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Asian Disaster Preparedness
Center

**Meeting on Regional Cooperation on Early Warning Arrangement,
Preparedness and Mitigation of Natural Hazards**
12-14 July 2006, Bangkok, Thailand

SUMMARY REPORT

1. Background

The *Meeting on Regional Cooperation on Early Warning Arrangement, Preparedness and Mitigation of Natural Hazards* from 12-14 July 2006 held in Bangkok, Thailand brought together early warning national focal points of Bangladesh, Cambodia, China, Lao PDR, Maldives, Myanmar, the Philippines, Sri Lanka, Thailand, and Vietnam (refer to Annex 1: Participants List) to:

- i) Consider, for approval, an end-to-end multi-hazard early warning (EWS) program, developed subsequent to the *Ministerial Meeting on Regional Cooperation on Tsunami Early Warning Arrangements* in January 2005 in Phuket, with guidance from two expert consultation meetings in February and April 2005;
- ii) Consider the proposal to establish a regional severe weather forecast research support to national meteorological services, and develop an implementation plan of action; and
- iii) Detail the implementation arrangements of the ADPC-facilitated regional multi-hazard early warning arrangement, including funding support.

Reference documents on i) *Establishing End-to-End Early Warning System for Tsunamis and other Natural Hazards for Disaster Preparedness and Mitigation in the Indian Ocean and Southeast Asia* (refer to Annex 2); and ii) *Concept Paper on Regional Severe Weather Forecast Research Support to National Meteorological Services* (refer to Annex 3) were sent to the delegates in advance for their study.

2. Opening Session

The meeting was formally opened by H.E. Prof. Dr. Krasae Chanawongse, Chairman, Board of Trustees, Asian Disaster Preparedness Center. Special remarks were given by Mr. Wanhai Zhang, Minister Counsellor of the Embassy of the People's Republic of China, and H.E. Mr. Shahed Akhtar, Ambassador Extraordinary and Plenipotentiary of the Embassy of the People's Republic of Bangladesh. Prof. Dr. Krasae Chanawongse welcomed Bangladesh, Maldives, and Sri Lanka as additional members to the regional grouping, initially composed of Cambodia, China, Lao PDR, Myanmar, the Philippines, Thailand, and Vietnam during the *Meeting on End-to-End Multi-Hazard Early Warning System – Southeast Asia: Assessment of Needs* in March 2005 in Bangkok.

As resource partner in the regional early warning arrangement, Mr. Wanhai Zhang underscored China's vast experience and technical expertise through the China Meteorological Administration (CMA), China Earthquake Administration (CEA), and State Oceanic Administration of China (SOA), which may be harnessed, shared and transferred to the participating countries within the framework of this regional cooperation through secondment of experts, training, and collaborative research. H.E. Mr. Shahed Akhtar appreciated the participation of Bangladesh in the regional arrangement. Delegates witnessed earlier the signing of the Memorandum of Agreement between ADPC and the Bangladesh Meteorological Department, China Earthquake Administration, and China Meteorological Administration.

3. The Regional Program on End-to-End Early Warning System for Tsunamis and other Natural Hazards for Disaster Preparedness and Mitigation in the Indian Ocean and Southeast Asia

The regional program on end-to-end multi-hazard early warning system has the following program components:

- 1) **Regional** monitoring and evaluation of tsunamigenic seismic activity and anomalous sea level conditions; tsunami prediction and information communication to participating countries; and regional severe weather forecast research support for a multi-hazard approach;
- 2) Strengthening **national** capacities in early warning, disaster management planning, risk communication, and emergency response;
- 3) Enhancing **local** capacities to assess disaster risks, respond to warnings, and undertake local risk reduction;
- 4) Regional **exchanges** of information, best practices and lessons learned for cross-country learning and to guide replication; and
- 5) **Research** to improve warning technology, enhance understanding of risks, and develop effective, efficient, and locally-relevant risk mitigation options.

ADPC gave an update on international, regional, and national partnerships developed for program implementation, and work done to initiate the program. Annex 4 provides a summary of these ongoing and completed activities that contribute to the EWS Program. Best practices from the US-IOTWS Program and the UNDP (Thailand)-supported community preparedness activities in Southern Thailand were shared with the delegates (refer to Annex 5). One key issue noted is sustainability of activities initiated with communities. Community-Based Disaster Risk Management (CBDRM) needs to be integrated into community development planning to ensure sustainability.

3.1 Further gaps and needs at regional, national, and local levels

Focal points of Bangladesh, Cambodia, Lao PDR, Maldives, Myanmar, Sri Lanka, Thailand, and Vietnam provided updates on ongoing national activities in tsunami warning and severe weather forecasting (refer to Annex 6), and reported gaps and priority needs at national, sub-national and local levels, which were identified from consultations with early warning stakeholders, for inclusion in the regional program. Gaps and needs common in the country presentations are as follows:

Tsunami warning:

- Seismographs and sea level gauges appropriate for tsunami warning
- Sharing of real-time data, research results
- Training courses for seismologists
- Detailed bathymetric data (seafloor and contour of coastal areas)
- Telecommunications infrastructure for rapid warning dissemination
- Telecommunication network with first and second line receivers of warning information
- Addressing last mile communication gaps to ensure warning reaches communities at-risk
- Support to initiate multi-disciplinary stakeholders meetings
- Regular tsunami warning system exercise
- Collaborative research
- An independent tsunami research institute in the region

Severe weather forecasting

- Enhancement of meteorological observation network
- Establishment (e.g. Cambodia)/ upgradation of Global Telecommunication System (GTS) line
- Faster access to internet through broadband connection to receive Numerical Weather Prediction (NWP) outputs
- Upgrading of data communication system between national and sub-national offices
- Training in advanced prediction techniques
- Training in radar meteorology/ engineering
- Training in instrument maintenance
- Interface with users

Disaster Management

- Development and application of hazard maps (floods, flashfloods, landslide, etc.)
- Training on improved communication and dissemination systems for disaster management
- Community preparedness for timely and appropriate response to warnings
- Awareness program on tsunami
- Assistance in developing earthquake resistant building codes
- Training on earthquake hazard mitigation

Annex 7 incorporates participating countries' priority needs into the regional program.

3.2 Potential contributions from China and the Philippines

Focal points of China and the Philippines, the resource partners, presented a) their existing capacities in tsunami early warning, which included hazard observation and risk analysis, dissemination, research, training, and awareness raising; and b) capacities in numerical prediction of severe weather events; and subsequently identified potential contributions to the regional program (refer to Annex 8), as follows:

China:

Tsunami warning:

- Upgrading of 2 seismic stations in Myanmar, which were previously contributed by China
- Establishment of at least 2 broadband seismic stations in participating countries under the ADPC-facilitated system, including technical instruction/ training on installation and operation of seismic network
- Sharing of seismic data from select stations
- Technology and experience in:
 - Earthquake engineering
 - Construction and operation of seismic networks
 - Oceanographic observation and forecasting techniques
 - Multi-purpose observation systems
 - Data communication systems
 - Quick data processing
 - Marine numerical forecasting models in wave, storm surge, tsunami, current, water temperature, sea ice, and El Niño
- Research on:
 - Rapid determination of potential tsunami after earthquakes
 - Effective monitoring and alarming systems
 - Earthquake prediction

Severe weather forecasting:

- Technical assistance through secondment of experts or other suitable mechanism
- Research support in 5-10 day weather forecasting and provision of 5-10 day weather forecasts to participating countries, if needed
- Exchange of research findings and model outputs on climate prediction, climate impact assessment, climate risk assessment, etc.
- Training and technical assistance to build capacities of NMSs through the ADPC-facilitated system
- Cooperation with ADPC to enhance overall performance of the regional early warning system

Philippines:

Tsunami warning

- Years of operational experience in tsunami warning, including detection, modeling, inundation mapping, education and awareness
- Host on-the-job training in seismic data processing and analysis (the Philippines experiences 2-3 earthquake events per week)
- Tsunami wet sensor technology
- Software for rapid earthquake damage assessment system
- Experience in establishing community-based early warning systems for sudden onset hazards

Severe weather forecasting:

- Experience in community-based flood early warning system

Annex 7 summarizes the potential contributions of China and the Philippines vis-à-vis program components and activities. After updating the program with further gaps and needs, and noting the potential contributions from China and the Philippines, delegates approved the EWS program, and endorsed it for funding support from the UN Regional Tsunami Trust Fund.

The meeting also noted Thai Meteorological Department's (TMD) capabilities in numerical weather prediction and its potential to assist in this area. Currently, TMD is helping Cambodia and Lao PDR by providing weather forecast products.

4. Proposed Regional Severe Weather Forecast Research Support to National Meteorological Services

The regional severe weather forecast research support to national meteorological services was proposed as a sustainability strategy for the tsunami early warning arrangement, noting that, in most countries, national focal points for tsunami warning and severe weather warning are the same. Also, the initiative would assist countries in improving climate and severe weather forecast products and applications by providing a test bed to accelerate the transition of severe weather forecast research and development into operational forecasting and forecast product application. The regional arrangement to adapt/ customize and test global scientific advances for the region would be more economical compared to individual national efforts.

Prof. U.C. Mohanty, Center for Atmospheric Sciences, India Institute of Technology Delhi, presented the potential of high-resolution non-hydrostatic mesoscale models to predict, with much improved confidence, high impact events, such as thunderstorms, squall line, tropical cyclones, heavy rainfall episodes, monsoon depression, etc., with 2-3 days lead time (refer to Annex 9a: technical presentations) and the systematic approach towards providing such regional research support. Mr. M.C. Sinha, Director (Retired), Indian Meteorological Service, presented the methods used for numerical weather prediction, the challenges of NWP in the tropics, and the operational requirements (refer to Annex 9b). Mr. M. Mandal, Centre for Oceans, Rivers, Atmosphere and Land Sciences, Indian Institute of Technology, Kharagpur, presented the mesoscale modeling experience for severe cyclones over the Bay of Bengal, and results of studies in parameterization and model initial conditions (refer to Annex 9c). Dr.



Rachel V. Francisco, Weather and Flood Forecasting Center, PAGASA, Philippines, presented the ongoing high resolution modeling activities in the Philippines. All these presentations contributed to the plenary discussions on the requirements and the subsequent preparation of an implementation plan, with priority activities, including resource requirements, for the establishment of a severe weather forecasting research support system (refer to Annex 10a for the implementation plan; Annex 10b for the resource requirements).

5. EWS Program Implementation Arrangements

The meeting recommended a phased program implementation, to begin with the establishment of the regional real-time seismic and sea level monitoring network, and a data processing center with numerical modeling capabilities and other UNESCO/IOC requirements for a regional tsunami watch provider, such as multi-hazard, multi-purpose center on 24/7 basis; contingency plans, secure infrastructure, and uninterruptible power for continuous operation; capacity to back-up another regional center and continue the other center's full capabilities; and a communications infrastructure for effective information dissemination to all recipients. Funding support was recommended to be sought from the UN Regional Tsunami Trust Fund. The budget estimate for phase 1 implementation is presented in Annex 11.

Institutional arrangement for program implementation was also detailed as follows (also refer to Annex 12):

- 1) Regional Steering Committee consisting of heads of early warning national focal points, including five international experts (with no voting rights), to provide policy and technical guidance in the implementation of regional level projects and activities. A Chairperson and two Vice-chairpersons are elected from among the national focal points, for a term of two years (effective 14 July 2006). ADPC is a Member Secretary. The Committee shall meet at least once a year.
- 2) National Steering Committees consisting of forecast information providers and intermediary user agencies and stakeholder institutions, with the early warning national focal point as Chair, to implement, monitor and evaluate national level activities; identify and prioritize further needs and prepare technical proposals for funding; guide and evaluate sub-national and local activities; and disseminate disaster risk information to and get feedback from communities;
- 3) Sub-national and Local Steering Committees consisting of early warning stakeholder institutions at sub-national and local levels to implement, monitor and evaluate sub-national and local level activities; and identify further needs and recommend to the national steering committee

Participants to the meeting elected Mr. Tun Lwin, Director-General, Department of Meteorology and Hydrology, Myanmar as Regional Steering Committee Chair, and Mr. G.H.P Dharmaratna, Director-General, Department of Meteorology, Sri Lanka, and Ms. Sumalee Prachuab, Director, Seismological Bureau, Thai Meteorological Department, as Vice-Chairs.

6. Meeting Recommendations and Closing

Key agreements and recommendations of the meeting were documented in a resolution (refer to Annex 13) that was signed by the designated national focal points in the presence of Mr. Sihasak Phuangketkeow, Deputy Permanent Secretary, Ministry of Foreign Affairs, Thailand. Bangladesh, Cambodia, China, Lao PDR, Maldives, Myanmar, Philippines, Sri Lanka, Thailand, and Vietnam:

- Agreed that ADPC, as facilitator of the regional early warning system, shall serve as a regional tsunami watch provider to participating countries in the Indian Ocean and Southeast Asia
- Endorsed for funding and implementation, the regional program on end-to-end multi-hazard early warning
- Recommended the phased implementation of program activities
- Recommended to seek funding support from the UN Regional Tsunami Trust Fund
- Emphasized the need for a program approach that integrates the technical and societal aspects of warning
- Emphasized the urgency of establishing an operational tsunami warning system in the region
- Targetted 1 July 2007 to have the initial regional tsunami warning system in place
- Recommended the establishment of a regional severe weather research support system as a sustainability strategy for establishing the tsunami warning system
- Established the program implementation arrangement as consisting of a Regional Steering Committee, National Steering Committee, and Sub-national/ Local Steering Committees

The meeting was closed by Mr. Sihasak Phuangketkeow, Deputy Permanent Secretary, Ministry of Foreign Affairs, Thailand.

Annexes to the Summary Report will be provided on request. E-mail lolita@adpc.net