GIS based TCDIS are:

(i) continuous working to finish establishment of the WEB-GIS based TCDIS,
(ii) lead more participants and input from TC members, and
(iii) funding for developing countries from developed countries and the United Nations.

The expected benefits from the development of WEB-GIS based TCDIS are (i) establishment of typhoon trajectory prediction model with low cost input, (ii) collecting input data for prediction model from historical data of climate and disaster report, (iii) sharing disaster response information prepared by each county to prepare and recover the disaster and support for water resources allocations, (iv) using the new prediction model to compare with other hydrological models, and (v) building more accurate typhoon trajectory prediction model with more data obtained from disaster reports. For the prediction of tropical trajectory, central pressure value is used in the WEB-GIS based TCDIS which prediction model represent the similar typhoon trajectory by Nearest Neighbor Method (NNM). The simulation result with three historical input data such as the pressure, the longitude, the latitude, time and date obtained from meteorological warning center is shown in Figure 11. The calibration result shows that the prediction model represent well Typhoon Maemi's track with input data such as date, longitudinal, latitude, central pressure obtained from the report of Typhoon Maemi.

The WEB-GIS based TCDIS would serve as: (i) information service provider including the typhoon information, the damage, the alert, and other related model, (ii) application service provider including the typhoon trajectory prediction model

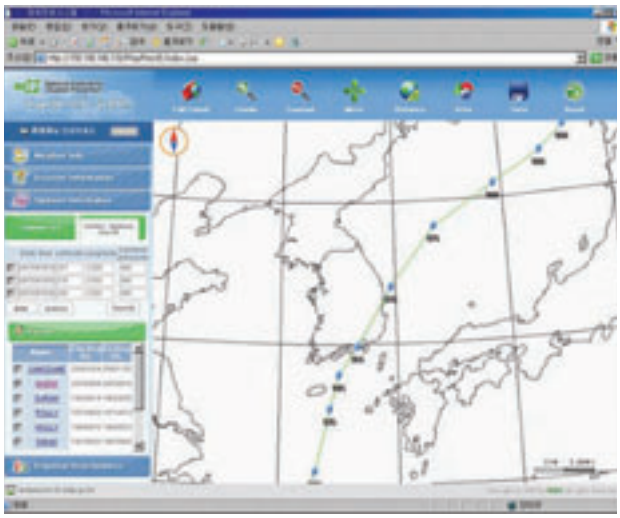


Figure 11. The calibration result of Maemi's trajectory

Figure 12. The regional damage result from the WEB-GIS based Typhoon Damage Estimation System, WEB-GIS based TCDIS

for each county, (iii) community service provider for various attendee and participants for typhoon committee, (iv) location service provider including the GIS based typhoon information, (v) interactive information provider.

2.2 Typhoon Damage Estimation System

In the WEB-GIS based Typhoon Damage Estimation System, WEB-GIS based TDES, kernel density function was used to estimate damage from typhoon which meteorological data was converted into trend analysis for kernel density function. The regional damage result for each typhoon trajectory which damage is estimated with rainfall and wind velocity data is represented in the WEB-GIS based TCDIS shown in Figure 12.

For estimation of WEB-GIS based Typhoon Damage, the events of precipitation and wind speed of historic typhoon and detailed information for 232 counties of Republic of Korea are arranged into database. For the damage estimation, rainfall and strong wind related typhoon implemented in database and detailed GIS data are converted into the kernel density function. Interpolation process with GIS programming based on “Intra map”, one of the dominant software in Republic of Korea and produced by KSIC was also used to estimate typhoon related damages. The calibration result show that the prediction model represent well typhoon related damages with input data such as wind data and precipitation data obtained from the database of the WEB-GIS based TCDIS.

III. TYPHOON COMMITTEE EXPERT MISSION

The Working Group for Disaster Prevention and Preparedness commenced implementation of its first project, the Typhoon Committee Disaster Information System in 2005. TCDIS is a tool for information exchange among the Typhoon Committee members. It contains disaster information such as the disaster management system, the early warning system, disaster statistics, disaster reports and DPP activities. The successful implementation of the project depends on the provision by all TC members the necessary member specific information to the TCDIS coordinator on a continuous basis. It is noted that hitherto not all members have submitted the required information for implementation of the TCDIS. In this respect, the TC decided that an expert mission would be conducted in 2008 to promote the TCDIS and to assist members in data collection and entry to the TCDIS. The first expert mission was conducted in four countries from 11 May to 20 May, 2008.

Typhoon Committee Secretariat (TCS) announced the launch of the first WGDPP Expert Mission through a circular letter to members. Members interested in receiving the Expert Mission (Lao People's Democratic Republic, Philippines, Thailand, and Viet Nam) notified TCS of their intention to participate. TCS, together with Chair, WGDPP selected 4 candidates as recipient members and notified the recipient members. Each recipient member then nominated a focal point to liaise with TCS and relevant local stake-holders and as well as make suitable logistic arrangements for the mission. A mission plan was prepared and agreed upon by the recipient members and TCS. The expert team, as well as the focal points of recipient members had a coordination meeting during the third meeting of WGDPP, to fine-tune the mission plan for each recipient member.

1. OBJECTIVES OF THE EXPERT MISSION IN 2008

The main objectives of the Expert Mission are to:

(i) introduce the TCDIS and WEB-GIS based TCDIS,
(ii) introduce the method for data input in the both system and practice with sample data,
(iii) collect disaster related information and data needed for WEB-GIS based TCDIS,
(iv) promote the use of TCDIS by the governments of the participating Members;
(v) identify needs and gaps of participating members in relation to the implementation of the EWS and acquisition of the necessary information to TCDIS, and
(vi) explore whether there is a need for public out-reach projects in relation to EWS and disaster risk reduction in the participating Members.

2. RECIPIENT MEMBERS AND PARTICIPANTS

Four TC members, namely, Lao PDR, Philippines, Thailand and Viet Nam, were selected

Table 3. Recipient countries and experts participated in the Expert Mission from 11 May to 20 May, 2008

Recipient	Management Organization	Expert Group	Number of Participants
Lao PDR	Dept. of Meteorology and Hydrology	- Disaster Prevention - Meteorologist	9
Viet Nam	Dept. of Floods and Storms Control	- Disaster Prevention - Meteorologist	13
Thailand	Dept. of Disaster Prevention and Mitigation	- Disaster Prevention - Meteorologist - GIS Major	16
Philippines	Disaster Control Division in Quezon City	- Disaster Prevention - Meteorologist - IT Major	10

as recipients of the expert mission in 2008. Recipient members and participants are listed in Table 3.

3. EXPERT TEAM

The mission was led by an expert team led by the Chair, WGDPP and comprising five experts from the Republic of Korea and the Secretary of TC, Dr. Olavo Rasquinho to conduct the mission. The experts were invited based on their areas of expertise on disaster management system, IT and database, Global Identification Number, and public-outreach, etc. as determined by the requirements indicated by the recipient members. The experts would promote usage of the TCDIS, identify needs and gaps of participating members in relation to the implementation of the EWS and the DIS and acquisition of the necessary information to the TCDIS as well as explore whether there is a need for public out-reach projects in relation to the EWS, the DIS, and disaster risk reduction in the participating members. The experts in undertaking the mission are listed in Table 4.

4. PROGRAMS

It has been planned that during the Expert Mission, the TCDIS would be promoted to the stake holders for timely and efficient disaster information exchange. The TCDIS could also be used as a platform for the members who have less access to the regional disaster information. This information exchange system could be utilized to provide essential typhoon disaster related information for decision makers. In the process, the gaps and needs on early warning systems and public out-reach programs of the respective recipient members would be identified for subsequent follow-up programs and proposals. Based on such consideration, the mission schedule was prepared as shown in Table 5.

The main task of the expert team was to explain the design and function of the TCDIS and the WEB-GIS based TCDIS and collect related disaster information for the disaster management system including the existing early Warning System and GIS information for building the WEB-GIS based TCDIS from participant members. Future works for collecting data, input collecting data, and modifying the disaster management system and early warning system are also discussed in the expert mission. The TCDIS material presented in the mission is attached in Appendix II, the WEB-GIS based TCDIS material presented in the mission is attached in Appendix III, and the material for Global Identification Number presented in the mission is attached in Appendix IV.

5. QUESTIONNAIRE FOR THE TCDIS/WEB-GIS BASED TCDIS

To establish the Web-GIS based TCDIS, the expert team prepared a questionnaire for surveying the availability of disaster information

Table 4. Experts undertaking the Expert Mission during 12-19 May, 2008

Name	Role of Mission	Specialty
Waonho Yi	General management	Chair of WGDPP
Olavo Rasquinho	Support for management and mission report	TCS
Sam-Kew Roh	Collect data related in EWS	Expert in EWS
Jitae Kim	Presentation of TCDIS	Hydrologist
Eun-Mi Chang	Presentation of WEB-GIS based TCDIS Survey data for WEB-GIS based TCDIS	Expert in GIS and IT
Dong Hyun Lee	Collect data and report for EWS and DIS	Statistician

such as weather report and disaster report and digital map for the Geological Information System from recipient members. This survey is very useful for building a database and decision making system for analysis disaster information and decision making. A second questionnaire to assess the existing situations (in particular, on Early Warning Systems) in the recipient member was also prepared by Chair of WGDPP in consultation with TCS and sent to the respective

Table 5. Schedule for the Expert Mission

Place	Date	Time	Contents
Hanoi, Viet Nam	May 12 (Mon)	09:00-09:30	- Opening Ceremony
		09:30-10:30	- WGDPP and Expert Mission (by Dr. Jitae Kim)
		10:30-11:00	- Coffee Break
		10:30-12:00	- TCDIS (by Dr. Jitae Kim)
		12:00-13:30	- Lunch
		13:30-15:00	- WEB-GIS based TCDIS (by Dr. Eun-Mi Chang)
		15:00-15:30	- Coffee Break
		15:30-17:00	- Disaster Information Systems of Viet Nam
		17:00-18:00	- Practice and discussion/Closing Ceremony
Vientiane, Lao PDR	May 13 (Tue)	13:00-13:30	- Opening Ceremony
		13:30-14:30	- WGDPP and Expert Mission (by Dr. Jitae Kim)
		14:30-15:00	- Coffee Break
		15:00-16:00	- TCDIS (by Dr. Jitae Kim)
		16:00-17:30	- WEB-GIS based TCDIS (by Dr. Eun-Mi Chang)
	May 14 (Wed)	09:00-10:30	- Disaster Information Systems of Lao PDR
		10:30-11:00	- Coffee Break
		11:00-12:00	- Practice and discussion
		12:00-13:30	- Lunch
		13:30-17:00	- Practice and discussion/Closing Ceremony
Bangkok, Thailand	May 15 (Thu)	13:00-13:30	- Opening Ceremony
		13:30-14:30	- WGDPP and Expert Mission (by Dr. Jitae Kim)
		14:30-15:00	- Coffee Break
		15:00-16:00	- TCDIS (by Dr. Jitae Kim)
		16:00-17:30	- WEB-GIS based TCDIS (by Dr. Eun-Mi Chang)
	May 16 (Fri)	09:00-10:30	- Disaster Information Systems of Thailand
		10:30-11:00	- Coffee Break
		11:00-12:00	- Practice and discussion
		12:00-13:30	- Lunch
		13:30-17:00	- Practice and discussion/Closing Ceremony
Manila, Philippines	May 19 (Mon)	09:00-09:30	- Opening Ceremony
		09:30-10:30	- WGDPP and Expert Mission (by Dr. Jitae Kim)
		10:30-11:00	- Coffee Break
		10:30-12:00	- TCDIS (by Dr. Jitae Kim)
		12:00-13:30	- Lunch
		13:30-15:00	- WEB-GIS based TCDIS (by Dr. Eun-Mi Chang)
		15:00-15:30	- Coffee Break
		15:30-17:00	- Disaster Information Systems of Philippines
		17:00-18:00	- Practice and discussion/Closing Ceremony

focal points before the expert mission during 12-19 May, 2008. Focal points were requested to return the completed questionnaire before commencement of the mission.

5.1 Questionnaire on availability of disaster information

Five questions about the status of digital maps, status for weather report, status for disaster report, contact points, and constraints were listed in a questionnaire to be used as input tosh the Web-GIS based TCDIS. The question on the digital map (Table 6) is for assessing the possibility of establishing a member-specific geological information system. The questions for the status for weather report (Table 7) is to assess the possibilities for prediction of typhoon trajectory and damage estimation from typhoon related disaster. The questions on disaster report are as follows: (i) is there any disaster report for each administration unit; (ii) if yes, how are the damage categorized; (iii) if yes, is that in electronic file (spreadsheet or word file) or not (book, hard copy); (iv) if yes, how many years disaster report have been produced; and (v) if yes, does the report include weather information related to each disaster event.

Table 6. Questionnaire of the status of digital map

Items	Check		Questions	
1:50000 Topographic Map	**YES**	**NO**	**If yes, write**	**If yes, write**
Urban Area			-	*Type of Format* [a]
Rural Area			-	*Type of Format* [a]
Digital Elevation Data			*Resolution*	*Type of Format* [a]
Land Use Map			*Class Number*	*Type of Format* [a]
National Boundaries			-	*Type of Format* [a]
Administration Boundary			-	*Type of Format* [a]
Main Highway Map			-	*Type of Format* [a]
Street Map			-	*Type of Format* [a]
1:25000 Topographic Map				
Urban Area			-	*Type of Format* [a]
Rural Area			-	*Type of Format* [a]
Digital Elevation Data			*Resolution*	*Type of Format* [a]
Land Use Map			*Class Number*	*Type of Format* [a]
National Boundaries			-	*Type of Format* [a]
Administration Boundary			-	*Type of Format* [a]
Main Highway Map			-	*Type of Format* [a]
Street Map			-	*Type of Format* [a]
1:5000 Topographic Map				
Urban Area			-	*Type of Format* [a]
Rural Area			-	*Type of Format* [a]
Digital Elevation Data			*Resolution*	*Type of Format* [a]
Land Use Map			*Class Number*	*Type of Format* [a]
National Boundaries			-	*Type of Format* [a]
Administration Boundary			-	*Type of Format* [a]
Main Highway Map			-	*Type of Format* [a]
Street Map			-	*Type of Format* [a]

[a] Example of Type of Format: HSP, TIFF, JPG, PDF, ETC.

The questions about contact persons requested information on the following (i) Institute or agency, (ii) Department, (iii) Name, (iv) Fax, (v) Phone, and (vi) Email. The last question on constraints asked whether it is possible to bring the map data out of member's territory when the scale is lower than a certain value. As an example, detailed maps in 1: 50000 cannot normally be taken out of the Republic of Korea, except with special permission in the public's interest.

6. CURRENT STATUS OF DISASTER RISK MANAGEMENT OF RECIPIENT MEMBERS

6.1 Viet Nam

The following geographical features and rainfall characteristics as well as the disaster information were provided by the expert from Viet Nam in the expert mission. Viet Nam is located in southeast Asia with an area of 333,000㎢ and 3,200 kilometers of shoreline. The population in

(a) Attendant from Vietnam

(b) Expert Mission Meeting

Figure 13. Photos of attendants from Viet Nam and expert team and meeting scene

Table 7. Questionnaire of the status for weather report

Items	Check			Questions	
Weather Stations	**YES**	**NO**	**If yes, write**	**If yes, write**	**If yes, write**
Named			*Number*	*Locations* [b]*/Altitude*	
Unnamed			*Number*	*Locations* [b]*/Altitude*	
Monitoring Items			**If yes, write**		
Precipitation Record			*Recording Time*	*Duration Time*	*Type of Format* [a]
Wind Speed Record			*Recording Time*	*Duration Time*	*Type of Format* [a]
Max. Wind Speed Record			*Recording Time*	*Duration Time*	*Type of Format* [a]
Wind Direction Record			*Recording Time*	*Duration Time*	*Type of Format* [a]
Relative Humidity			*Recording Time*	*Duration Time*	*Type of Format* [a]

[a] Example of Type of Format: HSP, TIFF, JPG, PDF, ETC.
[b] Locations : longitude and latitude

Viet Nam?is 84,000,000 in 2006, and the population density is 226 per square kilometers (urban region: 27 percent and rural region: 73 percent). Geographical features of Viet Nam are as follows: (i) the northern part of Viet Nam is divided by a alpine region formed from northwest to southeast; (ii) the Red River, Thai Binh River, and the vicinity of seashore region are located in the low area; (iii) the central region and an alpine zone have a geographical features that the west is high and the east is low; and (iv) the regions in northern part of Viet Nam are low and even. Viet Nam has a climate characteristics of tropical monsoon, high temperature, humidity, and a high rainfall. The rainfall is biased for each season and region. There are fourteen rivers in Viet Nam, and two rivers are connected with neighboring countries. The attendants from Viet Nam and expert team and meeting scene are shown in Figure 13. The whole contents of the presentation is appended in the Appendix II.

6.2 Lao People's Democratic Republic

Organization of disaster management, hydro-meteorological observation network, data collection network, metrological status in Lao People's Democratic Republic, rainfall distribution, recent natural disaster examples in Lao People's Democratic Republic, typhoon warning system, flood forecast and warning system were presented by expert from Lao People's Democratic Republic. The Department of Meteorology and Hydrology under the influence of Ministry of Water Resource and Environment Administration (WREA) is in charge of disaster prevention and preparedness, meteorology, and hydrology in Lao People's Democratic Republic. The attendants from Lao People's Democratic Republic and expert team and meeting scene are shown in Figure 14. Details on the presentation by the expert from the Lao People's Democratic Republic is appended in the Appendix III.

6.3 Thailand

The presentation for the database management system for Thailand (www.disaster.go.th), the database emergency system, input data for the TCDIS and the WEB-GIS based TCDIS, the database of expert for disaster prevention and preparedness, the example of casualty database (disaster management of a chemical plant), the earthquake and storm waves database, disaster database using GIS, the map representing the danger of a drought, traffic accident database was presented by expert from Thailand in the expert mission. The attendants from Thailand and expert team and meeting scene are shown in Figure 15. The presentation is appended in the Appendix IV.

(a) Attendants from Lao PDR

(b) Expert Mission Meeting

Figure 14. Photos of attendants from Lao PDR and expert team and meeting scene

(a) Attendants from Thailand

(b) Expert Mission Meeting

Figure 15. Photos of attendants from Thailand and expert team and meeting scene

(a) Attendants from Philippines

(b) Expert Mission Meeting

Figure 16. Photos of attendants from Philippines and expert team and meeting scene

6.4 Philippines

The topics for the disaster management system, the damage of typhoons in 2006, the typhoon warning system, flood forecast and warning system for local area were presented by expert from Philippines in the expert mission. There four types typhoon warning system following as: i) Storm Signal No.1 when it is predicted that a wind with 30~60km/h speed will happen during 36 hours; ii) Storm Signal No.2 when it is predicted that a wind with 60~100km/h speed will happen during 24 hours; iii) Storm Signal No.3 when located near by a central of a typhoon or when it is predicted that a wind with 100~185km/h speed will happen during 18 hours; iv) Storm Signal No.4 when it is predicted that a wind over 185km/h speed will happen during 12

hours. The attendants from Phil- ippines and expert team and meeting scene are shown in Figure 16. The whole presentation is appended in the Appendix V.

7. SURVEY RESULTS

7.1 Republic of Korea

The 1:50,000, 1:25,000, 1:5,000 Topographic Map information obtained from Republic of Korea is shown in Table 8-10. Republic of Korea have various formatted map for geological information system. The information for weather status obtained from Republic of Korea are shown in Table 11. Republic of Korea have 76 managed weather stations and 1800 unmanaged weather stations and monitoring time of each monitoring stations are 6 hours. These weather information are obtained from 1910 and electronic archival of these data are available from 2000.

For each disaster event, 232 administrations have published disaster reports. There are ten disaster categories including snow, heavy rain with typhoon, heavy rain with thunderstorm, wind, drought, earthquake, hail, and storm surge in the disaster report. For ease of electronic processing such as spreadsheet or word file, text file is converted to spreadsheet and relative DBMS format. Hard copies of disaster information are available for more than 30 years. The starting date and time of precipitation were recorded in the disaster report. A brief overview of the weather condition is also included as a situation overview. The database is already in digital format.

Table 8. 1:50,000 Topographic Map information obtained from Republic of Korea

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

Table 9. 1:25,000 Topographic Map information obtained from Republic of Korea

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Shp/Dxf
Rural-Area	Selected Area	Yes	Shp/Dxf
Digital Elevation Data	Selected Area	Yes	Shp/Dxf
Land-use	Selected Area	Yes	Shp/Dxf
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 10. 1:5,000 Topographic Map information obtained from Republic of Korea

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Shp/Dxf
Rural-Area	Selected Area	Yes	Shp/Dxf
Digital Elevation Data	Selected Area	Yes	Shp/Dxf
Land-use	Selected Area	Yes	Shp/Dxf
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 11. The information for weather status obtained from Republic of Korea

Items	Check		If yes, write:	If yes, write:	
Weather Stations	**YES**	**NO**	**Number**	**Locations/Altitude**	**Type of format**
- manned	V		76	Table 20	
- unmanned	V		1800	-	
Monitoring Stations			**Recording time**		
- Precipitation Record			6-hr	-	Analog, Digital
- Max, Wind Speed Record			6-hr	-	Analog, Digital
- Wind Direction Record			6-hr	-	Analog, Digital
- Relative Humidity			6-hr	-	Analog, Digital

Table 12. 1:50,000 Topographic Map information obtained from Viet Nam

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

7.2 Viet Nam

The 1:50,000, 1:25,000, 1:5,000 Topographic Map information obtained from Viet Nam is shown in Table 12-14. Viet Nam has various formatted maps for use in geological information system.

The information for weather status obtained from Viet Nam are shown in Table 15. Viet Nam has 155 manned weather stations and reporting time of each monitoring stations is every 6 hours.

For every disaster event, 64 administrations have been published disaster report for 40 years. For converting electronic file such as spreadsheet or word file, text file is converted to spreadsheet. Starting date and time of precipitation had been recorded in the disaster report from 1990. A brief overview of the weather condition is also included as situation overview. The database is already in digital format.

Table 13. 1:25,000 Topographic Map information obtained from Viet Nam

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Dxf
Rural-Area	Selected Area	Yes	Dxf
Digital Elevation Data	Selected Area	Yes	Dxf
Land-use	Selected Area	Yes	Dxf
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 14. 1:5,000 Topographic Map information obtained from Viet Nam

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

Table 15. The information for weather status obtained from Viet Nam

Items	Check		If yes, write:	If yes, write:	
Weather Stations	**YES**	**NO**	**Number**	**Locations/Altitude**	**Type of format**
- manned	V		155	Table 20	
- unmanned		V	-	-	
Monitoring Stations			**Recording time**		
- Precipitation Record			6-hr	-	Analog, Digital
- Max, Wind Speed Record			6-hr	-	Analog, Digital
- Wind Direction Record			6-hr	-	Analog, Digital
- Relative Humidity			6-hr	-	Analog, Digital

7.3 Lao People's Democratic Republic

The 1:50,000, 1:25,000, 1:5,000 Topographic Map information obtained from Lao People's Democratic Republic is shown in Table 16-18. Lao People's Democratic Republic has various formatted maps for use in geological information system. The information for weather status obtained from Lao People's Democratic Republic is shown in Table 18. Lao People's Democratic Republic has 30 manned weather stations and reporting time of each monitoring station is every 24 hours.

For each disaster event, 30 administrations published disaster report. There are five disaster categories such as heavy rain, drought, fire, landslide, storm, tsunami in the disaster report. For ease of electronic processing such as spreadsheet or word file, text file is converted to spreadsheet format. A brief overview of the weather condition is also included as a situation overview. The database is already in digital format. The station nomenclature with barometric correction in Lao People's Democratic Republic is shown in Table 20.

Table 16. 1:50,000 Topographic Map information obtained from Lao People's Democratic Republic

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

Table 17. 1:25,000 Topographic Map information obtained from Lao People's Democratic Republic

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

Table 18. 1:5,000 Topographic Map information obtained from Lao People's Democratic

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	No	-
Rural-Area	Selected Area	No	-
Digital Elevation Data	Selected Area	No	-
Land-use	Selected Area	No	-
National Boundary	Whole Phil. Soc.	No	-
Admin Boundary	Whole Phil. Soc.	No	-
Main Highway	Whole Phil. Soc.	No	-
Street Map	Selected Area	No	-

Table 19. The information for weather status obtained from Lao Lao People's Democratic Republic

Items	Check		If yes, write:	If yes, write:	
Weather Stations	**YES**	**NO**	**Number**	**Locations/Altitude**	**Type of format**
- manned	√		37	Table 20	
- unmanned		√	-	-	
Monitoring Stations			**Recording time**		
- Precipitation Record			24-hr	-	Analog, Digital
- Max, Wind Speed Record			24-hr	-	Analog, Digital
- Wind Direction Record			24-hr	-	Analog, Digital
- Relative Humidity			24-hr	-	Analog, Digital

Table 20. The station nomenclature with barometric correction in Lao People's Democratic Republic

Station names	Index		Location/Altitude			Started Year	Stopped Year
	WMO	ICAO	Latitude	Longitude	Altitude		
Muang Sing	-	-	21°12′	100°09′	810		
Viengphoukha	-	-	-	-	-		
Muang Houn	-	-	20°10′	101°29′	440		
Viengxay	48927	VLVX	20°25′	104°14′	913		
Muang Kham	-	-	-	-	-		
Huay Khot	-	-	19°45′	102°10′	304		
Paklay	48934	-	18°12′	101°12′	220		
Namtan	48937	-	19°07′	101°33′	370		
Borten	-	-	-	-	-		
Kenthao	-	-	-	-	-		
Tonpheng	-	-	20°19′	100°09′	371		
Xaysomboun	48933	VLXB	18°59′	102°56′	460		
Napheng	48943	-	18°16′	102°56′	172		

Table 20. The station nomenclature with barometric correction in Lao People's Democratic Republic (Continued)

Station names	Index		Location/Altitude			Started Year	Stopped Year
	WMO	ICAO	Latitude	Longitude	Altitude		
Vangvieng	48939	-	18°55′	102°27′	298		
Kasy	-	-	19°24′	102°29′	360		
Veunkham	-	-	-	-	-		
Thangon	48944	-	18°17′	102°38′	185		
Khamketh	-	-	18°11′	104°51′	540		
Napok	-	-	-	-	-		
Nakay	-	-	17°40′	105°06′	570		
Seno	48948	VLSO	16°40′	105°00′	185		
Donghen	-	-	16°42′	105°16′	158		
Sepon	48949	-	16°43′	106°12′	170		
Laongam	-	-	15°28′	106°10′	540		
Khongsedon	-	-	15°36′	105°48′	156		
Samuay	-	-	-	-	-		
Paksong	48956	VLPG	15°14′	106°20′	1,200		
Changsavang	-	-	15°10′	106°24′	1,120		
Soukhouma	-	-	14°39′	105°47′	90		
Muang Khong	48958	VLMG	14°07′	105°50′	76		
Itou (Lak35)	-	-	15°10′	106°35′	890		
Thateng	-	-	15°27′	106°22′	816		
Nongbok	-	-	-	-	-		
Longxan	-	-	18°32′	102°57′	254		
Muang Phuang	-	-	18°39′	102°06′	243		
Phoukhoun	-	-	19°26′	102°26′	1,317		
Phoukhout	-	-	19°34′	103°05′	1,114		

Table 21. 1:50,000 Topographic Map information obtained from Thailand

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Shp
Rural-Area	Selected Area	Yes	Shp
Digital Elevation Data	Selected Area	Yes	Shp
Land-use	Selected Area	Yes	Shp
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

7.4 Thailand

The 1:50,000, 1:25,000, 1:5,000 Topographic Map information obtained from Thailand is shown in Table 21-23. Thailand has various formatted maps for use in geological information system. The information for weather status obtained from Thailand is shown in Table 24. Thailand have 70 manned weather stations and reporting time of monitoring stations is from 3 hours to 24 hours. For every disaster event, 64 administrations have

Table 22. 1:25,000 Topographic Map information obtained from Thailand

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Tiff
Rural-Area	Selected Area	Yes	Tiff
Digital Elevation Data	Selected Area	Yes	Tiff
Land-use	Selected Area	Yes	Tiff
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 23. 1:5,000 Topographic Map information obtained from Thailand

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Dxf
Rural-Area	Selected Area	Yes	Dxf
Digital Elevation Data	Selected Area	Yes	Dxf
Land-use	Selected Area	Yes	Dxf
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 24. The information for weather status obtained from Thailand

Items	Check		If yes, write:	If yes, write:	
Weather Stations	**YES**	**NO**	**Number**	**Locations/Altitude**	**Type of format**
- manned	V		76	Table 20	
- unmanned		V	-	-	
Monitoring Stations			**Recording time**		
- Precipitation Record			24-hr	-	Analog, Digital
- Max, Wind Speed Record			24-hr	-	Analog, Digital
- Wind Direction Record			24-hr	-	Analog, Digital
- Relative Humidity			1-hr	-	Analog, Digital

published disaster report for 48 years. There are five disaster categories including heavy rain, drought, fire, landslide, storm, tsunami in the disaster report. For ease of electronic processing such as spreadsheet or word file, text file is converted to spreadsheet format. The starting date and time of precipitation had been recorded in the disaster report since 1960. A brief overview of the weather condition is also included as a situation overview. The database is already in digital format.

7.5 Philippines

The 1:50,000, 1:25,000, 1:5,000 Topographic Map information obtained from Philippines is shown in Table 25-27. The Philippines has various formatted map for geological information system. The information is obtained from the National Mapping and Resource Information Authority, Department of Environment and Natural Resources, Philippines. The information for weather status obtained from Philippines is shown in Table 28. Philippines have 54 manned weather stations and 7 automatic weather stations and reports time of monitoring stations is from 1 hour to 24 hours. These weather information are obtained from Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Dept. of Science and Technology (DOST).

For every disaster event, the Office of the Civil Defense (OCD), Department of National Defense (DENR), Philippines prepares and documents all the events. It is posted and archived in the NDCC website (http://ndcc.gov.ph). Detail reports from 2005 onwards are available while the Annual Summary are archived starting 1972 to present.

Table 25. 1:50,000 Topographic Map information obtained from Philippines

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Shp/Jpg/TIFF
Rural-Area	Selected Area	Yes	Shp/Jpg/TIFF
Digital Elevation Data	Selected Area	Yes	Jpg/TIFF
Land-use	Selected Area	Yes	Jpg/TIFF
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 26. 1:25,000 Topographic Map information obtained from Philippines

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Jpg/TIFF
Rural-Area	Selected Area	Yes	Jpg/TIFF
Digital Elevation Data	Selected Area	Yes	Jpg/TIFF
Land-use	Selected Area	Yes	Jpg/TIFF
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 27. 1:5,000 Topographic Map information obtained from Philippines

Items	Archive Types	Yes/No	Type of Format
Urban-Area	Selected Area	Yes	Shp/Jpg/TIFF
Rural-Area	Selected Area	Yes	Jpg/TIFF
Digital Elevation Data	Selected Area	Yes	Jpg/TIFF
Land-use	Selected Area	Yes	Jpg/TIFF
National Boundary	Whole Phil. Soc.	Yes	Shp
Admin Boundary	Whole Phil. Soc.	Yes	Shp
Main Highway	Whole Phil. Soc.	Yes	Shp
Street Map	Selected Area	Yes	Shp

Table 28. The informations for weather status obtained from Philippines

Items	Check		If yes, write:	If yes, write:	
Weather Stations	**YES**	**NO**	**Number**	**Locations/Altitude**	**Type of format**
- manned	V		1800	Table 29	
- unmanned	V		7	-	
Monitoring Stations			**Recording time**		
- Precipitation Record			1, 3, 6, 24-hr	-	Analog, Digital
- Max, Wind Speed Record			1, 3, 6, 24-hr	-	Analog, Digital
- Wind Direction Record			1, 3, 6, 24-hr	-	Analog, Digital
- Relative Humidity			1, 3, 6, 24-hr	-	Analog, Digital

The complete information can also be accessed at CalamiDat in future as at present it is still under construction. A brief overview of the weather condition is also included as a situation overview. The database is already in digital format. The station nomenclature with barometric correction in the Philippines is shown in Table 27.

8. ACHIEVEMENTS OF THE EXPERT MISSION IN 2008

During the Expert Mission, the strategies and work plan of the WGDPP as well as the advantages and expected benefits of the TCDIS were introduced to the officials in charge of disaster management in the respective recipient members. Cooperation programs to enhance the TCDIS and expend activities of the WGDPP were also discussed. The present status of the TCDIS and the methods for data input and modification to the TCDIS data of each respective country were presented.

Through analysis for the status of database development and the needs of the respective disaster management system, effective methods for information sharing, technology transfer, and supporting plan were identified. The work plan of the next-generation WEB-GIS based TCDIS was also present by the expert team and the necessary input data such as GIS information and damages information from tropical-cyclone-related disaster were collected.

All recipient members expressed appreciation of the initiative and leadership of National Emergency Management Agency (NEMA) of the

Republic of Korea in the TCDIS Project and the Expert Mission and looked forward to more active engagement with NEMA. It was also suggested that disaster management experts in each recipient member should be encouraged to familiarize with the policy and strategies of disaster prevention and preparedness from NEMA and foster closer working relationships with NEMA. The major accomplishment of the Expert Mission are enhanced disaster risk management capabilities of the recipient members and strengthened collaboration in the disaster prevention community in the TC region.

The mission also identified the need to organize regular meetings and briefings to public officials responsible for disaster prevention and preparedness in the respective member countries, as well as implement public out-reach projects on Early Warning System (EWS) and the Disaster Information System (DIS). The objectives of the Expert Mission are considered fully accomplished.

9. FUTURE WORKS

Based on the findings of the expert mission, all parties concerned agreed to cooperate with the following targets: (i) completion of the TCDIS prototype based on WEB-GIS by September 2008, (ii) attendance on workshop for DPP, metrology, hydrology of the Typhoon committee during 22-26 September, 2008, Beijing in China, (iii) leading of session for DPP of the Typhoon committee and discussion on building the TCDIS based on WEB-GIS, (iv) completion of the TDCIS based on WEB-GIS by November, v) attendance on 41th Session of the Typhoon Committee from 12 to 17 of November at Chiangmi, Thailand, and (v) leading the session for DPP of the Typhoon Committee and presentation of the TCDIS based on WEB-GIS. The Republic of Korea, a leader of the WGDPP would organize regular meetings and briefings to public officials responsible for disaster prevention and preparedness in TC members, as well as implement public out-reach projects on Early Warning System (EWS) and the Disaster Information System (DIS).

Table 29. The station nomenclature with barometric correction

Station	Index	Elevation (m)			Correction				Location		Remarks
		Station	Ground	Runway	ins't	Graviry	Altitude	Altimeter	Latitude	Longitude	
Itbayat	98132	124	123		-0.02	-2.00	+14.1	+14.8	20°48'05.06 N	121°51'05.10 E	Old Survey
Calayan	98133	13	12		-0.30	-2.00	+01.5	+01.6	19°16'00.04 N	121°28'16.23 E	Old Survey
Basco	98134	167	166	92.416			S.Table	+11.4	20°25'14.87 N	121°57'54.76 E	GPS. WWWstn
Sinait	98222	58.129	57.374		+0.60	-2.20	+06.6	+06.8	17°53'10.72 N	120°27'49.82 E	Google
Laoag	98223	5.000	4.469	5.485	-0.02	-2.10	+00.6	+01.3	18°10'58.55 N	120°32'03.82 E	GPS. WWWstn
Aparri	98232	3	2		-0.04	-2.10	+00.3	+00.4	18°21'36.36 N	121°38'08.59 E	GPS. WWWstn
Tuguegarao	98233	62	61	21.711	-0.20	-2.20	+07.1	+03.0	17°36'51.54 N	121°43'30.39 E	GPS
Baguio Radar	98321	2256	2254			-2.20	S.Table	+243.3	16°21'21.88 N	120°33'33.12 E	Google
Jba	98324	5.538	4.773	4.488	-0.30	-2.20	+00.6	+00.9	15°19'34.26 N	119°58'04.30 E	GPS
Dagupun	98325	2	1		-0.30	-2.20	+00.2	+00.2	16°05'12.75 N	120°21'08.10 E	GPS. WWWstn
DMIA(Clark)	98327	151.564	155.8	141.229		-2.20	S.Table	+07.4	15°11'07.77 N	120°32'56.05 E	Google
Buguio Synop	98328	1510.08	1509.34	1285.62	+0.70	-2.20	S.Table	+145.5	16°24'14.76 N	120°36'05.21 E	GPS. WWWstn
BSU Agromet									16°27'01.25 N	120°35'36.74 E	Google
Munoz Agro	98329	76	75		+0.30	-2.20	+08.7	+09.1	15°44'08.11 N	120°56'12.46 E	Google
Cabanatuan	98330	32	31			-2.20	+03.6	+03.8	15°28'17.29 N	120°57'06.89 E	GPS. WWWstn
ISU Echague	98332	84	82			-2.20	+09.6	+10.1	16°42'18.00 N	121°39'59.99 E	GPS
NVSIT									16°28'53.40 N	121°08'34.80 E	GPS
Baler info	98333								15°45'36.08 N	121°33'50.45 E	GPS
Baler Radar	98334	173	172		+0.53	-2.20	S.Table		15°44'57.72 N	121°37'55.37 E	GPS
Casiguran	98336	4	3		-0.35	-2.20	+00.5	+00.4	16°15'55.54 N	122°07'43.73 E	GPS. WWWstn
Port Area Mla	98426	15	6		-0.60	-2.30	+01.7	+01.9	14°35'13.10 N	120°58'43.44 E	Google
SBLA(Cubi)	98426	19.087	18.272	17.390	±0.60	-2.30	+02.2	+02.7	14°47'30.43 N	120°16'15.24 E	Google
Tayabas	98427	158	157		-0.10	-2.30	S.Table	+19.8	14°01'06.36 N	121°35'47.64 E	GPS
Sangley PL	98428	3	2	2	-0.20	-2.30	+00.3	+00.4	14°29'29.93 N	120°53'54.90 E	Google
NALN	98429	21	5		-0.30	-2.30	+02.4	+02.5	14°30'25.75 N	121°00'15.90 E	GPS. WWWstn
Dna Luisita									15°26'08.76 N	120°38'46.32 E	GPS
TCA Camiling									15°38'13.79 N	120°24'57.47 E	Google
AWS alanan	98904								17°04'00.00 N	122°26'00.00 E	GPS
AWS omalig	98901								14°42'00.00 N	122°26'00.00 E	GPS
BOSS Garden	98430	43	42		+0.00	-2.30	+04.9	+04.9	14°38'41.35 N	121°02'40.45 E	GPS. WWWstn
Calapan	98431	41	39		+0.30	-2.40	+04.7	+04.9	13°24'35.19 N	121°11'22.80 E	GPS. WWWstn
Tagaytay	98424	592	590			-2.30	S.Table		14°05'33.10 N	120°54'26.66 E	GPS
Ambulong	98432	11	10		+0.40	-2.30	+01.2	+01.3	14°05'02.99 N	121°03'47.07 E	GPS
Tanay	98433	651.11	650.36		+0.20	-2.40	S.Table		14°34'53.22 N	121°22'09.30 E	GPS
Infanta	98434	7	5		+0.32	-2.30	+00.8	+00.8	14°45'00.00 N	121°39'00.00 E	GPS

Table 29. The station nomenclature with barometric correction (Continued)

Station	Index	Elevation (m)			Correction				Location		Remarks
		Station	Ground	Runway	ins't	Graviry	Altitude	Altimeter	Latitude	Longitude	
Alabat	98435	5	4		±0.00	-2.30	+00.6	+00.6	14°06'56.02 N	122°01'20.59 E	GPS
UP Los Banos									14°10'20.36 N	121°13'48.74 E	GPS
Daet	98440	3.770	3.120	3.497	+0.10	-2.40	+00.4	+00.8	14°07'43.50 N	122°58'57.22 E	GPS. WWWstn
CSSAC Pili	98442	35	34	43		-2.40	+04.0	+05.5	13°34'48.80 N	123°15'43.62 E	GPS
Legaspi	98444	15.487	14.747	18.260	-0.15	-2.40	+01.8	+02.6	13°09'02.85 N	123°43'42.26 E	Google. WWWstn
BUCAF									13°11'35.00 N	123°35'43.00 E	GPS
BRFFWC									13°37'18.00 N	123°09'46.00 E	GPS, Camaligan
Virac Synop	98446	31.574	30.689	41.474	-0.40	-2.40	+03.6	+05.3	13°34'35.00 N	124°12'34.00 E	Google
Virac Radar	98447	233	228		+0.10	-2.40	S.Table		13°39'16.73 N	124°20'27.92 E	GPS, Bato
Coron(new)	98526	59.938	59.188		-0.70	-2.47	+06.8		12°00'13.20 N	120°11'59.40 E	GPS. WWWstn
San Jose	98531	3.314	2.534	3.037	+0.80	-2.40	+00.4	+00.7	12°21'39.07 N	121°02'51.68 E	GPS. WWWstn
Romblon	98536	47	46		+0.20	-2.40	+05.4	+05.6	12°35'26.39 N	122°16'31.29 E	GPS. WWWstn
Roxas	98538	2.495	1.750	2.351	-0.20	-2.40	+00.3	+00.6	11°35'26.56 N	122°45'39.14 E	GPS
Masbate	98543	8.831	7.981	14.174	-0.20	-2.40	+01.0	+02.1	12°22'14.88 N	123°37'48.70 E	GPS. WWWstn
Catarman	98546	5.710	4.840	4.806	+0.20	-2.40	+00.6	+00.9	12°30'19.86 N	124°37'42.60 E	GPS
UEP Catarman									12°30'34.50 N	124°44'01.74 E	GPS
AWS Gamay	98905								12°22'56.22 N	125°17'58.63 E	GPS
Catbalogan	98548	5	3		-0.70	-2.40	+00.6	+00.6	11°46'30.12 N	124°53'03.30 E	GPS
Tacloban	98550	2.711	1.951	2.798	-0.70	-2.40	+00.3	+00.7	11°13'32.32 N	125°01'30.01 E	GPS. WWWstn
Borongan	98553	3.058	2.308			-2.40	+00.3		11°39'39.27 N	125°26'37.10 E	GPS
Guiuan	98558	60	56		-0.60	-2.40	+06.8	+07.2	11°02'43.50 N	125°45'20.58 E	GPS
LSU Baybay	98647	7	6			-2.40	+00.8	+00.8	10°44'46.54 N	124°47'27.95 E	GPS
Pag-asa Island	98602	3	2		-0.70	-2.50	+00.3	+00.4	11°03'09.60 N	114°17'01.65 E	Google
Pio. Prinaesa	98618	16.760	16.000	21.579	-1.30	-2.50	+01.9	+03.2	09°44'25.19 N	118°45'31.01 E	Google. WWWstn
Ciyo	98630	4	3		+0.40	-2.40	+00.4	+00.5	10°51'09.03 N	121°00'28.24 E	GPS. WWWstn
Aborlan									09°26'37.48 N	118°33'36.92 E	Google
Iloili	98637	5.882	5.092	5.451	+0.20	-2.40	+00.7	+01.0	10°42'47.40 N	122°33'15.16 E	GPS. WWWstn
La Granja	98639	96	95			-2.40	+10.9	+11.5	10°22'36.50 N	122°58'16.23 E	GPS
Dumaguete	98642	7048	6.288	11.668	-0.30	-2.50	+00.8	+01.8	09°20'00.00 N	123°18'00.00 E	GPS
Tagbilaran	98644	7.565	6.825	10.4	-0.50	-2.50	+00.9	+01.6	09°40'01.82 N	123°51'21.95 E	GPS
Dumangas									10°51'31.20 N	122°43'24.00 E	GPS
Cebu Complex	98646	25.703	24.953	11.762	-0.50	-2.40	+02.9	+02.0	10°19'20.80 N	123°58'48.74 E	GPS. WWWstn
Cebu AMSO				11.762				+02.0	10°18'51.74 N	123°58'40.56 E	Google. Mactan
Maasin	98648	72	71		-0.50	-2.40	+08.2	+08.6	10°08'20.43 N	124°51'37.44 E	GPS
AWS Camotes	98907								10°38'00.65 N	124°22'47.00 E	GPS

Table 29. The station nomenclature with barometric correction (Continued)

Station	Index	Elevation (m)			Correction				Location		Remarks
		Station	Ground	Runway	ins't	Graviry	Altitude	Altimeter	Latitude	Longitude	
AWS Siargao	98902								09°51′27.92 N	126°01′11.64 E	GPS
Surigao	98653	39	38	7.472	-0.30	-2.50	+04.4	+01.3	09°46′57.78 N	125°29′21.90 E	GPS. WWWstn
Dipolog	98741	3.7921	3.0821	4.020	-0.30	-2.50	+00.4	+00.8	08°36′12.09 N	123°20′43.53 E	GPS. WWWstn
Cotabato	98746	50.137	49.337	53.882	±0.00	-2.50	+05.7	+06.8	07°09′44.85 N	124°12′53.89 E	Google
Lumbia(CDO)	98747	182.00	181.170	182.140	-0.15	-2.50	S.Table	+22.0	08°24′32.70 N	124°36′43.57 E	GPS. WWWstn
CDO Complex	98748	6	5		-0.50	-2.50	+00.7	+00.7	08°29′02.03 N	124°38′51.25 E	Google
Malaybalay	98751	627	626		+0.20	-2.50	S.Table	+73.1	08°09′04.80 N	125°08′02.04 E	GPS
Butuan	98752	17.600	16.818	17.328	-0.15	-2.50	+02.0	+02.2	08°56′49.34 N	125°28′56.17 E	Google
Davao	98753	17.290	16.530	27.422	-0.40	-2.50	+02.0	+03.9	07°07′40.41 N	125°39′17.43 E	Google. WWWstn
Hinatuan	98755	3	2		+0.30	-2.50	+00.3	+00.4	08°21′54.68 N	126°20′09.41 E	GPS. WWWstn
AWS Mati	98906								06°57′15.36 N	126°12′32.47 E	GPS
Zamboanga	98836	6.857	6.097	9.488	+0.70	-2.50	+00.8	+01.5	06°55′10.78 N	122°03′47.78 E	Google. WWWstn
General Santos	98851	132.199	131.449	141.449	-0.30	-2.60	S.Table	+17.5	06°03′25.85 N	125°06′11.19 E	Google
Kabacan									07°07′05.58 N	124°49′51.90 E	GPS. Agromct
AWS Balabac	98903								07°59′00.00 N	117°03′00.00 E	GPS
USEP(New)									07°25′06.00 N	125°44′48.12 E	GPS
SBMA Radar		565	520						14°49′19.44 N	120°21′49.68 E	GPS(Sta. Rita Hill)
Tagaytay Radar									14°08′31.62 N	121°01′20.04 E	GPS(People's Park)

REFERENCES

Disaster Management System in Thailand, http://www.disaster.go.th
National Disaster Coordinating Council, http://ndcc.gov.ph
Permanent Committee on GIS Infrastructure for Asia & the Pacific, http://www.pcgiap.org
Typhoon Committee Disaster Information System, http://www.tcdis.org

APPENDIX

APPENDIX I : Chronology of the Typhoon Committee

March 1964

The Economic Commission for Asia and the Far East (ECAFE - renamed as ESCAP) at its 20th session recommended TC secretariat, in cooperation with WMO, to study practical means of initiating a joint program of investigations of Typhoons in the ECAFE region.

December 1965

A meeting of experts on Typhoon was organized by ECAFE and WMO with financial assistance from UNDP Manila. This was attended by experts from China; Hong Kong, China; Japan; Lao People's Democratic Republic; Philippines; Republic of Korea; Viet Nam; Thailand and USA. The group recommended that a preparatory mission on Typhoons be organized to visit the countries in the ECAFE region and neighboring countries, which are affected by Typhoons in order to formulate an action program, which would mitigate Typhoon damage.

December 1966

The ECAFE/WMO preparatory mission on Typhoons was organized during this period with financial assistance from UNDP. The mission visited Cambodia; China; Hong Kong, China; Japan; Lao People's Democratic Republic; Philippines; Republic of Korea; Viet Nam; Thailand and USA. Recommendations of the mission were following as: (i) improvement of existing meteorological observing networks, telecommunication facilities, Typhoon forecasts and arrangements for warning; (ii) improvement of the existing or establishment of pilot flood forecasting and warning system on a key river basin in each countries; (iii) establishment of a regional Typhoon centre.

October 1967

The second meeting of experts on Typhoons was held at Bangkok and was attended by representatives from China; Hong Kong, China; Japan; Lao People's Democratic Republic; Philippines; Republic of Korea; Thailand; USA and USSR (Union of Soviet Socialist Republic). The meeting examined the report of the preparatory mission and reiterated the need for early action to mitigate Typhoon damage as a means of speeding economic development in the region. It further reaffirmed that national as well as joint efforts were necessary to combat effectively the detrimental effect of Typhoons, therefore, regional co-operation was of paramount importance in solving common problems associated with Typhoons. It agreed that there was a need for comprehensive measures, data collection, analysis, forecasts, and dissemination of warnings in an integrated approach to deal effectively with the Typhoon problem.

To facilitate the expeditious implementation of the program, it was considered necessary to establish a regional inter-governmental body to promote and coordinate activities relating to Typhoon damage control. Accordingly it recommended that (i) a Typhoon Committee with a regional typhoon centre as its executive arm be established under the auspices of ECAFE in cooperation with WMO; (ii) the ECAFE and WMO secretariats draft jointly the statute and rules of procedure of the proposed Typhoon Committee and convene an ad hoc meeting of government representatives to consider and finalize these drafts.

March 1968

The ad hoc meeting on the statute of the Typhoon Committee was held in Bangkok and attended by government representatives from Hong Kong, China; Philippines and Viet Nam. Representatives from USA and USSR also attended as observers. The meeting also recommended that: (i) ECAFE and WMO had finalized and adopted be submitted to the 24th commission session of ECAFE and the appropriate body of WMO for their consideration; (ii) ECAFE and WMO provide as soon as possible a small staff to undertake the preparatory work required for the implementation of the program recommended by the mission.

April 1968

The United Nations ECAFE at its 24th session in Canberra endorsed the establishment of the TC in accordance with the statute as adopted by the ad hoc meeting. In a parallel action, the WMO executive committee at its 20th session held in Geneva in 1968 also endorsed the establishment of the Typhoon Committee.

June 1968

After China; Hong Kong, China; Japan; Lao People's Democratic Republic; Philippines; Republic of Korea; Thailand had signified their intention to join the Typhoon Committee, the executive secretary of ECAFE and the secretary general of WMO considered it appropriate to establish an ECAFE and WMO joint unit on Typhoons, located at the ECAFE secretariat, to assist and coordinate activities of the Typhoon Committee.

December 1968

The inaugural session of the Typhoon Committee was held in Bangkok, in December 1968, almost three years after its conception. In this session the administrative heads of the sponsoring UN agencies, ECAFE and WMO addressed the opening ceremony.

November 1970

On November 20, Mr. Roman L. Kintanar presented to the committee a resolution the UN to mobilize science and technology to work out means of mitigating Typhoon damage. The committee endorsed the resolution which went to the general assembly and eventually resulted in the establishment of the WMO Tropical Cyclone Program.

November 1971

In 1971, upon invitation of the Philippines the ECAFE and WMO joint unit was reallocated in Manila and given a new name as Typhoon Committee Secretariat.

November 1972

Cambodia (at that time designated as Khmer Republic) joined the Typhoon Committee in 1972.

November 1977

Malaysia joined the Typhoon Committee as its ninth member in 1977.

November 1979

Viet Nam joined the Typhoon Committee as its tenth member in 1979.

February 1992

First Typhoon Committee and Panel on Tropical Cyclones joint session was held at Pattaya, Thailand, in February 1992.

November 1993

Macao, China and the People's Democratic Republic of Korea joined the TC in 1993.

February 1997

Second Typhoon Committee and Panel on Tropical Cyclones joint session was held at Phuket, Thailand, in February 1997. Singapore formalized its entry to the Typhoon Committee at this session.

November 1998

At the 31st session of the Typhoon Committee, United States of America joined on the TC.

November 2004

The TC decision of hosting the secretariat for four years with a possible extension of equal period up to a maximum of eight years, in one of the Members, was adopted at the 37th session of the TC held in Shanghai in November 2004.

November 2005

At the 38th session of TC on Hanoi, Viet Nam, the TC decided to transfer the Typhoon Committee Secretariat to Macao, China for a minimum of 4 years with possibility of extension of another four years.

December 2006

The "Host country agreement between the government of China and the Typhoon Committee regarding the Typhoon Committee Secretariat" was signed on the 7th session of TC on December 2006, in Manila, by Excellency Ambassador of China to the Philippines, Mr. Li Jinjun, and by the Chairman of the Typhoon Committee Mr Prisco D. Nilo, Officer-in-Charge of the Philippines Atmospheric, Geophysical and Astronomical Administration.

February 2007

Signing of the "Agreement between the government of the Macao, China special administrative region of China and the Typhoon Committee regarding administrative, financial and related arrangements for the Typhoon Committee Secretariat" and inauguration of the premises of Typhoon Committee Secretariat in Macao China.

September 2007

The integrated workshop on social-economic Impacts of extreme Typhoon related events was held at the United Nations Conference Centre, Bangkok, Thailand from 10 to 14 September 2007. The primary objectives of the workshop were to exchange information on priorities and key areas related to assessment and mitigation of social economic impacts of extreme Typhoon related disasters as part of the implementation of the strategic plan of the Typhoon Committee.

November 2007

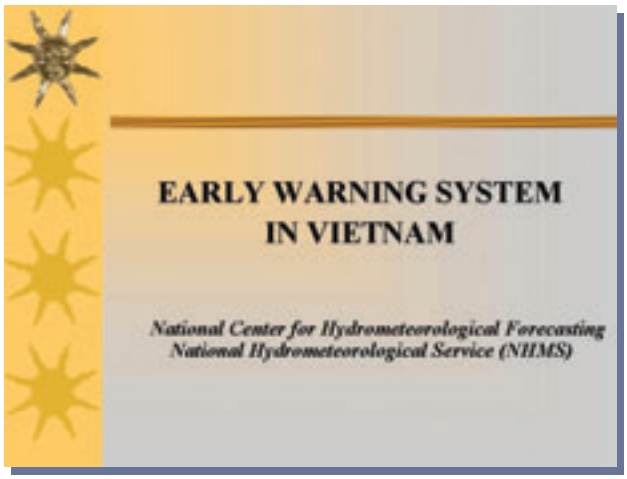
The 40th session of the Typhoon Committee was held at the World Trade Center, Macao, China from 21 to 26 November 2007. The session was attended by 82 participants from 13 out of 14 Members of the Typhoon Committee. The session reviewed committee's activities, Typhoon season and annual publications during 2007, program for 2008 and beyond.

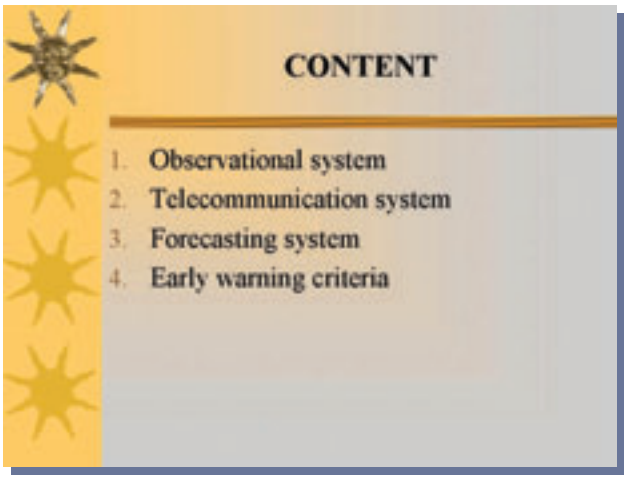
APPENDIX II : List of Participants on Typhoon Committee WGDPP Meeting

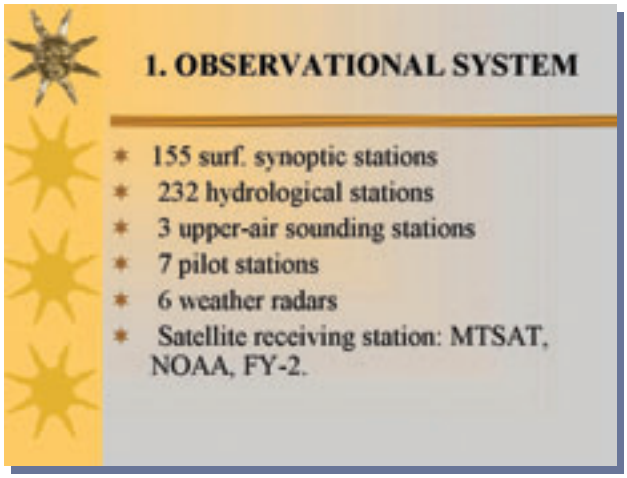
Country	1st Meeting, 2006	2nd Meeting, 2007	3rd Meeting, 2008
CAMBODIA	-	-	-
CHINA	Siquan Yang	Youmin Wang	-
DPR KOREA	-	-	-
HONG KONG, CHINA	Mingchung Wong	-	Mingchung Wong
JAPAN	Eiji Aoki	Takeo Murakami Katsuhito Miyake	Shingo Kochi
LAO PDR	BouaNgeun Oudomchith	BouaNgeun Oudomchith	Bouangeum Oudomchith
MACAO, CHINA	Lei Sai Cheong Vong Hon Iun	Lei Sei Cheong Sio On Chan	Sai Cheong Lei Sio On Chan
MALAYSIA	Badrul Shah	-	Rodzi MD Saad Kongchiew Low
PHILIPPINES	Noel L. Lansang	Noel L. Lansang	Noel L. Lansang
REP. OF KOREA	Sam Kew Roh Dugkeun Park Jitae Kim Il Pyo Hong Do-Shick Shin Eun-Jin Choi	Waon Ho Yi Sam Kew Roh Jae Hyun Shim Dugkeun Park Jitae Kim Il Pyo Hong Do-Shick Shin Eun-Jin Choi	Waon Ho Yi Sam-Kew Roh Jae Hyun Shim Dugkeun Park Jitae Kim Tae Sung Cheong Il Pyo Hong En Jung Cha
SINGAPORE	-	-	-
THAILAND	Somsak Suwansujarit Luckana Manimmanakorn	Luckana Manimmanakorn	Luckana Manimmanakorn
USA	Genevieve Miller	Charles Philip Guard	Genevieve C. Miller
VIET NAM	-	-	Viet Tien Ngyuen
TC SECRETARIAT	-	-	Olavo Rasquinho Denise Lau
ESCAP	Le Huu Ti		Le-Huu Ti
ISDR	Yuichi Ono	Yuichi Ono	Yuichi Ono
ADRC	Makoto Ikeda	Hajime Nakano	Hajime Nakano
WMO	Nanette Lomarda	-	-

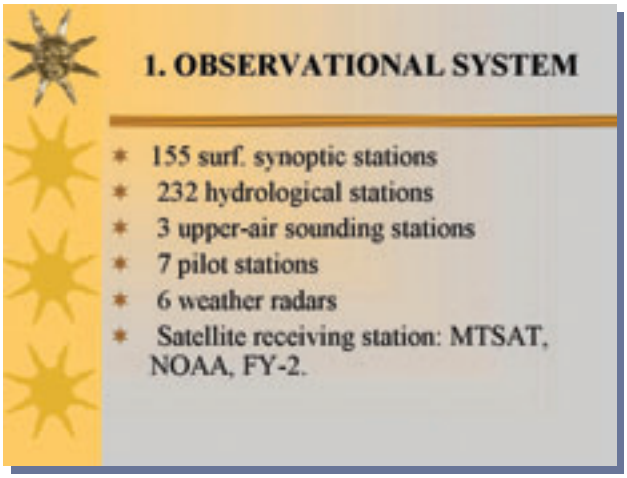
APPENDIX III : Presentation Materials of Expert from Viet Nam

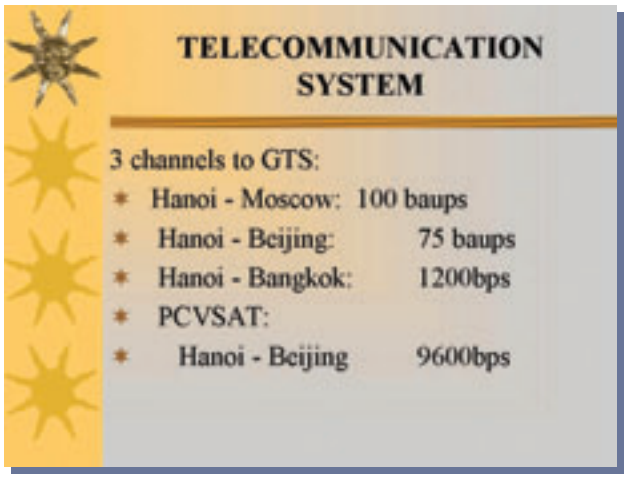
1. Early Warning System in Viet Nam

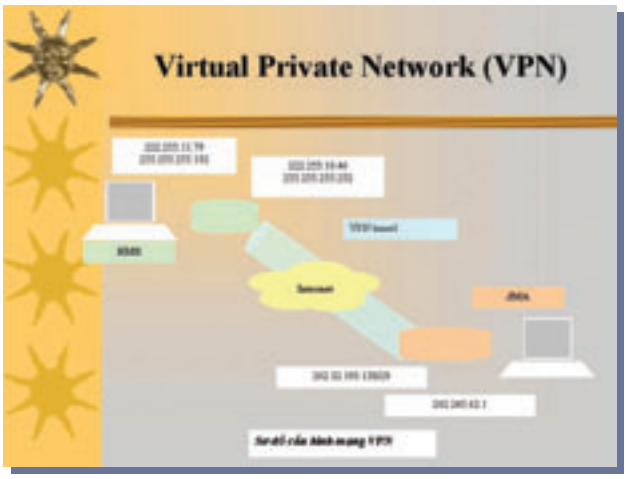


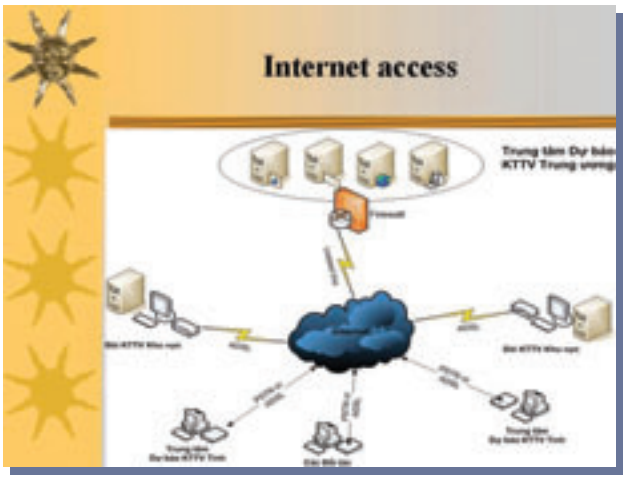


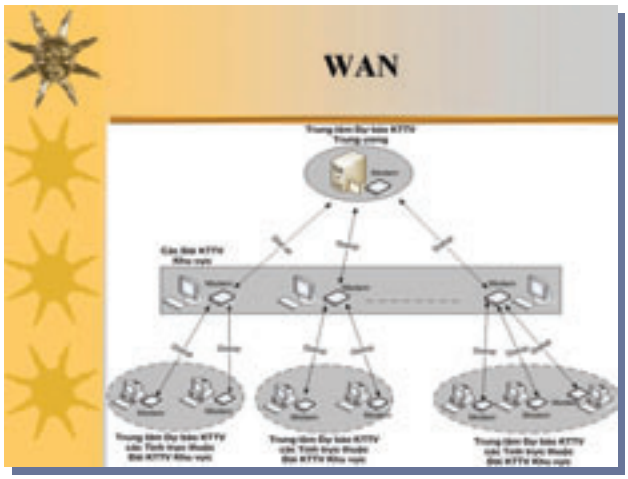


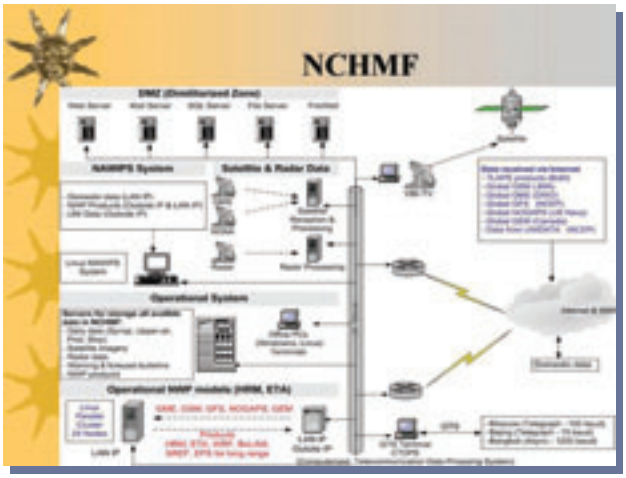


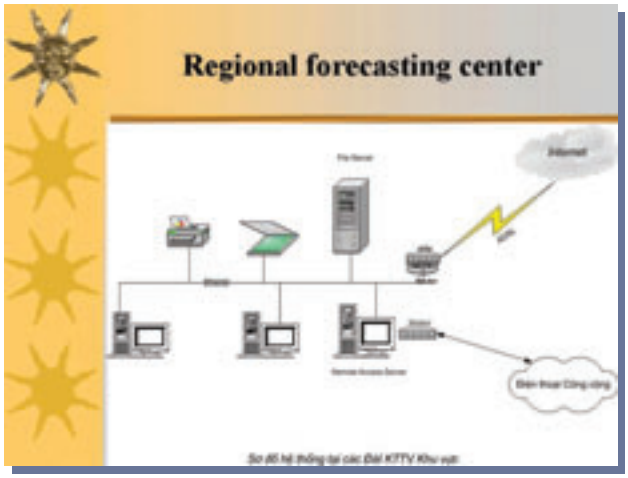


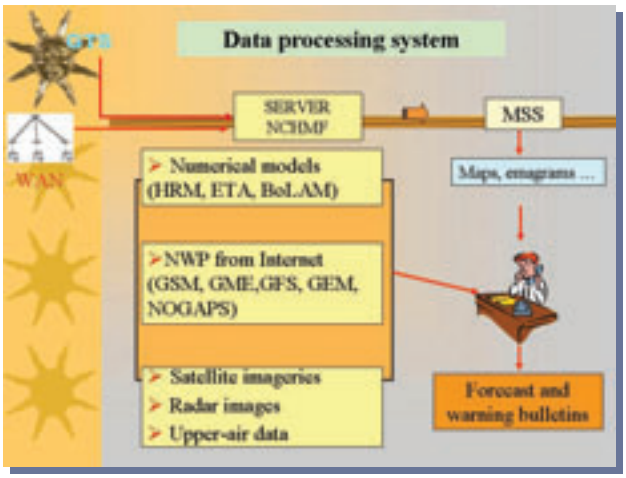


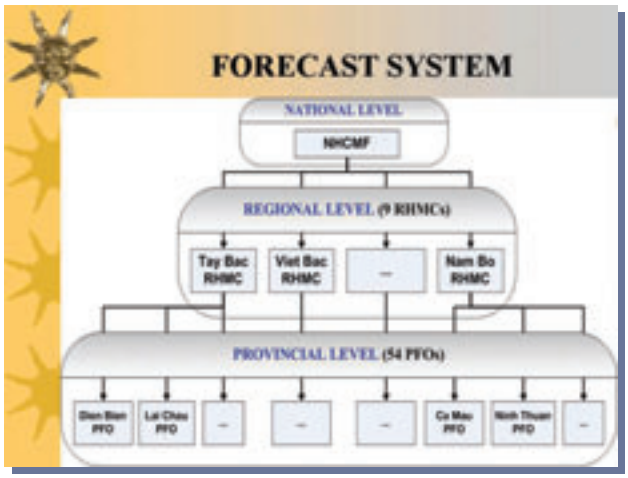

Internet access


WAN

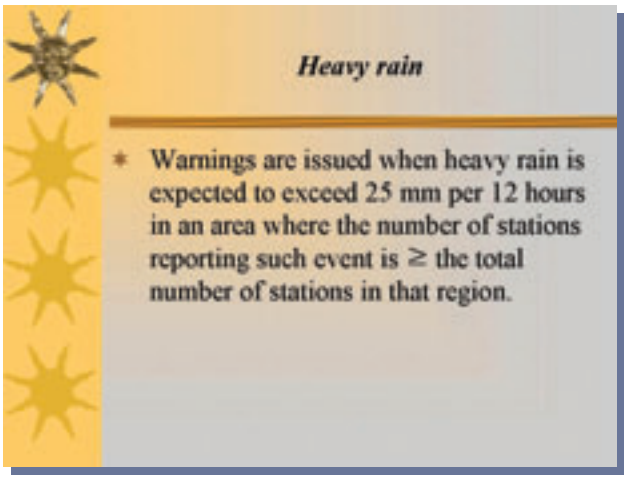

NCHMF

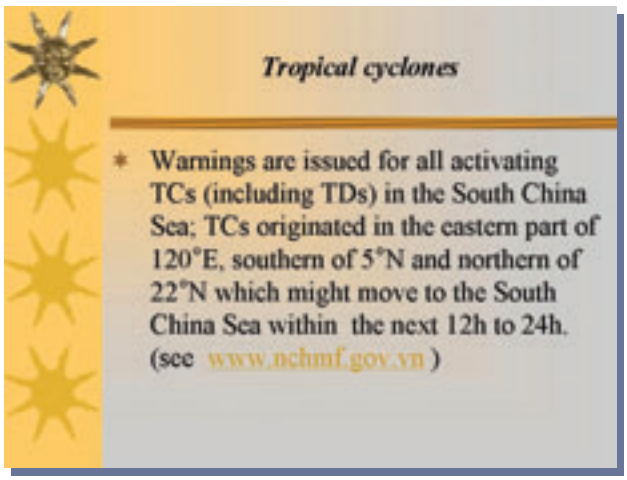

Regional forecasting center

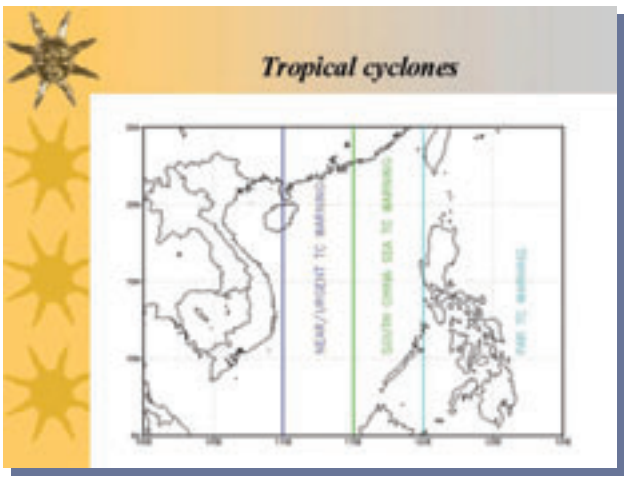

Data processing system
GTS
SERVER NCHMF
MSS
WAN
Numerical models (HRM, ETA, BoLAM)
Maps, emagrams …
NWP from Internet (GSM, GME,GFS, GEM, NOGAPS)
Satellite imageries
Radar images
Upper-air data
Forecast and warning bulletins

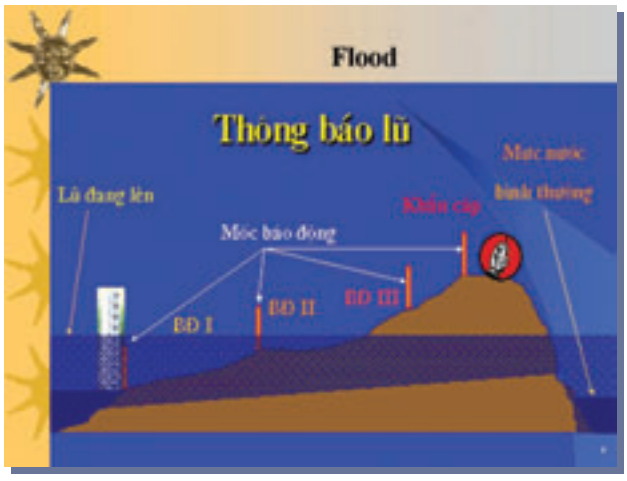

FORECAST SYSTEM
NATIONAL LEVEL
NHCMF
REGIONAL LEVEL (9 RHMCs)
Tay Bac RHMC
Viet Bac RHMC
Nam Bo RHMC
PROVINCIAL LEVEL (54 PFOs)
Dien Bien PFO
Lai Chau PFO
Ca Mau PFO
Ninh Thuan PFO

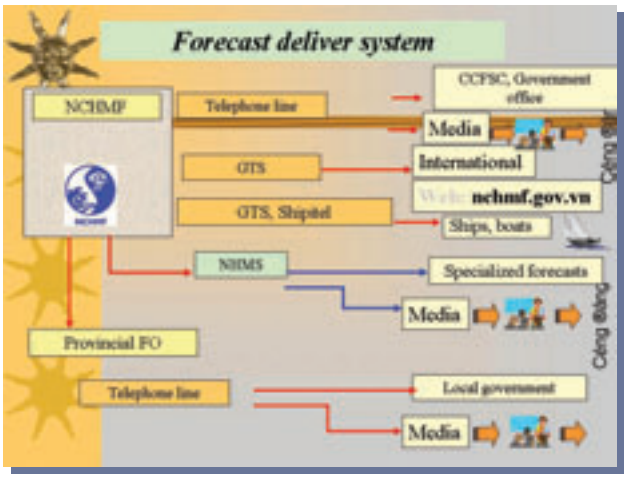

EARLY WARNING SYSTEM


Heavy rain
Warnings are issued when heavy rain is expected to exceed 25 mm per 12 hours in an area where the number of stations reporting such event is ≥ the total number of stations in that region.

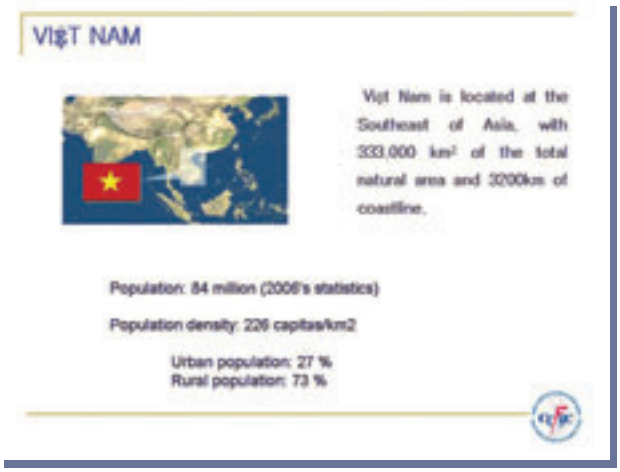

Tropical cyclones
Warnings are issued for all activating TCs (including TDs) in the South China Sea; TCs originated in the eastern part of 120°E, southern of 5°N and northern of 22°N which might move to the South China Sea within the next 12h to 24h. (see www.nchmf.gov.vn)

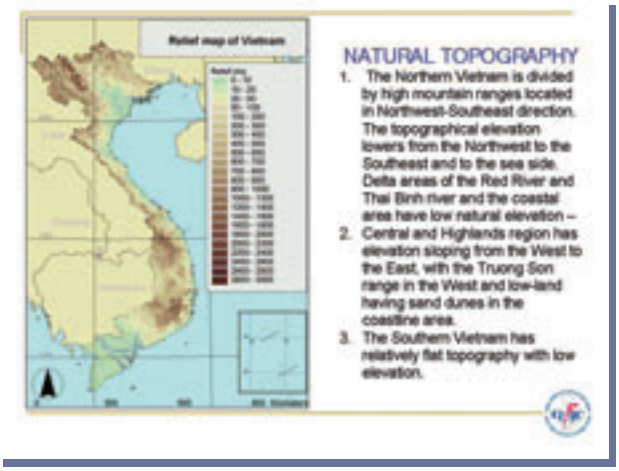

Tropical cyclones

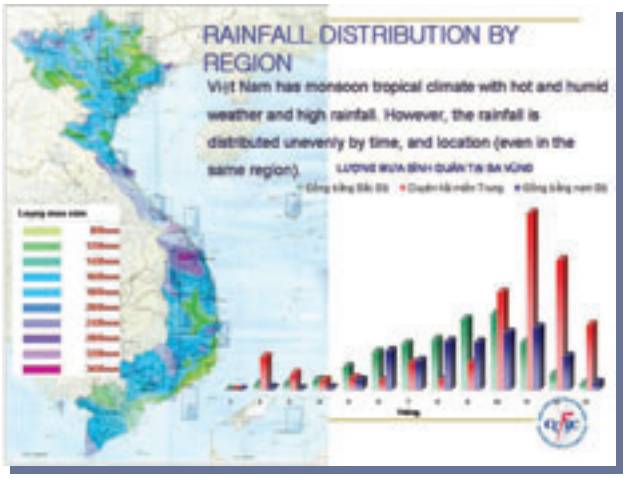

Flood
Thông báo lũ
Lũ đang lên
Mức báo động
Khẩn cấp
Mức nước bình thường
BĐ I
BĐ II
BĐ III

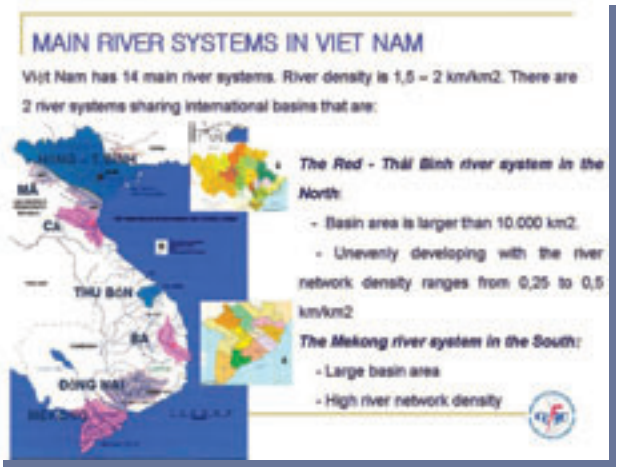

Forecast deliver system
NCHMF
Telephone line
CCFSC, Government office
Media
GTS
International
nchmf.gov.vn
GTS, Shiptel
Ships, boats
NHMS
Specialized forecasts
Media
Provincial FO
Telephone line
Local government
Media

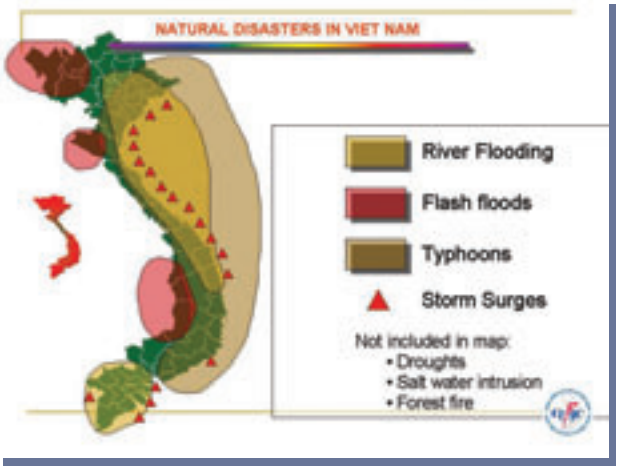
2. Flood, Storm Management System in Viet Nam

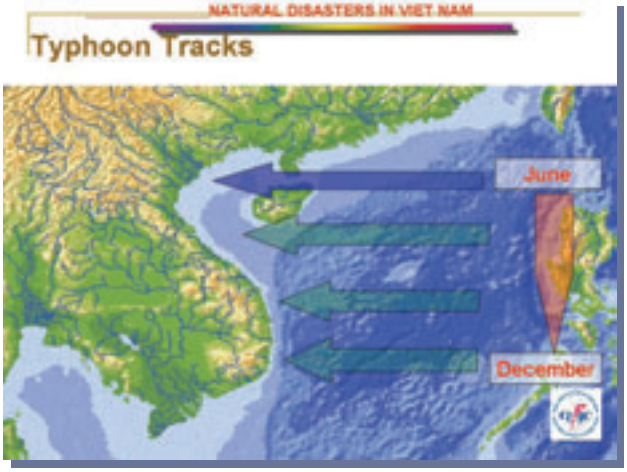


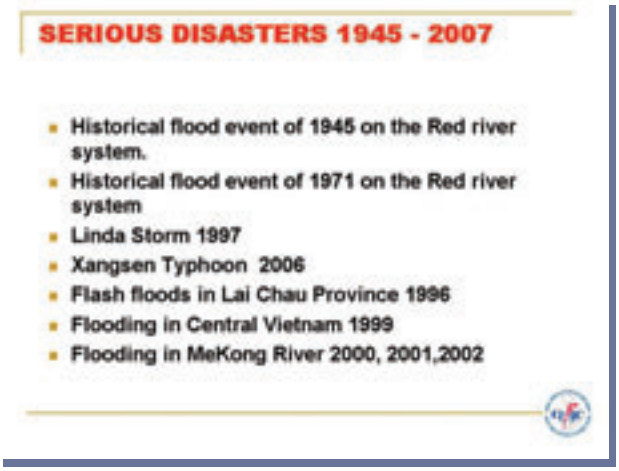


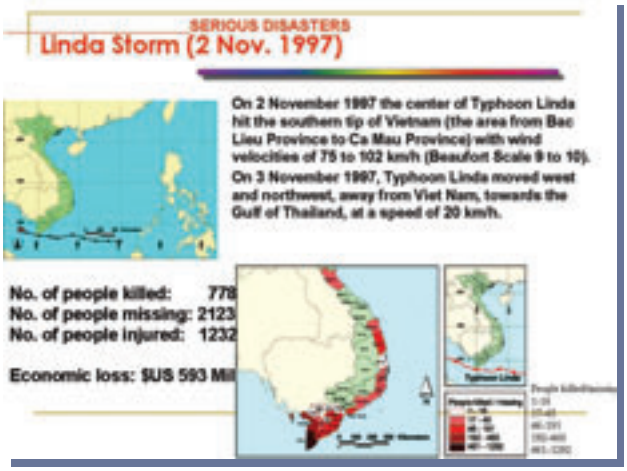


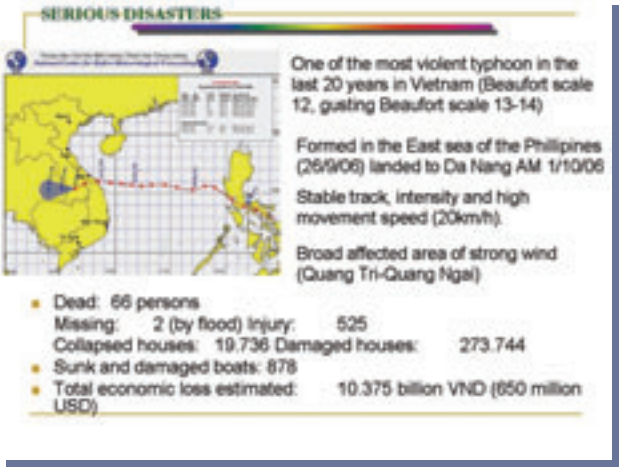


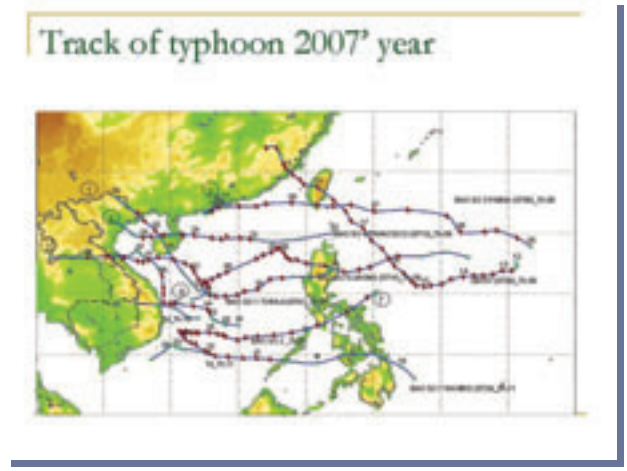

NATURAL DISASTERS IN VIET NAM
River Flooding
Flash floods
Typhoons
Storm Surges
Not included in map:
• Droughts
• Salt water intrusion
• Forest fire


NATURAL DISASTERS IN VIET NAM
Typhoon Tracks
June
December


SERIOUS DISASTERS 1945 - 2007
Historical flood event of 1945 on the Red river system.
Historical flood event of 1971 on the Red river system
Linda Storm 1997
Xangsen Typhoon 2006
Flash floods in Lai Chau Province 1996
Flooding in Central Vietnam 1999
Flooding in MeKong River 2000, 2001,2002


SERIOUS DISASTERS
Linda Storm (2 Nov. 1997)
On 2 November 1997 the center of Typhoon Linda hit the southern tip of Vietnam (the area from Bac Lieu Province to Ca Mau Province) with wind velocities of 75 to 102 km/h (Beaufort Scale 9 to 10).
On 3 November 1997, Typhoon Linda moved west and northwest, away from Viet Nam, towards the Gulf of Thailand, at a speed of 20 km/h.
No. of people killed: 778
No. of people missing: 2123
No. of people injured: 1232
Economic loss: $US 593 Mil


SERIOUS DISASTERS
One of the most violent typhoon in the last 20 years in Vietnam (Beaufort scale 12, gusting Beaufort scale 13-14)
Formed in the East sea of the Phillipines (26/9/06) landed to Da Nang AM 1/10/06
Stable track, intensity and high movement speed (20km/h).
Broad affected area of strong wind (Quang Tri-Quang Ngai)
Dead: 66 persons
Missing: 2 (by flood) Injury: 525
Collapsed houses: 19.736 Damaged houses: 273.744
Sunk and damaged boats: 878
Total economic loss estimated: 10.375 billion VND (650 million USD)


Track of typhoon 2007' year

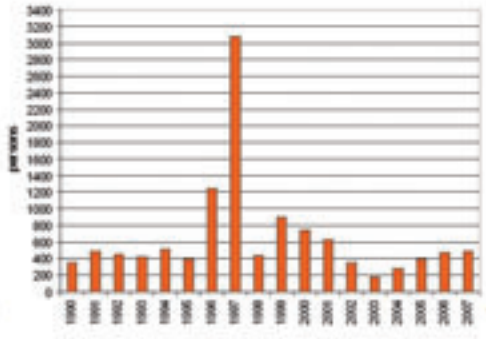
Natural disaster in 2007

- In 2007, natural disaster occurred severely, especially in central provinces. There were 7 typhoons, 3 tropical depressions, 8 floods and 57 whirlwinds which caused seriously damages in terms of human lives, state and people property.

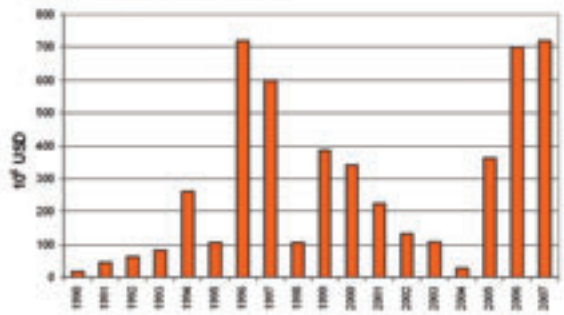
Natural disaster in 2007

- Total damage of 2007
  - Dead people: 462
  - Missing people: 33
  - Injured people: 856
  - Total economic loss: 11.520 million VND (720 mil. USD)

HUMAN LOSS RECORDED FROM 1990 TO 2007



ECONOMIC LOSS RECORDED FROM 1990 TO 2007



Solutions to response to natural disaster in Vietnam

- In 16th November 2007, the Prime Minister issued the Decision No.172/2007/ QD- TTg on approving the National Strategy for natural disaster prevention, response and mitigation to 2020.

Responsibilities and solutions for each region

a. The Northern plains and the North Central

- Enhance flood-prevention capacity for river dyke system
- Continue constructing reservoir system
- Improve the flood discharge capacity for river bed
- Implement programs such as restoring and upgrading sea dykes, plantation of watershed forest and protective forest

Responsibilities and solutions for each region

b. The Central Coast, South East and Islands

"Proactive in prevention, avoidance and adaptation to develop"

- Plan residential, industrial and tourism areas
- Shift the crop and animal husbandry structure
- Promote research and suggest solutions on preventing the river mouth area extension, enhancing flood discharge and combining with water traffic
- Strengthen and upgrade dykes, preserve natural sand dune; build reservoirs, afforest and; build parking space for boats and ships

Responsibilities and solutions for each region

c. The Mekong River Delta

"Live together with floods"

- Planning to control flood
- Construction of residential clusters and infrastructure for the population to flood resistance
- Proactively take advantage of floods
- Enhance international cooperation with countries in Mekong basin

Responsibilities and solutions for each region

d. Mountainous areas and Central Highlands

"Proactively prevent natural disasters "

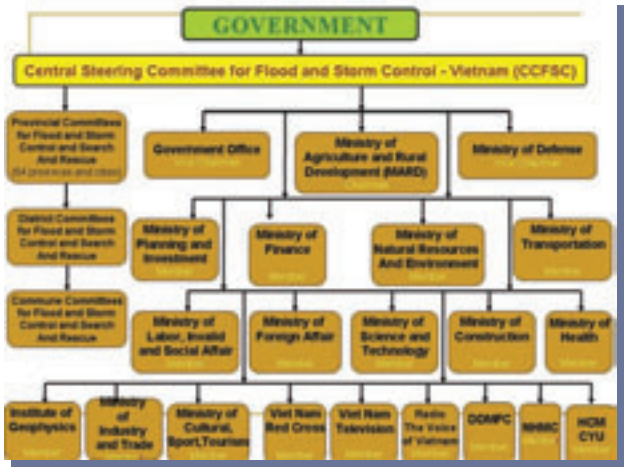
- Define and map areas highly prone to flash floods, landslides
- Establish warning and communication systems
- Strengthen the international cooperation in natural disasters forecasting, warning

Responsibilities and solutions for each region

e. Offshore areas

"Proactively prevent and response "

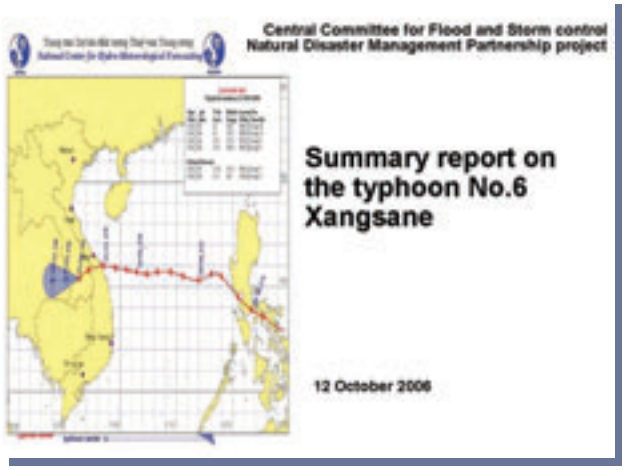
- build management system for pelagic fishing boats and ships
- Establish communication system
- Strengthen the cooperation with other countries and border localities in region

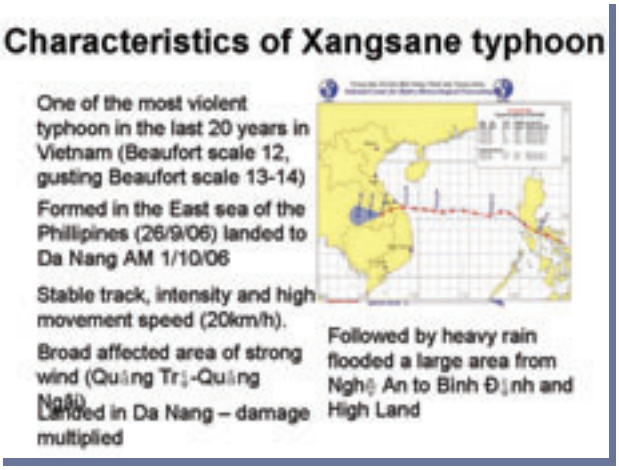


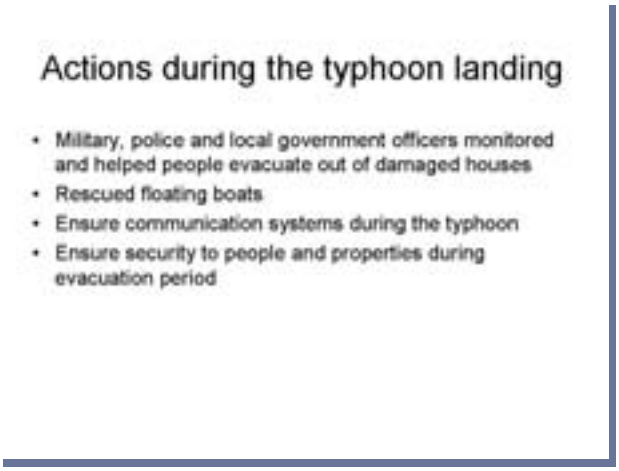

PROMOTION OF INTERNATIONAL COOPERATION, ESPECIALLY IN THE REGION, ACTIVE CONTRIBUTION TO ACTIVITIES OF THE ASIAN COMMITTEE ON DISASTER MANAGEMENT
World Conference on Disaster Reduction

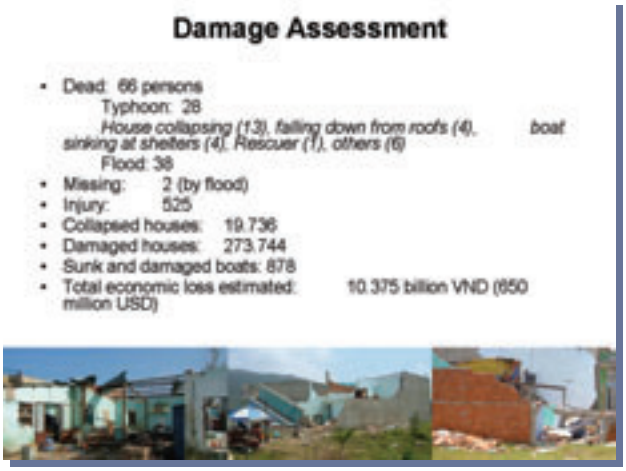

Thank for your Attention

3. Summary Report on the Typhoon No. 6 Xangsane









primary results

1.

Collapsed and damaged houses are being rebuilt and fixed by local people and soldiers with support from the government and other organizations

100% school students have returned to schools

Collapsed and damaged houses, schools, hospitals and health clinics are being rebuilt and fixed

Telecommunication and electricity networks have been recovered

Transportation networks are being recovered

Environment is being cleaned

Needs assessment

Da Nang>Quang Nam>TT-Hue>Quang Ngai>Quang Tri

1. Provide food 9,000 tons for one month
2. House to be rebuilt: 17,000
3. House to be recovered: 200,000
4. School to be rebuilt: 200 rooms
5. School to be recovered: 3,500 rooms
6. Provide books and facilities
7. Recover infrastructure (Roads, Hydraulic structures)
8. Clean environment and epidemic prevention
9. Subsidy seeds to farmers
10. Material to repair fishing boats

lessons

1. Early forecast and warning
2. Call and help fishing boat to evacuate
3. Timely evacuate people
4. Ensure security for evacuated people and properties
5. Prompt recover damages
6. Mobilize all resources to respond to the typhoon
7. Coordinated closely with regional countries
8. Constant direction

APPENDIX IV : Presentation Materials of Expert from Lao People's Democratic Republic

Ministry of Water Resource and Environment Administration (WREA)
Department of Meteorology and Hydrology

Disaster Information System In Lao PDR

13 - 14 May, 2008 Vientiane, Lao PDR

CONTENTS

- Organization, Role and Function of DMH .
- Hydro-Meteorological Network and data exchange
- Weather condition of Lao PDR
- Disaster Information System in Lao PDR

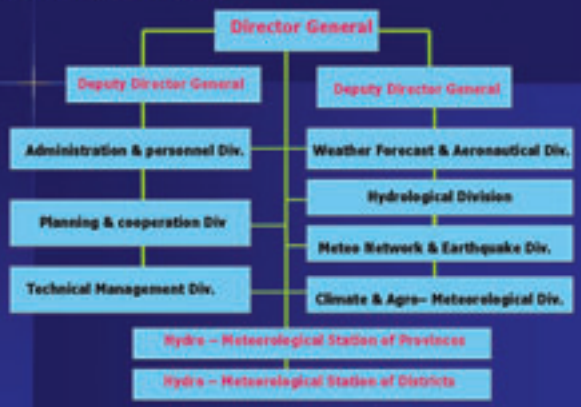
Organization, Role and Function of DMH

- DMH in Lao PDR is a governmental organization under the WREA and is assigned as national service provider of both fields Meteo - Hydrological monitoring and products.

DMH 's administrative structure is divided into 2 levels:

- ***The Headquarter level (74 staffs)*** : looks after strategic plans , principles, regulations for the whole country. Data collection, processing, analysis, archiving and disseminating for services are also roles of Headquarter level
- ***The Provincial level (132 staffs)***: is responsible for routine operational duties of all stations.

Organization Chart of DMH



Role and Function of DMH

Role of DMH Laos in National Development: ***Lao PDR Government has set a goal of poverty eradication and graduation from LDC status by 2020.***

- Meteo-Hydrological information take vital role to play in the national strategy.
- DMH provides Meteo-Hydrological information to protect life and property of people, mitigation of natural events.

Function of DMH

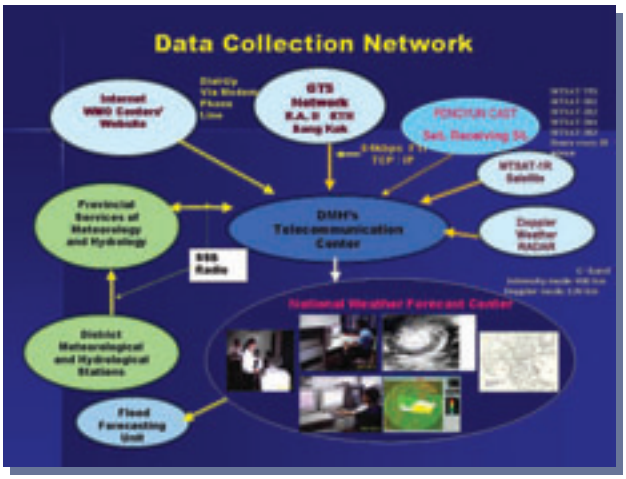
- Collection of Meteorological and Hydrological data
- Data processing and analysis
- Weather forecasting
- Flood forecasting
- Carry out both Meteorological and hydrological information to users
- Training

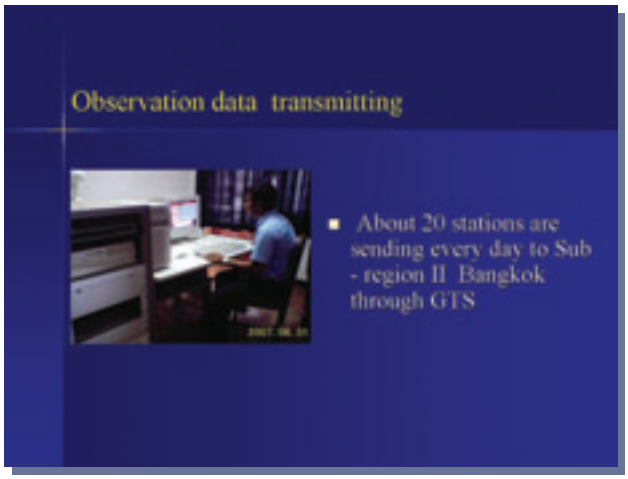
Hydro - meteorological Network in Laos

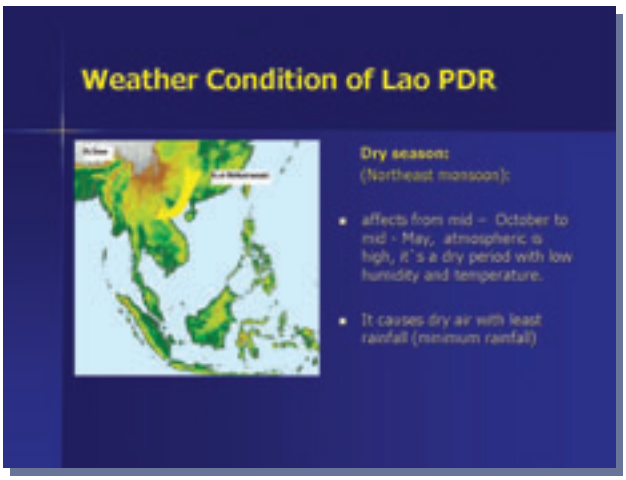
METEOROLOGICAL NETWORK:
- Main synoptic station = 17
- Secondary synoptic station =33 (monthly data recording only)
- Rain gauges = 113 stations

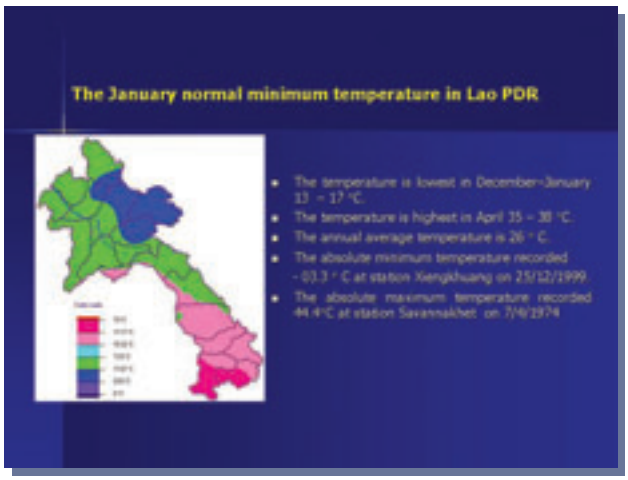
HYDROLOGICAL NETWORK:
- Staff gauges = 109 stations
- Discharge = 40 stations

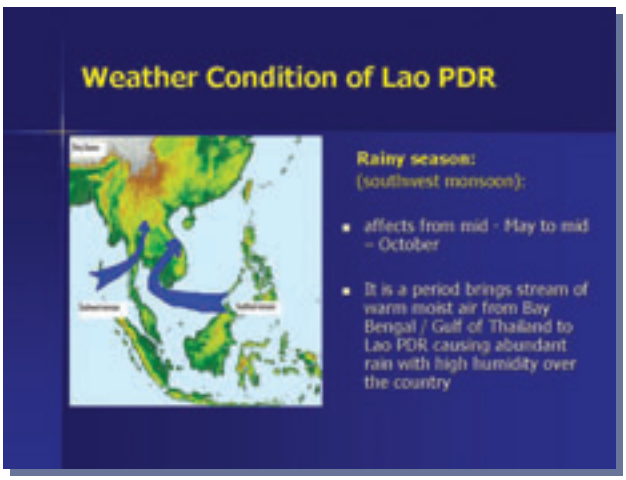
C – Band Doppler Radar
MTSAT 1R receiving station at DMH
FENGYUN Cast Satellite Receiving Station

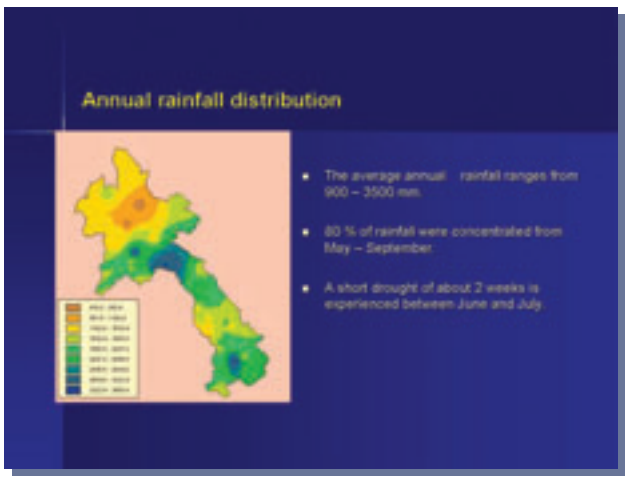

Data Collection Network
Internet
WMO Centers'
Website
GTS
Network
R.A. II KTH
Bang Kok
PENGRUN CAST
Sat. Receiving SS
9.6kbps X.25
TCP / IP
WTSAT-1R
Satellite
Provincial
Services of
Meteorology
and Hydrology
DMH's
Telecommunication
Center
Doppler
Weather
RADAR
SSB
Radio
National Weather Forecast Center
District
Meteorological
and Hydrological
Stations
Flood
Forecasting
Unit

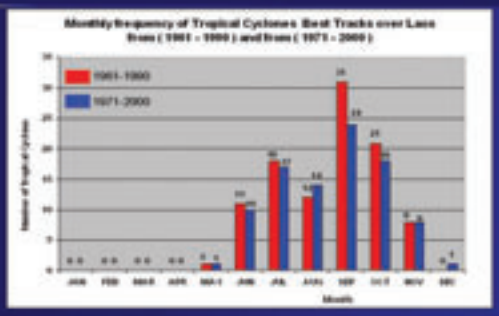

Observation data transmitting
About 20 stations are sending every day to Sub - region II Bangkok through GTS


Weather Condition of Lao PDR
Dry season:
(Northeast monsoon):
affects from mid – October to mid - May, atmospheric is high, it`s a dry period with low humidity and temperature.
It causes dry air with least rainfall (minimum rainfall)


The January normal minimum temperature in Lao PDR
The temperature is lowest in December-January 13 – 17 °C.
The temperature is highest in April 35 – 38 °C.
The annual average temperature is 26 ° C.
The absolute minimum temperature recorded - 03.3 ° C at station Xiengkhuang on 25/12/1999.
The absolute maximum temperature recorded 44.4°C at station Savannakhet on 7/4/1974


Weather Condition of Lao PDR
Rainy season:
(southwest monsoon):
affects from mid - May to mid – October
It is a period brings stream of warm moist air from Bay Bengal / Gulf of Thailand to Lao PDR causing abundant rain with high humidity over the country


Annual rainfall distribution
The average annual rainfall ranges from 900 – 3500 mm.
80 % of rainfall were concentrated from May – September.
A short drought of about 2 weeks is experienced between June and July.



Distribution (%) of total rainfall caused by tropical cyclones in August 1991 - 2004

Total rainfall (mm)	50 <	100- 200	201- 300	301 - 400	400- 500	< 501
Affected When TCs spotted in Indochina	33.33	14.29	33.33	14.29	14.29	0
During TCs best tracks over Laos	14.29	33.33	0	14.29	33.33	14.29

Tropical Cyclone Monitoring

DMH utilizes:

- Meteorological observation data
- Weather maps
- Satellite imageries
- Doppler Radar data
- Utilize the typhoon forecast and NWP Products from ECWMF , RSMC (JMA) , KMA , Hong Kong and other center trough GTS and Internet .

Tropical Cyclone forecast Methodology

The forecast methodologies used are:

- Pressure falling method: the use of pressure changes can be especially helpful in short range forecasting.
- With the utility of MTSAT in Tropical Cyclones, DMH has improved the operational work in analysing satellite data imageries.
- The procedure is based on the method delivered by Dvorak technique.
- Analysis surface observation by using compass method to determine pressure center of Tropical Cyclone.
- On analysing Satellite imageries by applying DVORAK technique are helpful to accurate forecast and issue warning timely for assistance government and public to take prevention and activities in Lao PDR.

The occurrence of series extreme weather disturbances in Lao PDR consists as follow

- *Local storms (whirlwind)*
- *Drought*
- *Flood*
- *Local Heavy Rain*
- *Typhoon*
- *Torrential rains (flash flood)*
- *Landslide*
- *Earthquake*

Local storm (whirlwind)

Pictures A MRC's building and B Vatchanh village , Chanthabouly District (Vientiane Capital) have been destroyed by southwesterly gust winds about 108 km /h on 07:25 pm of 10 May 2006.

Overflow from Namtha River
on 01:00 pm 07 August 2006

From 01 – 03:00 pm 07 August 2006 its flow rose rapidly overflows Namtha dam to cover flood plains of Luang Namtha province .

Flash flood at Luang Namtha province on 07 August 2006

The resulting flash flood practically affected to 5 districts ,132 villages with an average flood depth 1.20 m

Flooded picture by Tropical cyclone WASHI
(0508) at Oudomxay province on 31 July , 2005

Tropical Cyclone warning issuance

These are issued three categories :

When a storm wind reaches 35 kts or greater

Far warning: This is issued one time a day (valid for 24 or 48 hours) when a TS is located between 115 ° – 120 ° E

Near warning: This is issued one time a day (valid for 24 hour).

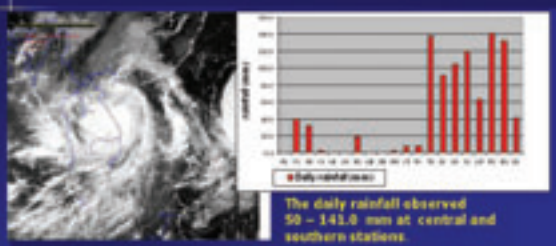
Urgent warning: This issued every 6 hours when TS is located nearest western of 110 ° E .

Flood Warning

DMH also divided the flood warning criteria, which consists as the following:

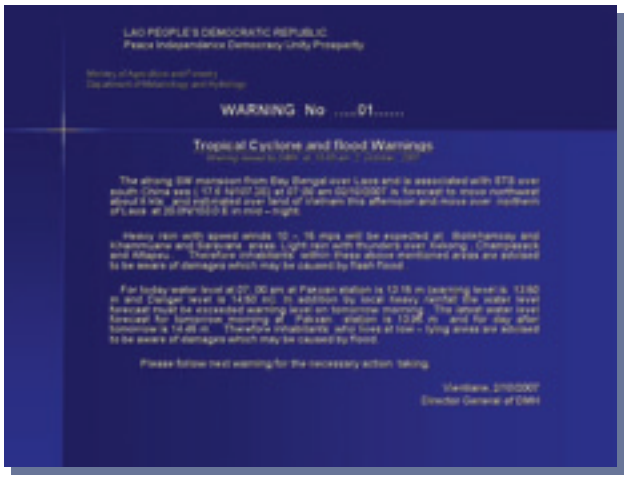
- ***Nearly warning:*** In case the water level forecast at that station will expect below 0.50 m below to Warning level, DMH have to provide the warnings and timely delivering to users.
- ***Urgent warning:*** In case the water level exceeds the warning level, DMH have to provide the urgent warning and rapidly sent to focus areas.

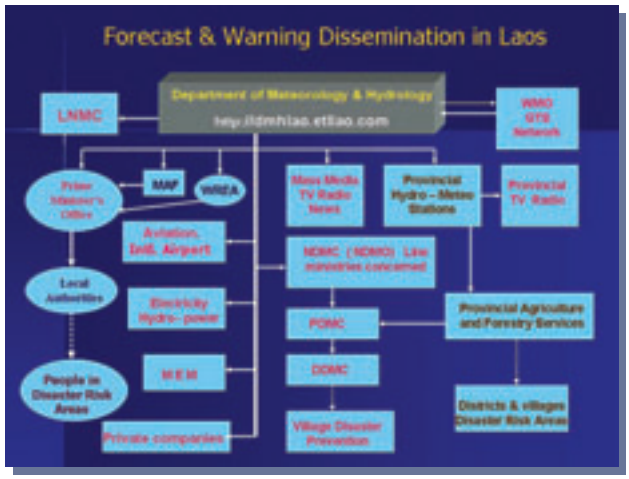
Flash flood at Central and Southern provinces
on 03 October 2007 by TS Lekima (0714)



The daily rainfall observed 50 – 141.0 mm at central and southern stations.

The MTSAT-1R infrared Channel image 05:30 UTC 03 Oct. 2007





Unmet needs for forecasts and warnings to flood at risk communities

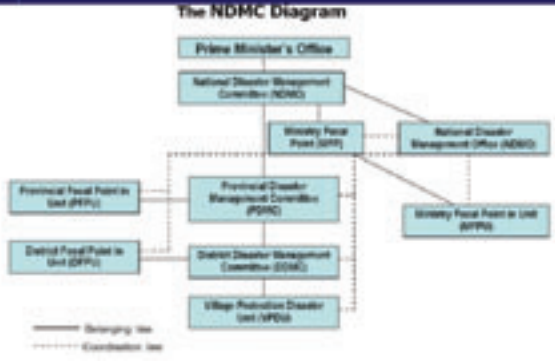
- In Lao PDR Radio is the most powerful for public awareness on weather , flood forecast and warning .
- Television has less coverage in the country due to the network is not yet cover all territory .
- The internet services are available in most urban areas.
- People who living in the remote areas can obtain the weather and flood forecasts ,warning information via radio network.
- The remote areas people can receive warning and announcement through local authority.

Disaster Prevention and Preparedness

- Natural Disaster prevention and mitigation is one of measures that contribute to the poverty alleviation strategy of the Lao PDR government.
- *Disaster Management Institutions: The NDMC consisting of representative from 12 key ministries and Lao Red Cross:*
  - *Minister of MLSW* — *Chairman*
  - *Vice-Minister of MAF* — *Vice-Chairman*
  - *Chief of Cabinet of MFA* — *Vice-Chairman*
  - Chief of Cabinet of MOD — Member
  - Chief of Cabinet of MOS — Member
  - Chief of Cabinet of MOE — Member
  - Director of Budget Dept. MOF — Member
  - Director of Transport Dept. MPWT — Member
  - Director of Energy and Mine Dept. — Member
  - Director of Hygiene Dept. MOH — Member
  - Director of Mass Media Dept. MIC — Member
  - Director of Social Welfare Dept. MLSW — Member
  - Chairman of Lao Red Cross — Member

The following ministries such as: WREA, LNMRC, Energy and Mine, Planning and Investment, Science and Technology will be come member of NDMC.

National Disaster Management Framework



Damages Data Collection

- The instant team has been set up and compose the representative of DMH ,NDMO, RAF, LNMC and PMH (MRCs). The duties of this team are to collect damages data and analyse the impact after flood.
- The damages data was reported by representative of local concerned authorities FAFO, PDMC , DDMC, PHMs, Chief of governor District and chief of villages , then together were visit the areas have been flooded

Description	Assessment methodology is based on data reporting from Provincial Agriculture and Forestry Office (PAFO) , MAF , PDMC (SDMO) and Damages data collection by representative of SDMO, DMH, LSMC and FSM (MRCs) on the period from 2 to 5 January , 2007.
Provinces affected	4 provinces
Districts affected	27 districts
Villages affected	614 villages
House affected	25 292 households
People affected	118 074 persons at Khammouane , Savannakhet and Saravane provinces
People killed	2 persons died (1 boy 4 years old and 1 female 30 years old)
Agriculture	
Hectares of rice field	210.77,8 damaged
Vegetable fields	499.62 ha damaged (planted areas is 1.384,83 ha)
Livestocks	
Cattle	343 (buffalo , cows , goats , pigs)
Poultry	74. 939 heads
Fishpond	136 sites and about 1.000.000 fishes damaged
Infrastructures	
School	11 primary schools was inundated
Health Center	2 health centers affected
Temple	2 temples affected
Market	Mahaxay district market affected
Boat	27 Boats collapsed away by strong flowige
Road affected	3 places destroyed about 60 – 70 meters of length
Irrigation	29 sites affected (23 sites damaged)

Flash flood by Tropical Storm LEKIMA (0714) at Nabanghieng River, and at Songkaly district Savannakhet province on 03 October 2007

Rice field damaged statistic by flood in Laos from 1998 – 2007 (MAF)

Improvement of national and regional telecommunication and Disaster information systems:

- DMH planning for migration from analogue alpha numeric code to digital TDCF
- Increase the frequency of issuing forecasts and warnings and uploading into DMH Web page, and through mass media to public and directly to concerned end users.

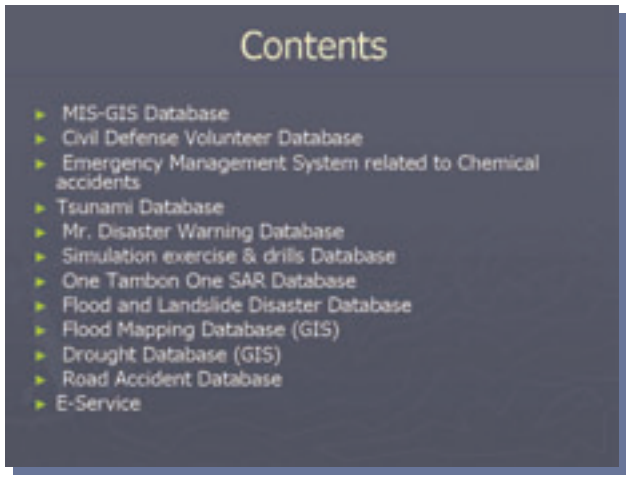
CONCLUSION

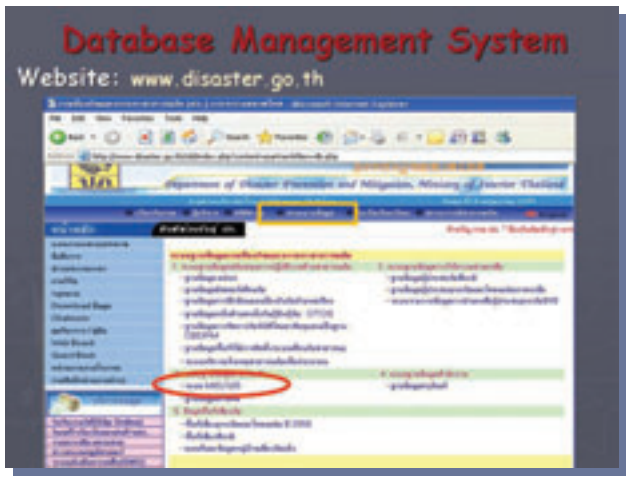
- During the year flash floods occurred from tributaries caused by TS Lekima (0714) affected to 4 provinces (Khammouane , Savannakhet , Saravane and Champasack), 27 districts , 614 Villages , 25 292 households ,118 074 persons 2 persons were killed and 74 739, 8 ha of rice and crop damaged and resulted in loss to livestock and damages to national infrastructure
- The extreme weather monitoring and accurate of forecasts and warnings at DMH of Laos is a great importance to assist the government and public users to take prevention activities
- Sharing of Meteorological and Hydrological information with mass - media and concerned line agencies
- DMH will keep going on strengthening with regional and international organization in term of disaster prevention and mitigation

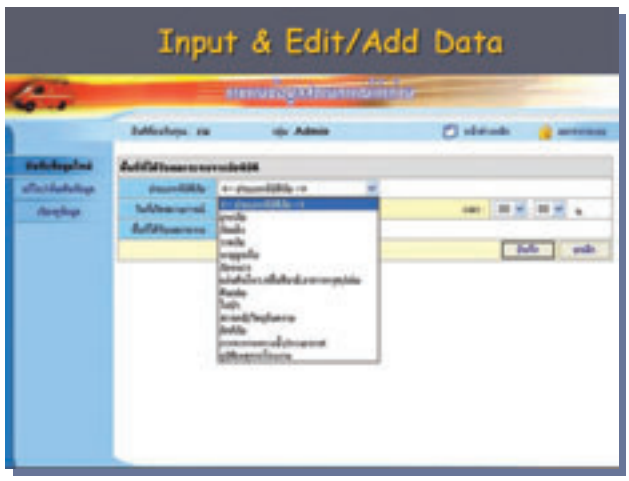
Thank you

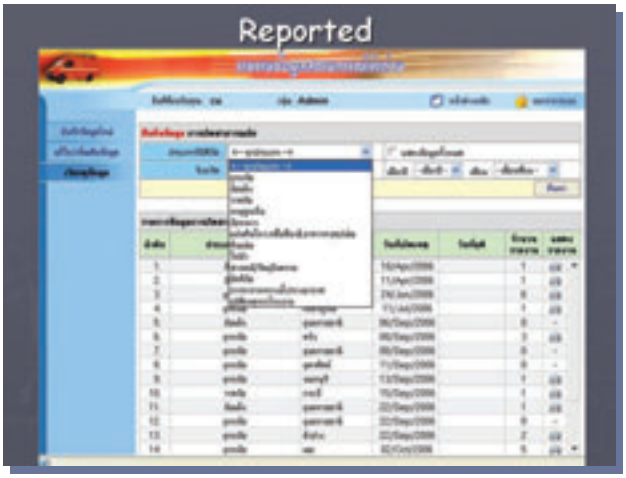
APPENDIX V : Presentation Materials of Expert from Thailand

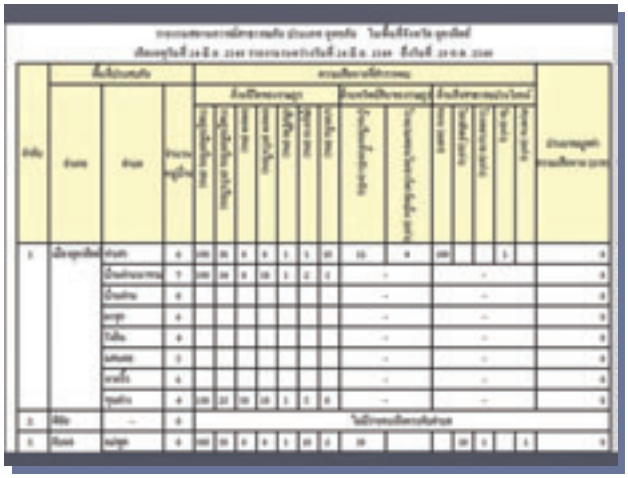
1. Disaster Information of Thailand



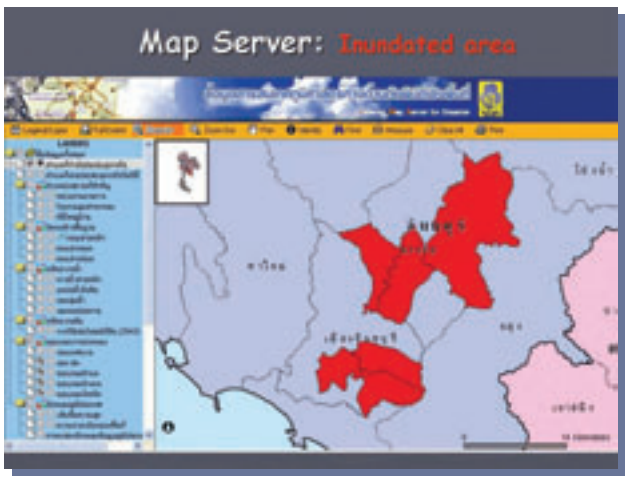


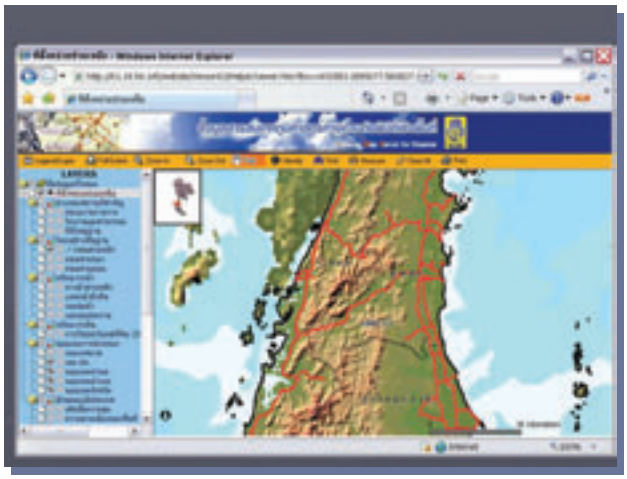



Reported

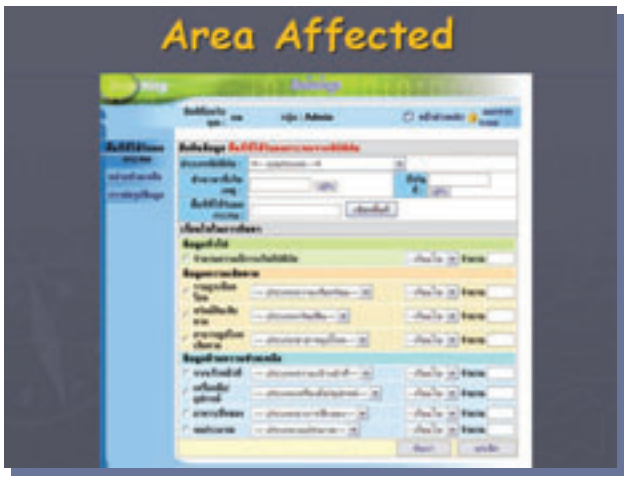


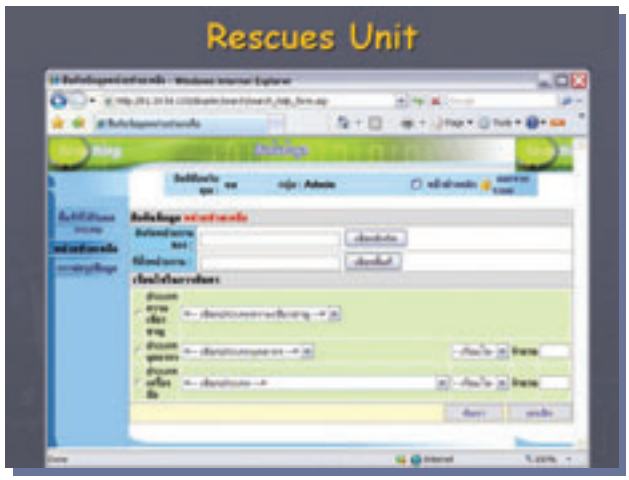

Display on Map

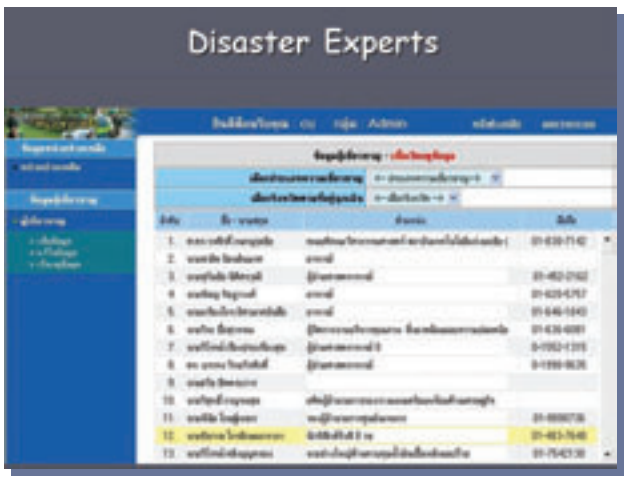

Map Server: Inundated area

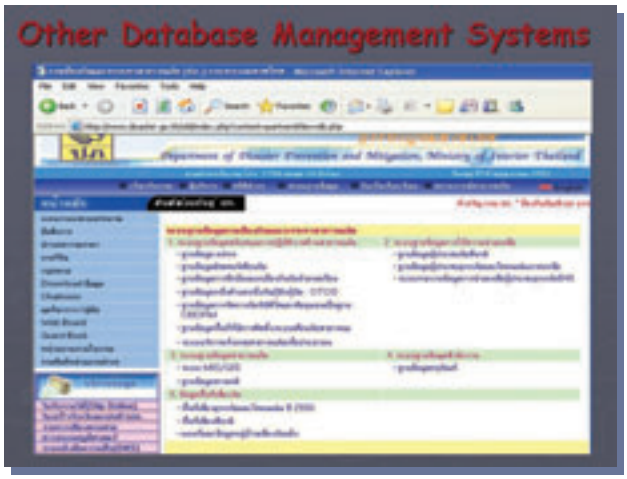



Searching

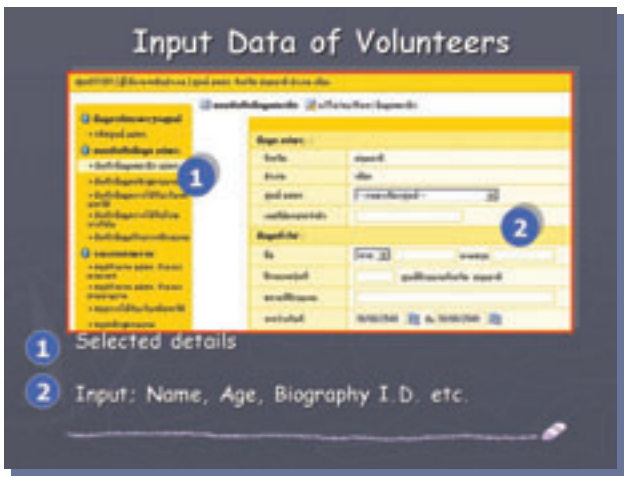

Area Affected


Rescues Unit

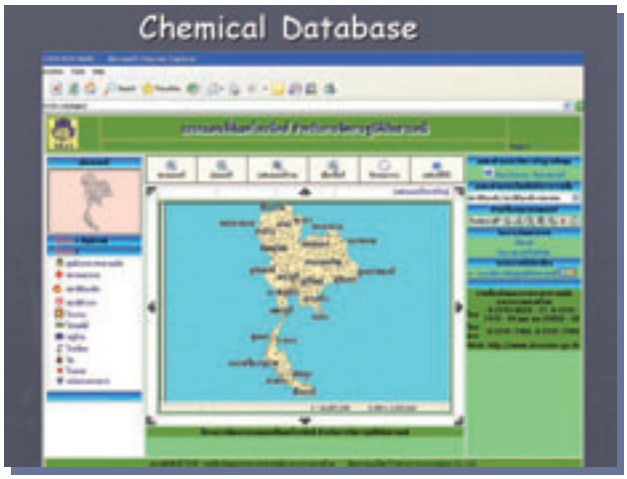

Disaster Experts


Other Database Management Systems


คลิก login

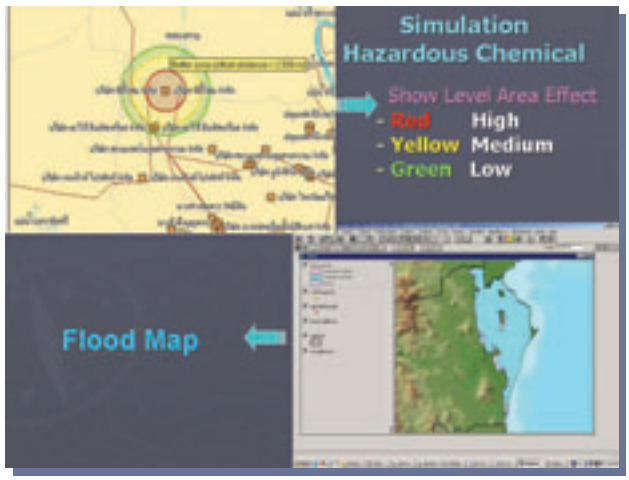

Input Data of Volunteers
1
2
1 Selected details
2 Input: Name, Age, Biography I.D. etc.


Reported

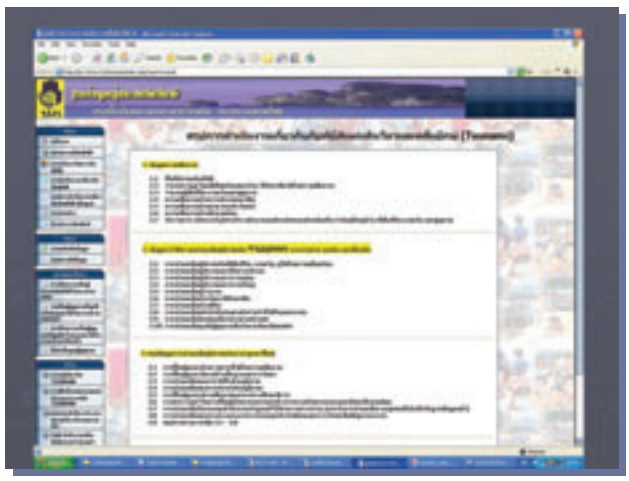

Chemical Database


Showed Factory Location

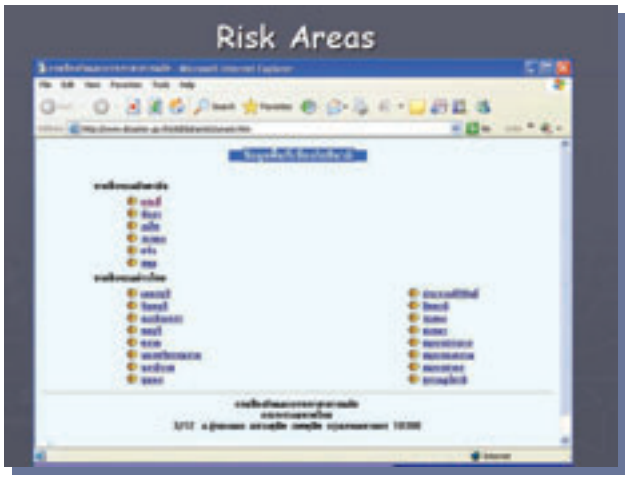

Information of Factory


Simulation
Hazardous Chemical
Show Level Area Effect
- Red High
- Yellow Medium
- Green Low
Flood Map

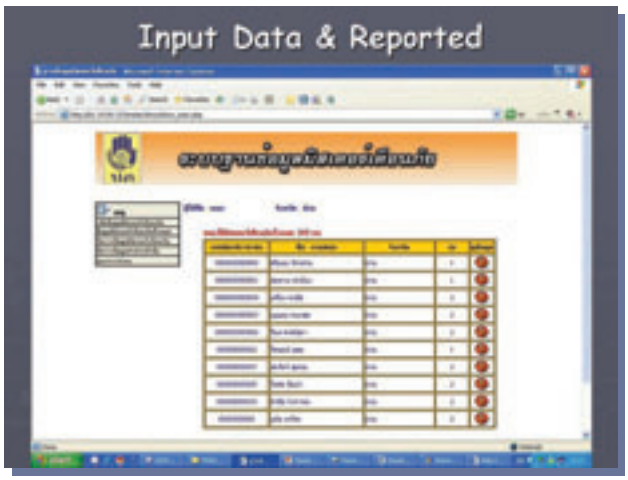

Tsunami Database



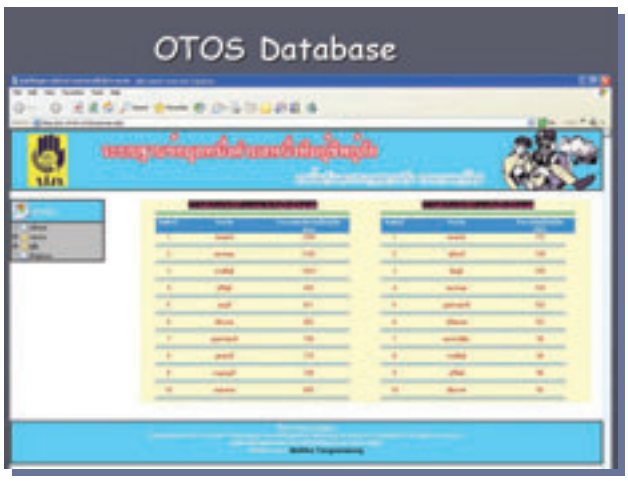

Verification & Searchableness

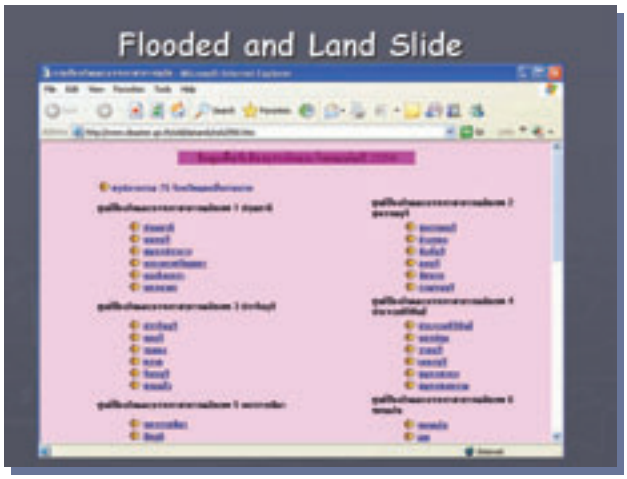

Risk Areas

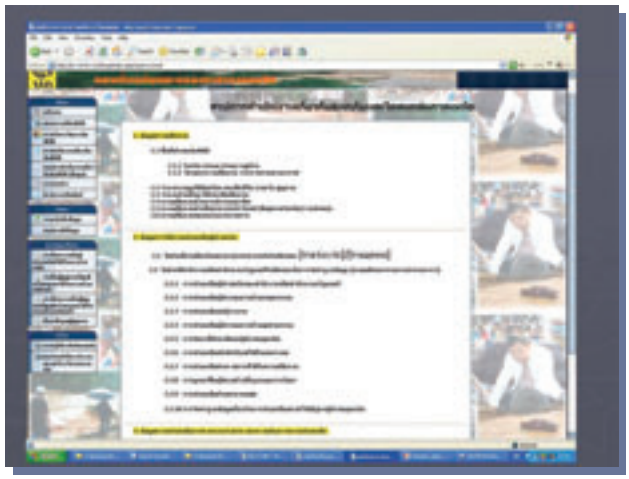

Mr. Disaster Warning


Input Data & Reported

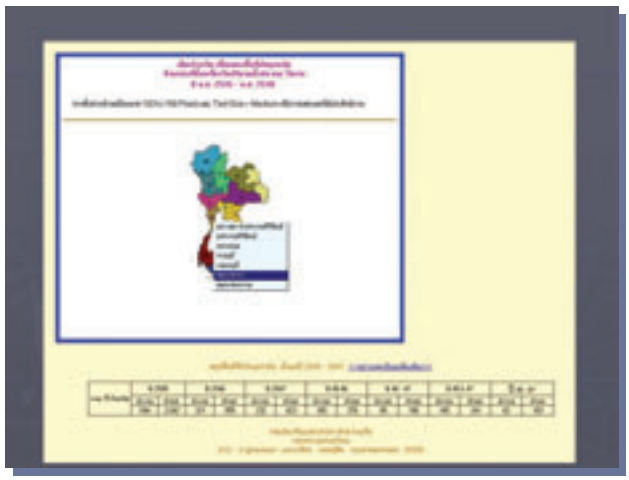

Simulation exercise & drills Database

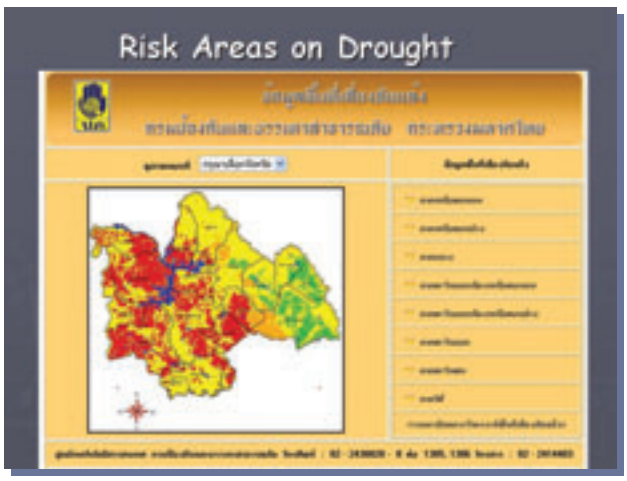

OTOS Database


Flooded and Land Slide




ระบบสารสนเทศภูมิศาสตร์
Geographic Information System : GIS




Risk Areas on Drought


Information ; village name

Road Accident

During: New Year & Songkran Festival

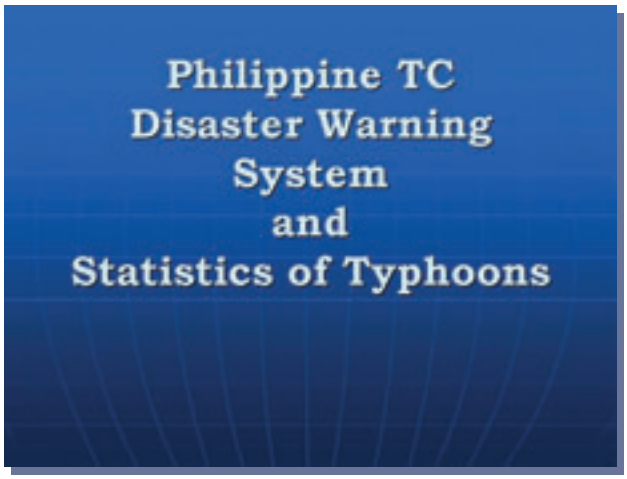
E-Service

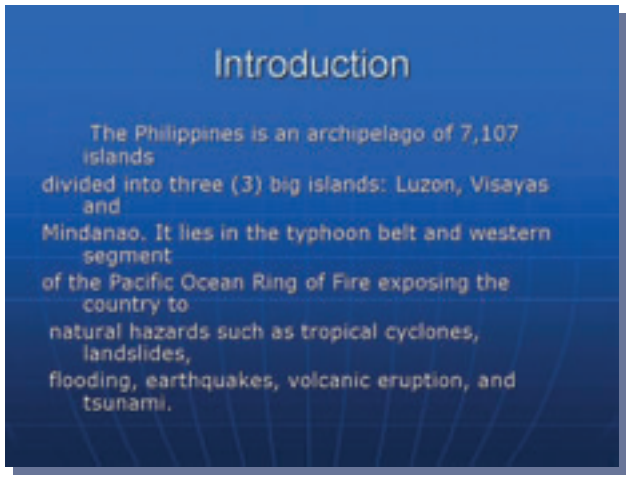
People can input and get the disaster information via Internet

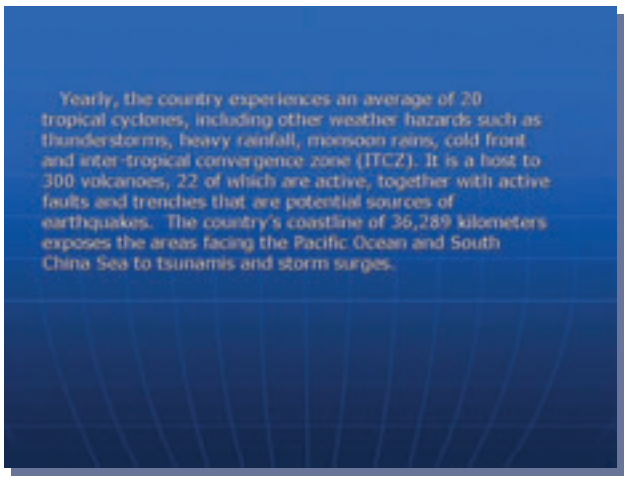
Thank You

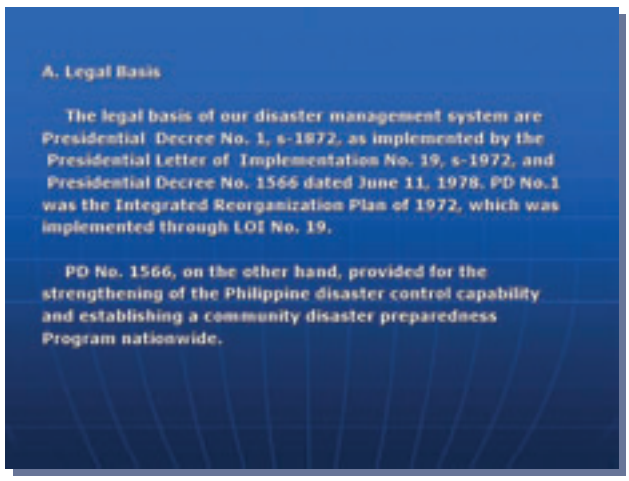
APPENDIX VI : Presentation Materials of Expert from Philippines

1. Philippine TC Disaster Warning System and Statistical of Typhoons









B. Doctrines of Disaster Management

The guiding principles/doctrines of Disaster Management in the Philippines are laid down in Sec. 1 of PD 1566, which are as follows:

1. Self-reliance shall be developed by promoting and encouraging the spirit of self-help and mutual assistance among the local officials and their constituents.

2. Each political and administrative subdivision of the country shall utilize all available resources in the area before asking for assistance from neighboring entities or higher authority.

3. The primary responsibility rests on the government agencies in the affected areas in coordination with the people themselves.

4. Responsibility for leadership rests on the provincial governors, city mayors, and municipal mayors (and barangay chairman), each according to his area of responsibility.

5. It is the responsibility of all government departments, bureaus, agencies and instrumentalities to have documented plans of their emergency functions and activities.

6. The national government exists to support the local governments. In time of emergencies and according to their level of assignment, all national government offices in the field shall support the operations of the local government.

C. Salient Provisions of PD 1566

Among the salient provisions of PD 1566 are the following:

1. State policy on self-reliance among local officials and their constituents in responding to disasters or emergencies;

2. Organization of disaster coordinating councils from the national down to the municipal level;

3. Statement of duties and responsibilities of the National Disaster Coordinating Council (NDCC), RDCC and LDCCs;

4. Preparation of the National Calamities and Disaster Preparedness Plan (NCDPP) by OCD and implementing plans by NDCC member-agencies;

5. Conduct of periodic drills and exercises; and

6. Authority for government units to program their funds for disaster preparedness activities in addition to the 2% calamity fund as provided for in PD 474 (amended by RA 8185).

D. Scope

The Philippine Disaster Management System has broad scope covering preparedness, mitigation, response and rehabilitation.

Preparedness refers to pre-disaster actions and measures being undertaken to avert or minimize loss of lives and properties, such as, but not limited to, community organizing, training, planning, equipping, stockpiling, hazard mapping and public information and education initiatives.

Mitigation refers to the measures aimed at minimizing the impact of a natural or man-made disaster on a nation or community in terms of casualties and damages. It also refers to measures designed to prevent natural phenomena from causing or resulting to disasters or other related emergency situations.

Response refers to any concerted effort by two or more agencies, public or private, to provide emergency assistance or relief to persons who are victims of disasters or calamities, and in the restoration of essential public activities and facilities.

Rehabilitation refers to the process by which the affected communities/areas or damaged public infrastructures are restored to their normal level or their actual condition prior to the occurrence of the disaster or calamity.

Summary of effects of 2006 destructive tropical cyclones

Name	Date of Occurrence	Population Affected	Casualties			Cost of Damages in PhP
			Dead	Injured	Missing	
1. TY CALOY (Chanchu)	09-15 May	927,981	82	59	36	4,322,893,156
2. TS FLORITA (Bilis)	10-14 July	202,614	45	33	6	1,256,274,620
3. TY GLENDA (Kaemi)	21-25 July	282,830	7	-	1	84,385,687
4. TS HENRY (Prapiroon)	28 July-02 Aug	825,819	12	1	6	223,748,930
5. TS INDAY (Bopha)	05-09 Aug	190	2	5	-	13,900.00
6. TY MILENYO (Xangsane)	25-29 Sept	4,139,195	213	660	48	6,606,836,575
7. TY PAENG (Cimaron)	27-30 Oct	364,733	32	62	23	1,248,495,106
8.TY QUEENIE (Chebi)	10-12 Oct	21,250	1	10	23	-
9. TY REMING (Durian)	28 Nov – 01 Dec	2,895,464	709	2190	733	4,817,070,173
10. TY SENIANG (Utor)	07-10 Dec	952,277	37	63	21	979,179,000

In 2006, the Philippines experienced several major disaster events which caused billions of pesos in property damage and affected over two million people. Seventeen weather disturbances hit the country – four of which successively occurred in November and December and devastated most of the areas of Luzon. These were Typhoons 'Milenyo' (Xangsane); 'Paeng' (Cimarron); 'Reming' (Durian), and 'Seniang' (Utor.)

Other major disaster events include landslides, mostly in Southern Leyte Province, with Brgy. Guinsaugon Landslide as the most devastated. This occurred in the morning of February 17, 2006 and wiped out almost the entire 480 hectares of Guinsaugon, which is one of the 16 villages of the town St. Bernard. In the aftermath, 154 died, 30 were injured, and 968 were missing and uncovered.

Summary of the effects of 2006 Brgy. Guinsaugon, Southern Leyte Landslide

Casualties			Affected Population	Displaced Population	Cost Of Damages
Dead	Injured	Missing			
154	30	968	18,450	3,272	114,800,000

Another is the sinking of MT Solar 1 off Luzaran Point, Guimaras Island last August 11,2006 which resulted to spillage 0f 200,000 liters of industrial fuel oil, the largest oil spill in the country's history-affecting three provinces and 39 municipalities with 3,357 families or 16,785 persons.

Summary of effects of 2006 volcanic activity

MAYON VOLCANO	A total of 9,557 families or 44,779 persons Coming from the 32 barangays of St. Domingo, Daraga, Camalig, Malilipat and Guinobatan and cities of Legaspi, Ligao and Tabaco were evacuated to 29 evacuation centers.
BULASAN VOLCANO	A total of 414 families or 2,207 persons were evacuated to six evacuation municipalities affected.

These disaster have had grave social and economic consequences on the Philippines. Consequently, several realities surfaced, namely, 1) that due to the country's geographical location, Filipinos will continue to be in harm's way due to natural hazards; 2) that the poor are often most severely affected; 3) that disasters can reverse hard-won development gains which highlights the importance of addressing poverty reduction, environmental degradation and vulnerability to disasters; and 4) that capability is key to reducing disaster risks.

Typhoon Warning System

For typhoons, the PAGASA advises the public on the latest weather bulletins and announcements through the radio for public storm signals as follows:

Storm Signal No.1 – Winds of 30 to 60 Kilometers per hour may expected within 36 hours. Alert is on but business may be continued as usual except when flood occurs.

Storm Signal No.2 – Winds greater than 60 to 100 kilometers per hour may be expected within 24 hours. People are advised to take precautionary measures.

Storm Signal No.3 – The center of the tropical cyclone is expected to pass very close or over areas where Signal No.3 is raised. Winds greater than 100(27.7 m/s) to 185 kilometers per hour(51m/s) would be expected over these areas within the next 18 hours. People are advised to seek shelter in strong buildings and stay indoors.

Storm Signal No.4 – Winds greater than 185 kilometers per hour(51m/s) may be expected within 12 hours. People should stay indoors in strong buildings.

[Note: Typhoon signals are based on wind speeds only and do not indicate the intensity and diameter of rain which cause floods. In most cases, danger to lives and damage to property come from floodwaters. For this reason, Congress has instructed PAGASA to divide Signal No.2 into a non-destructive (60-80 wind speeds) and the destructive (80-100 wind speeds).]

Community Flood Warning System Monitoring and Information Flow for Localized Suspension of Classes

Hazard Zoning & Mapping as one of the Key Foundation for an Effective Disaster Information System

- Town watch mapping – school in collaboration with the local government
- Integration of DRR concepts into a policy in development planning

CLIMATE VARIABILITY/CHANGE AND EXTREME WEATHER/CLIMATE EVENTS

Trends of extreme events

Temperature Trends

1. Hot Days
   - Significant increases in hot days all over the country except in Ambulong, Alabat and Roxas

2. Warm Nights
   - Significant increases in a number of places all over the country

3. Cool Days
   - Generally, significant decrease in the number of cool days

4. Cold Nights
   - Generally, significant decrease in the number of cold nights.

Rainfall Trends

1. Total rainfall

Trend of annual total rainfall

- decreases in the top northern part of Luzon (Aparri, Tuguegarao, Vigan and Baguio)
- Increases in the Bicol Peninsula, except Daet.
- Increases in Visayas and Mindanao.

2. Rainday

Trend of number of rain days (2 mm considered as rainy day)

- Increases in the top northern part of Luzon
- Increases in the Bicol Peninsula, except Daet
- Increases in Visayas and Mindanao

3. Extreme Intensity

Trends in the average intensity of the 4 wettest events (in mm)

- generally, increases in Luzon

4. Extreme frequency

Trend in the frequency of 24-hr rainfall exceeding the 1961-1990 mean fourth wettest event (in days per year)

- Generally, decreases in top northern part of Luzon.

The Philippines, because of its numerous low lying islands, its exposure to tropical cyclones and the strong correlation between El Nino and rainfall is particularly vulnerable to changes in weather/climate extremes (usually referred to as climate variability). There is a potential for significant adverse socio-economic and environment impacts. For examples, if buffer stocks were deleted by one bad reason (either drought or floods), a second in succession could be devastating.

On the other hand, climate change (as a result of global warming) is manifested by increases in day time and/or night time temperatures, and increases/decreases in total rainfall and rainfall intensities. Temperature increases could be disastrous to agricultural production and may also cause energy production shortfalls. Changes in rainfall patterns could impact adversely on quantity and quality of water resource. With the knowledge of climate trends, communities can plan for the future to reduces losses while maximizing economic gains.

Recommendation

To come up with a probable Emergency Scenario on flooding determining the impact, response, and population that could be possibly displaced.

References:

- PAGASA
- http://www.pagasa.dost.gov.ph
- NDCC
- Local Government Units
- Disaster Preparedness A Primer

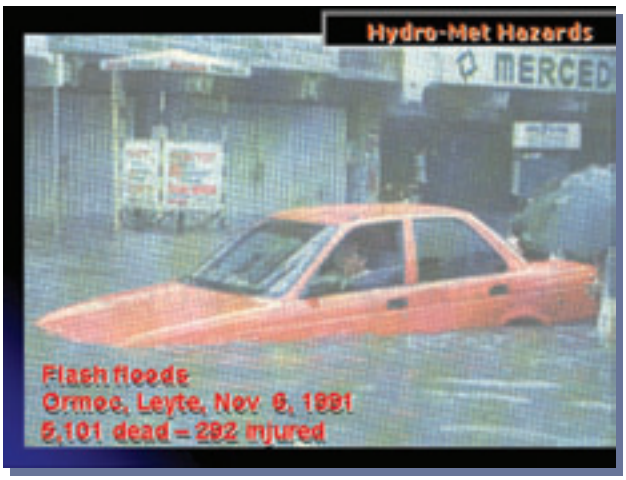
2. Launching of Marikina City Disaster Management Handbook

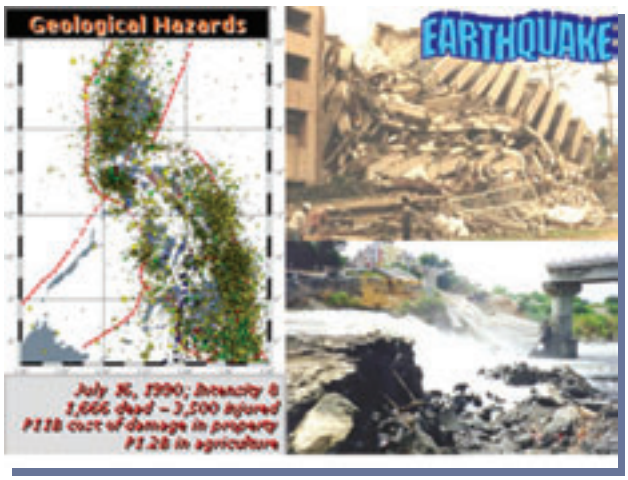
Launching of Marikina City Disaster Management Handbook

April 26, 2008

DISASTER

- A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceeds the ability of the affected community to cope using its own resources which necessitates outside assistance.





BACKGROUND

Marikina City is located in the Eastern part of Metro - Manila. On our Western part, you can find the Marikina River -our major source of flood.

Alongside of it is the Valley Fault Line which may move anytime. With these two hazard in our midst we have no choice but TO BE PREPARED.

In 1992 , upon the assumption of office of former Mayor Bayani F. Fernando – now Chairman of MMDA, the Marikina Disaster Coordinating Council was reactivated.

Although already in existence in the previous administrations such body was more oriented on post-disaster response. In his term and up to the present, all disaster scenarios are addressed at 3 levels namely:

-PRE-DISASTER

-DISASTER

-POST-DISASTER

Emphasis was given more on the preparedness aspect of the program. And this makes the big difference in managing all forms of disaster may it be man-made or natural in nature.

MISSION

To prepare our community and specially the entire government machinery to anticipate the onset of and respond to any disaster, thus bringing the number of casualties and damages at a minimum level. We aim to provide an integrated direction and control of manpower, material, monetary and other necessary resources that can be made available - responsive to the disasters and calamities which may occur in the City of Marikina.

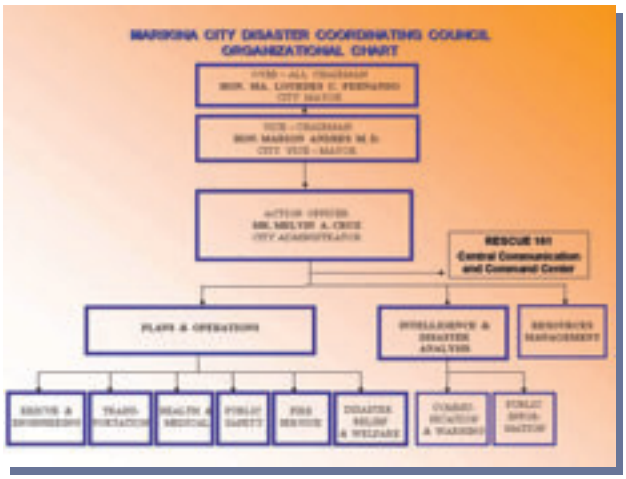
POPULATION

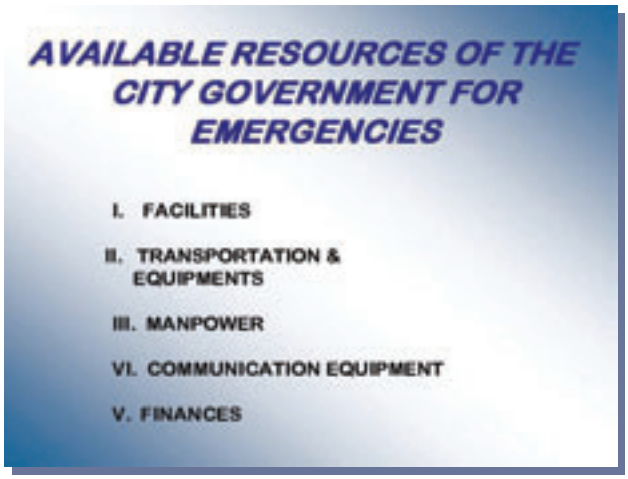
From a total population of 8,187 in 1903, the estimated population for 2007 is 445,429.

LAND AREA

Had a total of 21.5 Sq. Kms. Constituting 3.42% of Metro-Manila

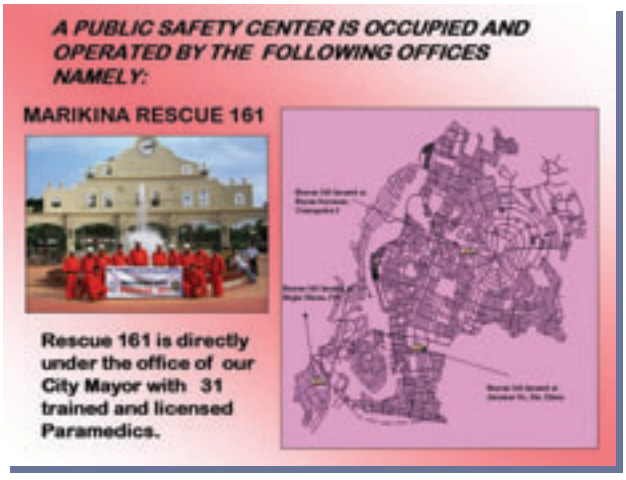
BARANGAY	POPULATION 2007
MARIKINA HEIGHTS	35,543
KALUMPANG	19,506
BARANGKA	25,820
TAÑONG	12,815
J. DELA PEÑA	12,262
IVC	17,415
SAN ROQUE	20,687
STA. ELENA	7,448
STO. NIÑO	34,257
MALANDAY	48,413
CONCEPCION I-	39,200
TUMANA	39,214
FORTUNE	37,882
PARANG	37,867
NANGKA	32,630
CONCEPCION II	24,470
TOTAL	

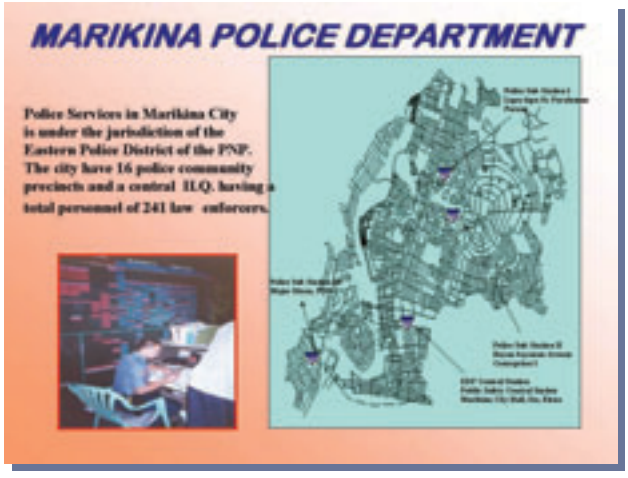

MARIKINA CITY DISASTER COORDINATING COUNCIL
ORGANIZATIONAL CHART
RESCUE 161
Central Communication
and Command Center


AVAILABLE RESOURCES OF THE CITY GOVERNMENT FOR EMERGENCIES
I. FACILITIES
II. TRANSPORTATION & EQUIPMENTS
III. MANPOWER
VI. COMMUNICATION EQUIPMENT
V. FINANCES


FACILITIES
MARIKINA SPORTS PARK
The Marikina Sports Park was established in the early 60's, was renovated in the 90's as part of the Healthy Cities program of the government. Aside form being a sports complex, we can use these as an evacuation site, but of recent times it had been our center for food preparation.


PUBLIC SAFETY CENTERS
166 CENTRAL STATION WITHIN THE CITY HALL COMPOUND
163
SOUTH STATION
MAJOR DIZON ST.
BARANGAY IVC
164
NORTH STATION
BAYAN-BAYANAN AVENUE


A PUBLIC SAFETY CENTER IS OCCUPIED AND OPERATED BY THE FOLLOWING OFFICES NAMELY:
MARIKINA RESCUE 161
Rescue 161 is directly under the office of our City Mayor with 31 trained and licensed Paramedics.


MARIKINA POLICE DEPARTMENT
Police Services in Marikina City is under the jurisdiction of the Eastern Police District of the PNP. The city have 16 police community precincts and a central ILO. having a total personnel of 241 law enforcers.

MARIKINA FIRE DEPARTMENT

The Marikina Fire Department have 5 sub-stations and an ambulance.

The fire fighting force is composed of 78 personnel.

The Fire Department also taps volunteer fire brigades from the business sector and from the Fil-Chinese Fire Brigade.

The city government supplements the fire departments with 4 fire trucks by dispatching the city-owned water tankers assigned to the Engineering Department, Parks Development Office, Waste Management Office and Market Office.

OFFICE OF PUBLIC SAFETY AND SECURITY

To augment our police force the OPSS has 190 personnel and 1,700 Bantay-Bayan civilian volunteers.

The OPSS assists in traffic management , keeping roads and sidewalks hassle-free, crowd control and securing public buildings/offices.

We have constructed 49 Multi-Purpose Covered Gymnasiums (Public) which can be utilized by the different organizations for recreational activities, spiritual endeavors, social functions, parties and ballroom dancing , but most specially as temporary evacuation centers.

(frameless design)

OFFICIAL EVACUATION CENTERS

NAME OF SCHOOL DISTRICT I	AVAILABLE
Marikina Elem. School	35
San Roque Elem. School	39
Kalumpang Elem. School	33
Ind. Valley Elem. School	20
L. Victorino Elem. School	33
Barangka Elem. School	36
Malanday Elem. School	43
Nangka Elem. School	33
TOTAL NO. OF ROOMS	272

DISTRICT II	AVAILABLE
H. Bautista Elem. School	30
St. Mary Elem. School	8
Sto. Niño Elem. School	47
Concepcion Elem. School	48
Parang Elem. School	65
SSS Village Elem. School	29
Fortune Elem. School	36
Kap. Moy Elem. School	14
TOTAL NO. OF ROOMS	277

HIGH SCHOOL	AVAILABLE ROOMS
Marikina High School	35
Parang High School	39
Sta. Elena High School	33
Concepcion Integrated School	41
Malanday High School	45
Concepcion High School	20
MHS-Tanong	33
MHS-Marikina Heights	36
MHS-Concepcion Annex	43
Fortune High School	36
GRAND-TOTAL-Elem. & High School Rooms	910 ROOMS w/c could house 18,200 persons

With regards to Hospitals, we have one (1) National Hospital (Eulogio "Amang" Rodriguez Memorial Medical Center, with 150 bed capacity.
New buildings are on the rise that aims to double its bed capacity.

There are additional six (6) private hospitals to augment the medical services needed in case of large-scale disasters, with a total bed capacity for 319 persons

NAME OF HOSPITALS	NUMBER OF BEDS AVAILABLE
PUBLIC/GOVERNMENT	
Among Rodrigues Emergency Hospital	150
PRIVATE	
Sta. Monica Hospital	25
Garcia General Hospital	25
Immaculate Conception Hospital	25
St. Vincent Hospital	45
P. Gonzales Hospital	15
Victoria Hospital	34
TOTAL	319

The city have 16 health center, one in each barangay. It is headed by a Physician, whose staff is composed of a dentist and a dental aide, 2-3 midwives, a barangay nutrition scholar (BNS), a nurse and nursing aides, volunteer health workers, sanitary inspector and a utility worker.

The City Health Office have 6 medical disaster teams composed of 7 to 8 personnel who go on regular rounds on all evacuation centers.

1 BLOOD BANK the first LGU operated blood station in the Philippines.

MARIKINA PUBLIC SERVICES CENTER

THIS FACILITY PLAYS A CRITICAL ROLE IN THE DISASTER OPERATION AS THIS IS THE AREA WHERE MAJORITY OF THE SERVICE-ORIENTED AGENCIES ARE HOLDING OFFICE.

A. ENGINEERING CENTER

B. METAL FABRICATION

C. MOTORPOOL

D. CENTRAL WAREHOUSE

E. ELECTRICAL & MAINTENANCE UNIT

F.DEMOLITION OFFICE / STREETS AND SIDEWALK OPERATION CENTER

G. TRAFFIC ENGINEERING UNIT

H. WASTE MANAGEMENT OFFICE


Additional support facilities:
1 Public Market
4 Private Markets
3 Private Commercial Centers/Malls
96 Hardware and Lumber Yard
2 Food Factories
All Pharmacies


II. Transportation & Equipments
6 -Emergency Ambulance
1- Mobile Command Facility
1 -Non-Emergency Ambulance
1 -Rescue Tender Truck
6 -Fire Trucks/ 4 Water tankers
36-Police Cars
69-Motorcycles
5-Buses
16-Barangay Vehicle
31-Service Jeep Vehicle
1-Manlifter
3-Tow trucks


HEAVY EQUIPMENT
37 DUMPTRUCKS
4 WATER TANKER
8 EXCAVATORS
2 AERIAL BASKET VEHICLES


1 TELESCOPIC CRANE
2 ROAD GRADERS
4 PAY LOADERS
2 SEWERJET CLEANER TRUCKS


LIGHT EQUIPMENT
18 Welding Machines
1 Portable Concrete Cutter
2 Portable Blower w/ Duct Hose
5 Power Saw
2 Bolt Cutter
4 Generator Sets
2 Rubber Boats w/ outboard motors
3 Wooden Boats
5 Acetylene Cutting Outfit
8 Oxygen Tanks w/ 4 regulators
10 Search Lights – portable / 5 flood lights
1 Tower Light
1 Command Tent


10 sets of Collapse Building Retrieval Boxes
LIGHTING
DIGGING TOOLS
LIFTING TOOLS
OTHERS
11 Container Van - MMDA OWNED

COOKING EQUIPMENT


Complete set of cooking equipments to prepare meals for 10,000 persons within four (4) hours, from time of preparation to distribution.



MEDICAL EQUIPMENTS (Rescue Tender Truck) Contents


7 Spine Boards, long
7 Spine Board, short
15 Extrication Collars
5 Gas Mask
4 Sphygmomanometer
5 Aneroid Sphygmo.
7 Stethoscope

5 thermometer
8 Tackle Boxes
1 Manual Suction Machine
30 Splints (long/short)
4 Nebulizers
6 Army Lift (collapsible)
ETC...

III. MANPOWER – The MCDCC is composed of Regular and Casual Government Employees.

CITY EMPLOYEES
34 Department Heads
21 Asst. Department Heads
500 Regular Employees

ENGINEERING DEPARTMENT

22	CIVIL ENGINEERS
22	ELECTRICAL ENGINEERS
4	MECHANICAL ENGINEERS
8	ARCHITECTS
29	HEAVY EQUIPMENT OPERATORS
13	HEAVY EQUIPMENT MECHANICS
10	DRIVERS
633	CONSTRUCTION WORKERS

MEDICAL/HEALTH OFFICE

17	DOCTORS
16	DENTIST
17	NURSES
86	OTHER MEDICAL PERSONNEL
19	SUPPORT STAFF

PARAMEDICS RESCUE 161

31 PERSONNEL

CLEARING/CLEANING (MDO/SSOC/WMO/PDO)

72	MARIKINA DEMOLITION OFFICE
241	WASTE MANAGEMENT OFFICE
120	PARKS DEVELOPMENT OFFICE

PUBLIC ORDER AND SECURITY

244	POLICE FORCE
78	FIREMEN
19	TRAFFIC ENFORCES
16	BARANGAY CAPTAINS
96	KAGAWAD
225	BARANGAY TANOD

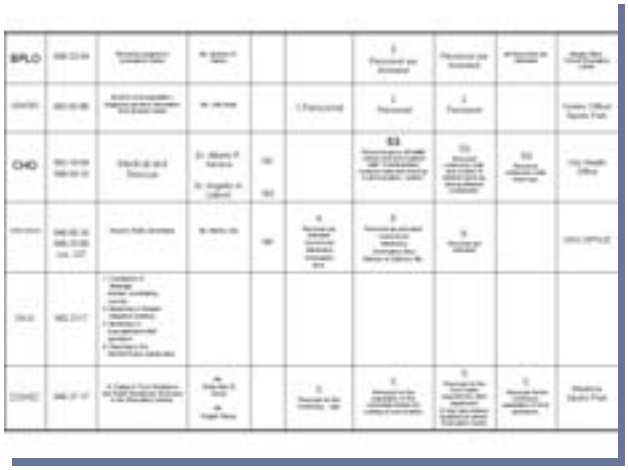
N.G.O. 'S

1,700 BANTAY BAYAN (ACTIVE MEMBERS)
50 ARMY RESERVIST
50 CIVIC ACTION TEAM
RADIO COMMUNICATION GROUPS

MARIKINA CITY DISASTER COORDINATING COUNCIL

EMERGENCY EXERCISE INFORMATION BULLETIN

OFFICE/ AGENCY	TELEPHONE NUMBERS	PRIMARY TASK	PERSON in CHARGE	LAU NCH	MANPOWER COMPLIMENT				REPORTING STATION
					per ALARM	per ALARM	per ALARM		



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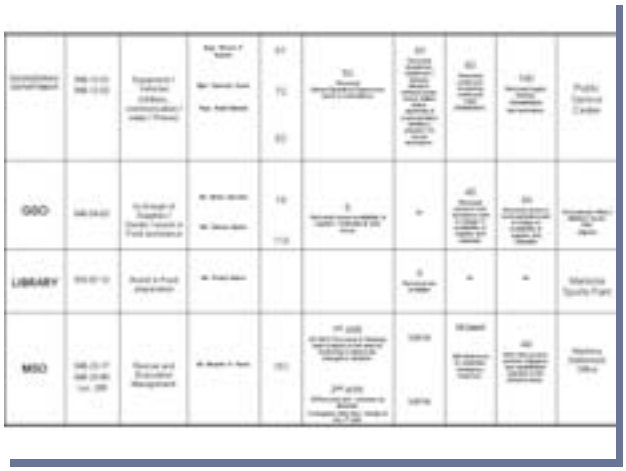
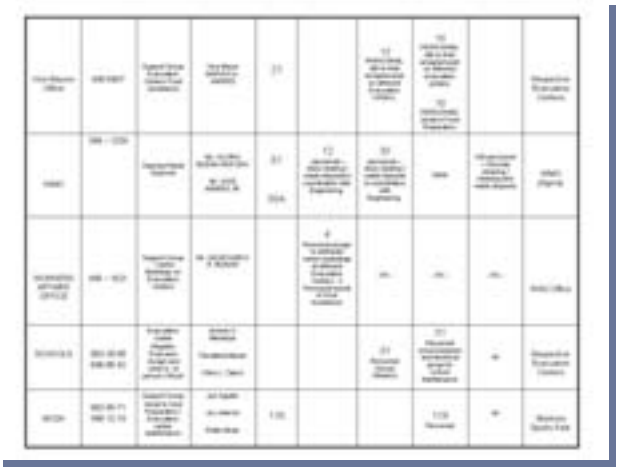


GSO									
LIBRARY									
MSO									

DPSS									

DRMO									
TEU									



VI. COMMUNICATION



We have a **Central Communication and Command Center** based at our Justice Building. It is here that all calls for emergencies are received and responded to once you **dial 161**. These functions 24/7, with or without disaster.

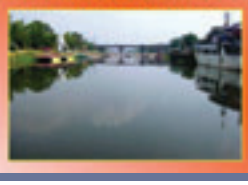
WWe pride ourselves of being the only local government in the National Capital Region that operates its own **Narrowcast Radio Station** (DZBF-1674 MHZ). We have our daily regular programming and we utilize also our radio station in sending information and alarm signals to our field operatives for any calamity or disaster.

WHAT OTHER RADIO COMMUNICATION SYSTEMS ARE INSTALLED IN THE CENTRAL COMMUNICATION & COMMAND CENTER?

A. MMDA Effective Flood Control Operation System (EFCOS)

***MONITORS THE AMOUNT OF RAINFALL IN THE DIFFERENT MEASURING STATIONS**

***OPENNING OF MANGGAHAN FLOOD CONTROL GATES**



B. BUREAU OF FIRE PREVENTION (BFP) COMMUNICATION SYSTEMS

C. PHILIPPINE NATIONAL POLICE (PNP) COMMUNICATION SYSTEM

D. AMATEUR RADIO COMMUNICATION GROUP- TO MONITOR AND ASSISTS THE MCDCC OPERATIVES, IF SITUATION REQUIRES , IN THE EVENT THAT THE CITY NEEDS ADDITIONAL COMMUNICATION EQUIPMENTS TO BE ASSIGNED IN CRITICAL AREAS.

COMMUNNICATION EQUIPMENT




215 Portable Radio Transceiver UHF
2 Repeater Unit UHF / IVHF Unit Repeater
2 Repeater Antenna UHF
1 Base Radio Transceiver VHF/MMDA
1 Base Radio Transceiver VHF-PNP
1 Base Radio Transceiver UHF-BFP
5 Base Radio Transceiver UHF-161

1 Radio Station DZBF 1674 MHZ
2 Sound Trucks
4 Telephone Unit/PLDT
2 Telephone Unit/Globe

V. FINANCE

A 60 MILLION PESOS CALAMITY FUND PER ANNUM TO SUPPORT THIS PROGRAM.

CITY ORDINANCE ON DISASTER MANAGEMENT

Ordinance no. 254
Series of 1998

Ordinance creating the **DISASTER MANAGEMENT OFFICE**, also to be known as, RESCUE 161, defining its function and responsibilities , and appropriating fund annually for its operational expenses.

Approved December 21, 1998
by **Bayani BF Fernando**
City Mayor

Ordinance no. 54
Series of 2005

Ordinance authorizing the use of twenty percent (20%) of the calamity fund of the City Government for disaster preparedness.

Approved on June 14,2005
by **Ma. Lourdes MCF Fernando**
City Mayor

Ordinance no. 109
Series of 2005

Ordinance adopting a Comprehensive Earthquake Disaster Reduction (CEDR) Program and Action Plan in the City of Marikina

Approved on September 28, 2005
by **Ma. Lourdes MCF Fernando**
City Mayor

FIVE MINUTES QUICK RESPONSE TIME

Recognized that the aim of our government is to have a quick response to peace and order and security of lives and properties, we imposed on ourselves a RESPONSE TIME. The program guarantees the arrival of emergency services (medical, fire and police assistance etc.) within five (5) minutes upon call for assistance.

The program is no different from those of other Local Government Units except for the sign posted in every vehicle involved in the operation:

IF THIS UNIT FAILS TO REACH YOU WITHIN **5** MINUTES

AFTER YOUR CALL FOR ASSISTANCE, REPORT TO MAYOR MCF CALL 646-1634

It is made possible by the order and discipline obtained in the streets of Marikina. We owe these to the successful implementation of the DISCIPLINA SA BANGKETA and HASSLE-FREE ROADWAYS. From an average response time of 10-15 minutes years ago, it has gone down to 3.6 minutes which is far better than America's Rescue 911.

Rescue 161- MMDA (EFCOS) Coordination

Travel Time (Flood Propagation)

River	Section	Travel Time (min.)	Distance (km)	Propagation Velocity (m/s)
Upper Marikina	Montalban-Nangka	80	9.0	1.9
	Nangka-Sto.Nino	50	5.3	1.8
	Sto.Nino-Rosario	30	6.7	3.7
San Juan	Tatalon-Junction	30	7.1	3.9

Monitor Site

1. Mount Ora-RGS
2. Mount Aries-RGS
3. Mount Boso Boso-RGS
4. Mount Campana-RGS
5. NANGKA WGS & RGS

RGS – Rain Gauge Station
WGS- Water level Gauge Station

ALARM SYSTEM

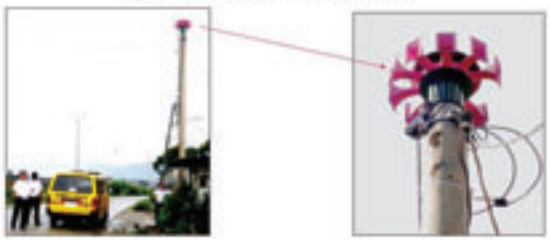
1st ALARM- Storm Signal No. **1** and / or **15** meter water level (ASSEMBLY) (WARNING)

2ND ALARM- Storm Signal No. **2** and / or **16** meter water level (EVACUATION)

3RD ALARM- Storm Signal No. **3** and / or **17** meter water level & up (FOOD PREPARATION)

POST DISASTER- CLEARING/ CLEANING/ REHABILITATION water level 14 meters

SIREN SYSTEM



WATER LEVEL 15 meters – 30 seconds Airing (Prepare to evacuate)

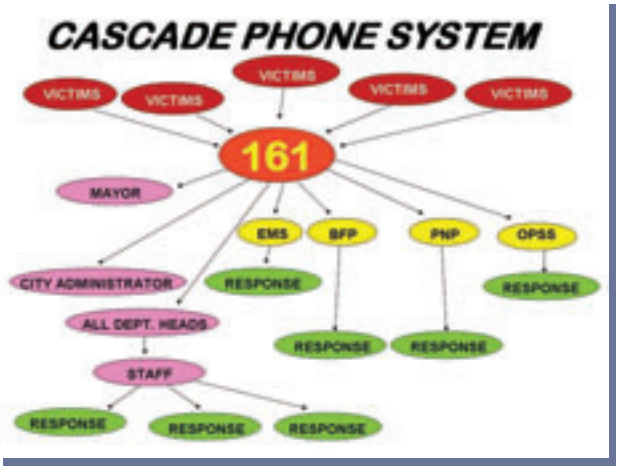
WATER LEVEL 16 meters – 2 minutes Airing (Evacuate to designated centers)

OTHER PROJECTS / PROGRAM

•ROAD DIKE

•Pontoon Bridges

•Planting of selected kind of trees on appropriate areas



These programs of the city government in times of emergencies and disasters are plus factor on our response to disaster calls. With a clear role for all personnel, plus the investments we have put up for our equipments and roadways our rescue personnel, rescue operations and equipment can move freely and unhampered to any point of the city, thus minimizing any loss of lives and property.

During normal times, we continue monitoring the city and apprehend anyone who violates or disregard our program.

With the strict implementation of the National Building Code and City Ordinances , our citizens know by heart that we mean business .

APPENDIX VII : Presentation Materials of Expert from Republic of Korea

1. Web-based GIS Typhoon Damage Estimation system

Web-based GIS Typhoon Damage Estimation system

KSIC.net

Korean geoSpatial Information Communication

Eunmi Chang

contents

- DB implementation
- System interface
- logics behind the system
- Schedule
- Results

Web-based GIS Typhoon Damage Estimation system

database implementation

2) Obtaining basic database for prediction and estimation

-Long-term trends, it is necessary to convert the amount of loss into the same criteria

-For each county, the loss of typhoon can be estimated

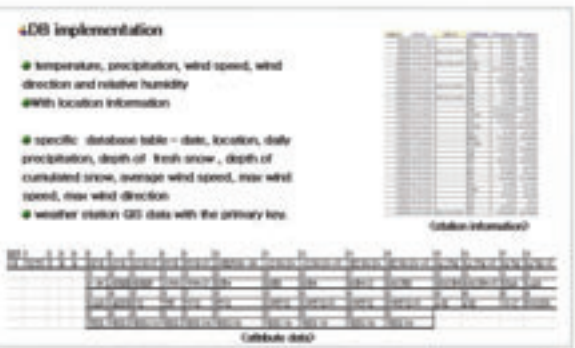
Information	Information characteristics	Source
Loss in the past	· 232 counties have their own loss data · conversion of values in the past into the same counties	NEMA, Annual disaster report
Population	· population data per 232 counties · census data	NSO
Boundaries of county in the past	· administration boundaries adjusted	Boundary data
Cadastral maps	· 20 detailed cadastral maps in damaged areas	Cadastral layer
Changes in price rated	· changes in consumer price rate	NSO
Meteorological data	· characteristics of meteorological data for each counties	

raw data for loss in the past for the estimation model

DB implementation

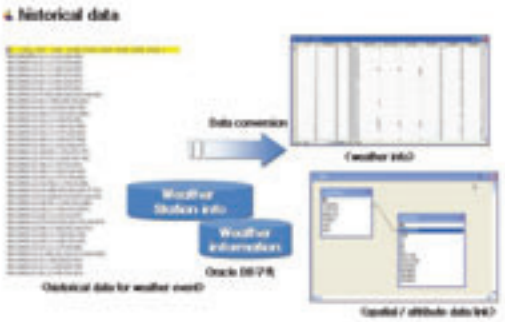
DB implementation

- temperature, precipitation, wind speed, wind direction and relative humidity
- With location information
- specific database table = date, location, daily precipitation, depth of fresh snow , depth of cumulated snow, average wind speed, max wind speed, max wind direction
- weather station GIS data with the primary key



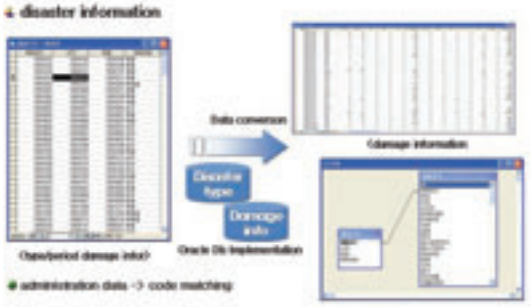
DB implementation

historical data



DB implementation

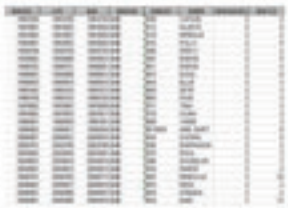
disaster information



- administration data -> code matching

DB implementation

- Typhoon DB implementation
  - From1951 to 2006
  - RSMC data
  - Name of typhoon, UTC time, latitude, longitude, central pressure
  - select 329 typhoon s having impacted on Korea from whole 1491 typhoons
  - master typhoon DB
  - detailed table
  - mapping table

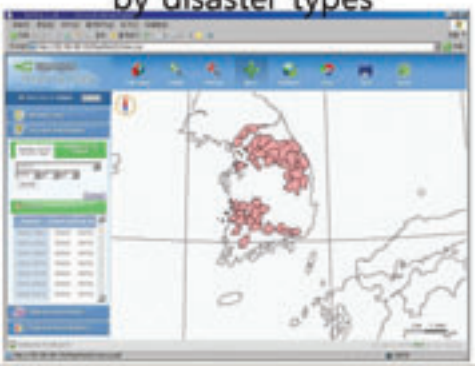


(mapping table between typhoon info and disaster info)

Search for Weather Station

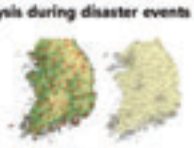
Search for precipitation, temperature *et als*

Search for disaster information by disaster types



Web-based GIS Typhoon Damage Estimation system

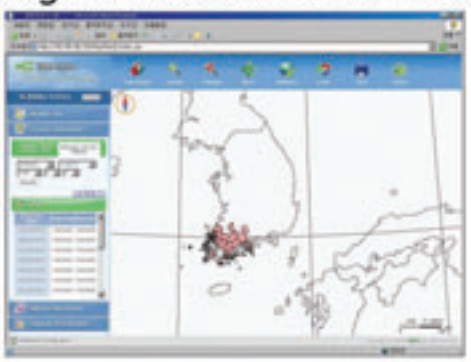
- meteorological interpolation and data analysis during disaster events
  - -The events of precipitation and wind speed during typhoon, detailed information are arranged into database for 232 counties.
  - -Database design and detailed GIS data in the other organizations are obtained and converted
  - -Interpolation process with GIS programming based on "Intra map", one of the dominant software in Korea and produced by KSIC



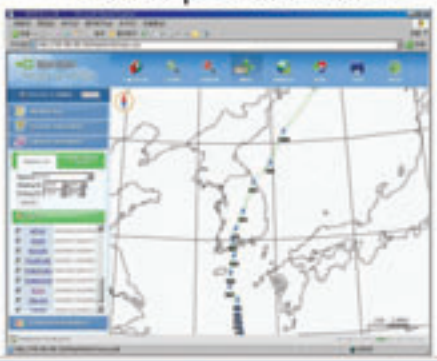
79 Gauges and 232 administration boundary

Interpolation for the county without gauges

Regional disaster information



Typhoon Trajectory with central pressure values



Search for Similar typhoons

Web-based GIS Typhoon Damage Estimation system

Category	Central air pressure(hPa)	Max wind speed (m/s)
1	>980	33~42
2	970~980	43~49
3	954~945	50~58
4	944~920	59~69
5	<920	>69

table 1. typhoon level (Saffir-Simpson Scale)

- meteorological characteristics:

-Occurrence rate, depth of central air pressure, moving speed, the shortest approach distance Trajectory, max wind diameter

Areas under influence		Max speed	
class	Range with higher than (km)	intensity	Max in center
Small	<300km	Weak	17~25 m/s
Medium	300~500 km	Medium	26~33 m/s
large	500~800 km	Strong	34~44 m/s
super	>800 km	Very strong	>44 m/s

table 2. KMA typhoon level

1. Based on Trajectory and characteristics of each typhoon
2. The comparison among the typhoons in the past (more than 200)
3. The similar typhoon selected
4. The simulation of damage for 232 counties will have their own values for modellings

Web-based GIS Typhoon Damage Estimation system

- logics of typhoon trajectory analysis system

-Similarity analysis from random phenomena
- pattern recognition of NNM (Nearest Neighbor Method)

-NNM is based on the comparison of sample typhoon with standard data for each center of regions

-nearest neighbor density function $\hat{f}(x) = \frac{k/n}{V_k(x)}$

-Calculation of density function -> the denser, the higher similarity or probability of a specific typhoon in the past

The concept of NNM(Nearest Neighbor Method)

Regional damage estimation

Web-based GIS Typhoon Damage Estimation system

- Each county has their own damage density trend

1) methodologies
-Annual Disaster report-> damage DB
-> damages for each events
-> financial damage and casualty

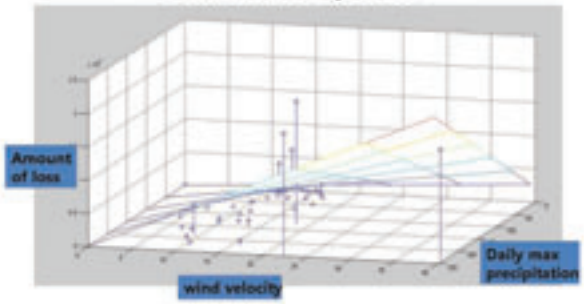
-Meteorological data converted into trend analysis for KDF (Kernel Density Function)

-Trend functions for each KDF of one county

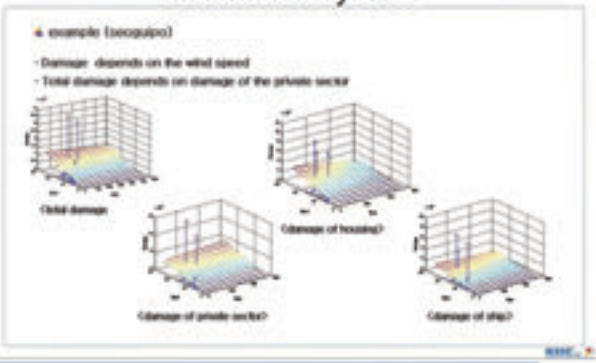
Web-based GIS Typhoon Damage Estimation system

- scenario for each trajectory

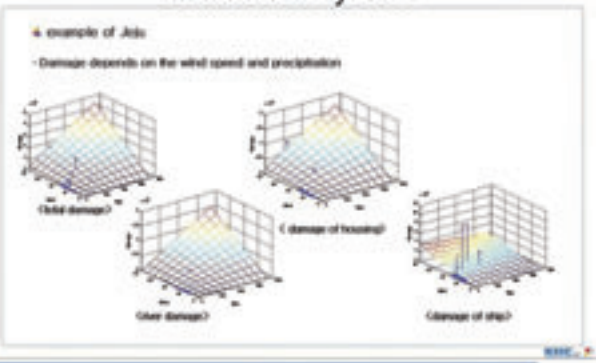
Web-based GIS Typhoon Damage Estimation system



Typhoon Damage Estimation system



Typhoon Damage Estimation system

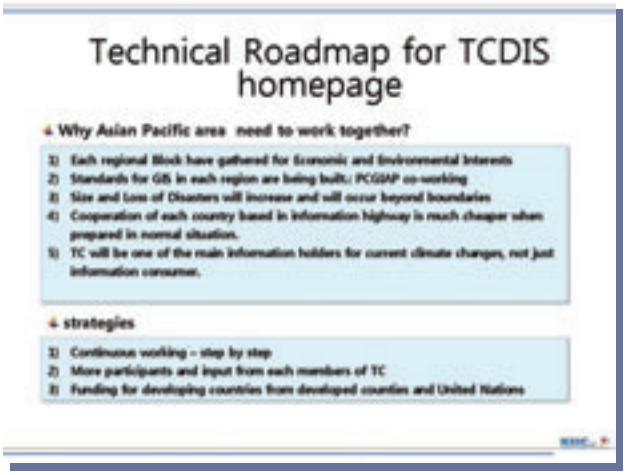


Web-based GIS Typhoon Damage Estimation system

- expected effects
  1) Low cost input for prediction model
  2) Historical data of climate and disaster report: not just report, but input for a prediction model
  3) Each county may prepare some response to manage disaster and be supported for resource allocations.
  4) The calibration of the prediction model will be compared with other hydrological Models and compensate each other .
  5) The more disaster reports are made, the more accurate prediction models will be built

Technical Roadmap for TCDIS homepage

- trend of information systems
  1) Information service provider
  2) Application service provider
  3) Community service provider
  4) Location service provider
  5) Web 2.0 and interactive information service provider
- beyond Homepage where to go!
  1) Information service provider: typhoon information, damage, alert, other model
  2) Application service provider: prediction model for each counties- experts joins
  3) Community service provider: various attendee and participants for TC
  4) Location service provider: GIS based typhoon information
  5) Web 2.0 and interactive information service provider:


Technical Roadmap for TCDIS homepage
Why Asian Pacific area need to work together?
1) Each regional Block have gathered for Economic and Environmental Interests
2) Standards for GIS in each region are being built; PCGIAP co-working
3) Size and Loss of Disasters will increase and will occur beyond boundaries
4) Cooperation of each country based in information highway is much cheaper when prepared in normal situation.
5) TC will be one of the main information holders for current climate changes, not just information consumer.
strategies
1) Continuous working – step by step
2) More participants and input from each members of TC
3) Funding for developing countries from developed counties and United Nations


Questions and Answers
Thank you very much!
emchang@ksic.net
82-2-10-6727-6300
Dr. Chang

APPENDIX VIII : Presentation Materials of Expert from Japan

1. ADRC's Activities and GLIDE for Typhoon Committee and TCDIS

ADRC's Activities and GLIDE for Typhoon Committee and TCDIS

Hajime Nakano

Senior Researcher

Asian Disaster Reduction Center

GLIDE

ADRC Member Countries

27 Member Countries, 5 Advisor Countries, 1 Observer

ADRC Activities

1. Information Sharing

International Meetings & Seminars, Disaster Information, Publications, Development of Tools including GLIDE, Satellite Image and Data of Affected Area

2. Human Resource Development

Seminars, Trainings, Workshop, VR Programs, Eduction programs

3. Building Community Capabilities

CBHM & Town Watching Method, Tsunami Awareness Projects

GLIDE (GLobal unique disaster IDEntifier)

"a tool for effective information sharing from existing disaster data sources"

(Example)

Tsunami Disaster in the Indian Ocean | The Indian Ocean Earthquake and Tsunami | Tsunami Disaster on December 26, 2004

Hazard Code | Serial Number

TS-2004-000147-IDN

Year | ISO Country Code

(DR: Drought EQ: Earthquake EP: Epidemic FL: Flood TS: Tsunami SL: Slide VO: Volcano WV: Wave / Surge WF: Wild Fire ST: Wild Storm)

Hazard Code used in GLIDE

CW - Cold Wave	MS - Mud Slide
CE - Complex Emergency	OT - Other
DR - Drought	ST - Severe Local Storm
EQ - Earthquake	AV - Snow Avalanche
EP - Epidemic	SS - Storm Surge
EC – Extra-tropical Cyclone	AC - Tech. Disaster
FR - Fire	TO - Tornadoes
FF - Flash Flood	TC - Tropical Cyclone
FL - Flood	TS - Tsunami
HT - Heat Wave	VW - Violent Wind
IN - Insect Infestation	VO - Volcano
LS - Land Slide	WF - Wild fire

24 hazard codes

Note: ET - Extreme temperature (use CW/HW instead), FA -Famine (use other "Hazard" code instead), SL - SLIDE (use LS/AV/MS instead), WV-Wave/Surge (use TS/SS instead)

GLIDE number generation and utilization

Event

GLIDE operators input the information on the GLIDE number web-site

→GLIDE number generated automatically

The web-site automatically links to other data base fitted GLIDE number

Report | Information

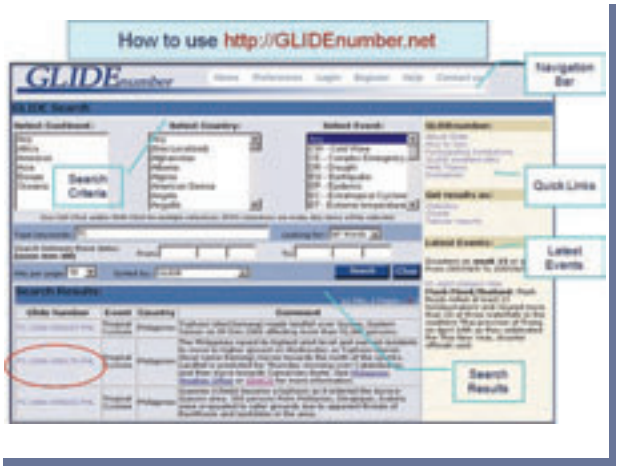
Registered User

<GLIDE number web-site>

GLIDE

Link to the Data Base with GLIDE number

ADRC Data Base | UN-OCHA Data Base | ....



Functions of GLIDEnember.net

- Identification of Disaster event
- Easy Link to detailed information
- GLIDE Search Engine-User can search disasters by any combination of continents, country, event type and dates as well as keywords.
- Disaster Notification System- User can receive instant notification by e-mails. Users can set up a filter to receive only notification of disasters matching their criteria.
- GLIDE generation System- Authorized Users can generate GLIDE numbers to new disaster events as they occur.

Current status of GLIDE utilization

GLIDE Operators	ADRC, CRED, LaRED, ReliefWeb, JRC/GDACS , IFRC, CDERA (Caribbean Disaster Emergency Response Agency), OCD/NDCC
using GLIDE for databases	ReliefWeb, ADRC, FAO, CDERA, UNOSAT, JAXA (Japan Aerospace Exploration Agency), NIED (National Research Institute for Earth Science and Disaster Prevention of Japan), , OCD/NDCC, PDC (Pacific disaster Center), Dartmouth Flood Observatory, SHELDUS (University of South Carolina), Benfield, NII , Typhoon Committee (TCDIS)
Endorsed by	IRI, ISDR, UNDP, WMO

In addition, some disaster related organizations and research institutes have expressed interest.

GRIP/GLIDE Initiatives

- Enhancement of GLIDE System: a) Governing body of GLIDE(Steering Committee, Advisory Group) b) Upgrading and maintaining GLIDEnumber.net c) Expert Review(twice a year)
- Increase of GLIDE Data: a) Assignment of GLIDE Operators(5 regions,5 languages) b) GLIDE manuals c) Seminars for Operators
- Promotion of GLIDE: a) GLIDE Promotion Materials (pamphlets, posters, user's guideline) b) Inclusion of GLIDE number into database c) Workshops for Users

Typhoon Committee supports and uses GLIDE.

Recommendation on GLIDE, workshop, Macao, March 2007

- Recognizing that GLIDE (Global Disaster Identifier) is an effective and efficient tool for disaster related information sharing and facilitating to implement the TC SP,
- Also recognizing the commitment of ADRC to promote the GLIDE and support developing the disaster database in Asian countries;
- The High-Level Workshop on the Implementation of the Strategic Plan of the Typhoon Committee supports the initiative of ADRC to promote the GLIDE and other related initiatives.

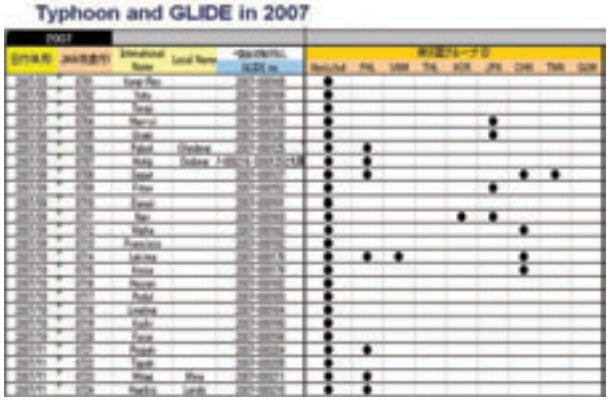
DPP (Disaster Prevention and Preparedeness) Working Group use GLIDE

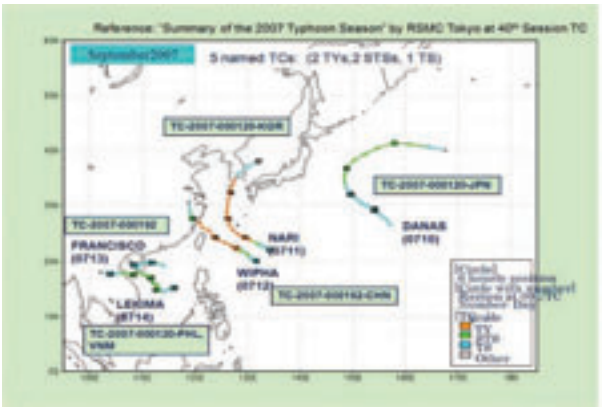
- GLIDE is recognized as key tool in TCDIS(TC Disaster Information System)
- Disaster reports in TCDIS is based on GLIDE.

ADRC Activities in WGDPP

- 2nd Meeting WGDPP at Seoul (August 22-24)
  - GLIDE will be used in the TCDIS system
- Integrated Workshop at Bangkok (Sept.10-14)
  - ADRC support Member countries while they use GLIDE in summarizing TCDIS data.
- 40th Typhoon Committee (Nov20-26)
  - ADRC support WGDPP in its activities.

Typhoon and GLIDE in 2007





New Projects for ASEAN
-Natural Disaster Mitigation-

1. *Developing Teaching Materials and Training Teachers for Disaster Education Promotion*
2. *Capacity Building for Local Officials on Disaster Management*
3. *Application of Satellite Technologies to Disaster Management*
4. *Development of Web-based GLIDE-associated Database on Natural Hazards*

Development of Web-based GLIDE-associated Database on Natural Hazards

- *Database on natural hazards as a basic tool for making disaster management policies*
- *Disaster event data developed and maintained independently by relevant organizations*
- *Developing Web-based database associated with GLIDE number as a common tool for disaster management*

Summary

- GLIDE as a tool of the effective information sharing of disaster data
- GLIDE System is supported by GLIDE Initiatives including ISDR, UNDP, Typhoon Committee and Other International Organizations.
- ADRC assist TC member countries while they use GLIDE in summarizing TCDIS data.
- ADRC launch New four projects for ASEAN, including "web-based GLIDE-associated database" project, which enhances DRR.

ADRC promote and implement the GLIDE project with close cooperation with you.

Thank You For Your Attention

Cooperative Project in the Philippines

Development of a web-based, GLIDE associated national disaster event database (CALAMIDAT.PH)

Objectives:

1) To increase local capacity for disaster analysis and decision support
2) To institutionalize an authoritative and world class disaster event database system

- Activities:

1) Development of a web based, glide compliant CALAMIDAT.PH
2) Building up of CALAMIDAT.PH (1968-Present)
3) Specialized training on:
   (a) Data analysis (b) Web Database Management and Maintenance (c) Decision support
4) Seminar by ADRC and OCD