



**Second Experts' Symposium on
Multi-Hazard Early Warning Systems (MHEWS – II)
with focus on the Role of National Meteorological and Hydrological
Services**

5 - 7 May 2009

***Météo-France Conferences International Centre
42 avenue Gaspard Coriolis, Toulouse, France***

**Standard Outline for Documentation of Good Practices in Multi-Hazard
Early Warning Systems, with a Focus on the Role of National
Meteorological and Hydrological Services**

This outline was used for documentation of the following Early Warning Systems

- The French Vigilance System
- Bangladesh Cyclone Preparedness Programme
- Shanghai Multi-Hazard Early Warning and Emergency Preparedness Programme
- Early Warning System For Tropical Cyclones in the Republic of Cuba

Background

Early warning systems have received significant international attention over the past few years, including (i) three International Early Warning Conferences hosted by Germany (1998, 2003, 2006)¹, (ii) recognition of early warning systems as an integral part of disaster risk reduction within the G8 Summit (2005) and UN General Assembly Resolutions, (iii) Report of the Global Survey of Early Warning Systems (2006)², (iv) First Experts' Symposium (May 2006) on Multi-Hazard Early Warning Systems (MHEWS-I), convened by WMO and co-sponsored by six other international agencies. The Second International Conference on Early Warnings specified the four operational components of early warning systems, including:

- (i) Observation, detection, monitoring, analysis, forecasting and development of hazard warning messages;
- (ii) Assessing potential risks and integrating risk information into warning messages;
- (iii) Dissemination of timely, reliable and understandable warning messages to authorities and public at-risk;
- (iv) Community-based emergency planning, preparedness and training programmes focused on eliciting an effective response to warnings to reduce potential impact on lives and livelihoods.

Based on these components, MHEWS-I identified criteria for "good practices" in early warning systems (EWS), further discussed major gaps within these components, and identified a number of such good practices in early warning systems.³

MHEWS-I further stressed that,

- Development and sustainability of EWS would require political commitment and dedicated investments,
- EWS should be an integral part of national and local disaster risk management plans and budgets;
- Enforceable legislation must define explicitly roles and responsibilities of various authorities and agencies,
- Implementation of EWS requires a clear concept of operations⁴ enabling effective coordination among agencies across the components of EWS, at national and local levels, and

¹ The three International Early Warning Conferences are as follows:

1) First International Conference on Early Warning (EWC-I) in 1998 (<http://www.geomuseum.com/ewc98/>)

2) Second International Conference on Early Warning (EWC II) in 2003 (<http://www.ewc2.org/pg000001.htm>)

3) Third International Conference on Early Warning (EWC II) in 2006 (<http://www.ewc3.org/>)

² In 2005, following the tragic Indian Ocean tsunami, Former UN Secretary General, Kofi Annan requested a global early warning survey. This survey was coordinated by ISDR Secretariat through its Platform for the Promotion of Early Warning Systems, support by a multi-agency task team, co-chaired by WMO and OCHA. The report of this survey can be accessed at:

[http://www.reliefweb.int/rw/lib.nsf/db900sid/AMMF-6VKH6Z/\\$file/UNISDR-Sep2006.pdf?openelement](http://www.reliefweb.int/rw/lib.nsf/db900sid/AMMF-6VKH6Z/$file/UNISDR-Sep2006.pdf?openelement)

³ MHEWS-I's co-sponsors included: WMO, IFRC, OCHA, UNDP, UNESCO, the World Bank and the ISDR Secretariat. This symposium brought together nearly 100 experts from networks of 20 international, regional and national agencies. MHEWS-I identified i) Shanghai Emergency Preparedness Programme; ii) France "Vigilance" System; iii) Cuba tropical cyclone early warning system; and iv) Bangladesh Cyclone Preparedness Programme as examples of "good practices". The Meeting noted that this is not a comprehensive list as there are such practices that could be identified and added to this list. Further details about the outcomes of MHEWS-I are available from http://www.wmo.int/pages/prog/drr/events/ews_symposium_2006.

⁴ Concept of Operations (CONOPS) documents can be developed in many different ways, but usually share the same properties. In general, a CONOPS will include the following:

- Statement of the goals and objectives of the system
- Strategies, tactics, policies, and constraints affecting the system
- Organizations, activities, and interactions among participants and stakeholders
- Clear statement of responsibilities and authorities delegated
- Specific operational processes for fielding the system
- Processes for initiating, developing, maintaining, and retiring the system

A CONOPS should relate a narrative of the process to be followed in implementing the system. It should define the roles of the stakeholders involved throughout the process. Ideally it offers clear methodology to realize the goals and objectives for the system, while not intending to be an implementation or transition plan itself. (Ref: Carnegie Mellon University 2008)

- Systematic feedback and evaluation at all levels are needed, to ensure improvements of the system over time.

Following the MHEWS-I, WMO Congress (XV) and Executive Councils (LVIII, LX) requested that WMO in collaboration with other key partners initiates EWS projects, particularly demonstrating National Meteorological and Hydrological Services' (NMHS) institutional cooperation and coordination with disaster risk management agencies and other stakeholders. Furthermore, these projects should aim to determine whether economies and synergies could be achieved through a multi-hazard approach. In this regard,

1. WMO in collaboration with the NMHSs and their partner ministries and agencies has initiated multi-hazard EWS projects in China (Shanghai) and France. In addition, WMO is facilitating the documentation of these good practices as well as those in Cuba and Bangladesh, with specific focus on the role of NMHS in EWS, including their operational coordination and cooperation with other technical and disaster risk management agencies at national to local levels.
2. WMO is working with ISDR System partners is facilitating national early warning system projects aimed at strengthening operational coordination and cooperation among the NMHSs, disaster risk management agencies and other key stakeholders, such as the Red Cross and Red Crescent Societies (RCRCs). These projects would address requirements of disaster risk management agencies for warnings and information, development of the EWS concept of operations and a feedback mechanism for improving the coordination and operations among the NMHS and their stakeholders. The first set of such pilots are being initiated in Central America.

The ability to scale up these capacities will require effective sharing of experiences and lessons learned and provision of guidelines to support capacity development overtime. In this regard, WMO is convening the Second Experts' Symposium on Multi-Hazard Early Warning Systems with focus on the Role of National Hydrometeorological Services (MHEWS-II), to be hosted by Météo-France, in Toulouse, France on May 5-7, 2008. MHEWS-II will bring together experts from NMHSs, disaster risk management authorities, RCRCs and other international and regional agencies, with the goals to:

- Review and synthesize lessons learned from the documented "good practices", focusing on specific roles of NMHS and how they support disaster risk management agencies and other stakeholders within the EWS operational framework;
- Review and provide expert input into the draft guidelines on the "Role of NMHS in Multi-Hazard Early Warning Systems, with Focus on Institutional Coordination and Cooperation" developed on the basis of synthesis of good practices in EWS;
- Provide recommendations to improve coordination and collaboration among agencies responsible for different aspects of early warning systems (national to local levels) for hydro-meteorological and climate-related hazards.

In planning for this symposium, WMO will be inviting NMHSs and their partner agencies in France, China (Shanghai), Bangladesh and Cuba to document their respective good practices and will facilitate the process through providing expert consultants to assist with the documentation of these practices.

Guidelines for “Documentation of Good Practices in the in Multi-Hazard Early Warning Systems, with a Focus on the Role of National Meteorological and Hydrological Services”

To facilitate documentation of your experiences in EWS, the following templates have been attached. Specifically:

1. Standard template has been attached in Annex I providing an outline for the documentation report to enable comparisons between the national early warning systems, where possible.
2. A list of issues to be covered under each item of the outline is provided in Annex II, to guide the information collection process for the documentation.

During the documentation process:

1. Please coordinate with your national and municipal partners to collect information relevant to the issues outlined in Annex II.
2. It is desirable that the report not exceed 30 pages (excluding figures and annexes)
3. WMO Secretariat will facilitate a consultant to assist you with compilation of information and drafting the report.
4. Provide any supporting documentation (as annexes) that facilitates understanding of the national EWS and the contribution the NMHS plays.
5. The report should be provided in English. If you have difficulties with translation or development of the report in English, please inform the WMO Secretariat regarding translation issues.
6. Kindly provide your report to the WMO Secretariat no later than February 28th, 2009 to allow for final preparation and submission for review by participating experts.
7. If you wish assistance from the consultant for drafting the report, we would appreciate it if you could facilitate information collection from your Service, partners and other key stakeholders and provide this information to the designated consultant by February 15th, 2009.
8. It would be helpful if you can designate a focal point within your Service with whom we can follow-up to address these issues.
9. If you have any questions please contact

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10. Dr Maryam Golnaraghi will contact you in early January 2009 regarding the contact information of the consultant who will be assisting you with the documentation process.

Documentation Template for Role of NMHS in Multi-Hazard Early Warning Systems, with Focus on Institutional Coordination and Cooperation

- 1 Executive Summary**
- 2 Overview of Early Warning Systems (EWS) and the role of National Meteorological and Hydrological Services (NMHS)**
 - 2.1 Background in the establishment of EWS in your country**
 - 2.2 Governance and Institutional Arrangements (national to local levels)**
 - 2.2.1 Policy, institutional and legal frameworks to support emergency planning and response
 - 2.2.2 National to local emergency planning and related linkages to EWS
 - 2.2.3 Organizational structure for implementing the plans
 - 2.2.4 Institutional capacities and concept of operations (coordination and operational collaboration)
 - 2.2.5 Financial and budgetary aspects
 - 2.3 Utilization of risk information in emergency planning and warnings**
 - 2.3.1 Organizational responsibilities and arrangements for the development of risk information
 - 2.3.2 Hazard assessment, quantification and mapping (national to local)
 - 2.3.3 Assessment of vulnerabilities and exposure (national to local)
 - 2.3.4 Storage and accessibility of disaster and national hazard risk information
 - 2.3.5 Development and utilization of hazard/risk information to support emergency planning and warnings
 - 2.4 Hazard Monitoring, forecasting, and mandates for warning development**
 - 2.4.1 Organizational responsibilities for monitoring, forecasting and development of hazard warnings
 - 2.4.2 Organizational collaboration and coordination for development of hazard warnings
 - 2.5 Development of understandable, authoritative, recognizable and timely warnings**
 - 2.5.1 Warning message development cycle
 - 2.5.2 Warning message improvement cycle
 - 2.6 Warning dissemination mechanisms**
 - 2.7 Emergency preparedness and response activities (national to local)**
 - 2.7.1 Disaster preparedness and response planning and emergency response activation
 - 2.7.2 Community response capacities
 - 2.7.3 Public awareness and education
 - 2.8 Improvement of overall operational framework of EWS**
- 3 Examples of previous events where the operational EWS has led to improvements in emergency preparedness and prevention**
- 4 Overall lessons learned and future steps for improving NMHS contribution in EWS particularly focusing on institutional coordination and cooperation**

Documentation Template with Issues to Address for the Role of NMHS in Multi-Hazard Early Warning Systems, with Focus on Institutional Coordination and Cooperation

Note: For each of the outline topics below please document your EWS system by addressing each of the sub-topic points that apply to your system (blue font) with particular focus on the specific roles of NMHS (red font) and how they can best support disaster risk management agencies and other stakeholders within the EWS operational framework.

1 Executive Summary

2 Overview of Early Warning Systems (EWS) and the role of National Meteorological and Hydrological Services (NMHS)

2.1 Background in the establishment of EWS in your country

2.2 Governance and Institutional Arrangements (national to local levels)

2.2.1 Policy, institutional and legal frameworks to support emergency planning and response

Describe your countries institutional, legislation and legal frameworks, coordination platform and mechanisms for emergency preparedness and response planning, particularly pertaining responsibilities, establishment and enforcement of mandates, procedures, and protocols during an emergency situation at local to national levels. Also, address how EWS is reflected in the emergency planning, policies and legislation, and whether there are any specific policies and legislation on EWS.

Describe how the NMHS is reflected in the countries legislation and legal frameworks.

2.2.2 National to local emergency planning and related linkages to EWS

Describe the national to local emergency preparedness and planning, procedures, and protocols at national to local levels and map how the early Warnings are integrated operationally in these planning at different levels.

Describe how the NMHS is involved in the EWS planning process and identify the roles and activities that it plays.

2.2.3 Organizational structure for implementing the plans

Map the EWS organizational structure at national, provincial to local levels, identifying ministries, disaster risk management agencies and authorities, other technical agencies, media, NGOs, at national to local levels, etc. that are mandated to support this process and their roles and responsibilities at different stages of the operational EWS.

Please provide organizational diagrams (as annexes) detailing the institutional and decision-making structure of the EWS in your country. Additionally, please provide a EWS decision tree chart detailing who makes what decisions and when and where.

Please clearly identify in the organizational diagram, what are the interfaces of the NMHS with other agencies and stakeholders, and what types of services and expertise the NMHS provide to them.

2.2.4 Institutional capacities and concept of operations (coordination and operational collaboration)

Identify the working relationships between each of the stakeholders you stated in item 2.2.3, and whether these working relationships are formalized by mandate of legislation, Memorandum of Understanding (MOU), or other form of agreement.

If your country has a Concept of Operations (CONOPS) and specific operational procedures for guiding your EWS operations, and coordination process among the agencies, please provide a brief description of the process behind its development and structure. If your EWS does not have a CONOPS or similar document, what process is behind the operational EWS, how is it implemented?

Describe how the organizational structure of the EWS is reviewed and whether it is reviewed regularly. Describe the process for improving the system to ensure that the all EWS stakeholder capacities are best utilized.

What role does the NMHS play in CONOPS development and implementation?

2.2.5 Financial and budgetary aspects

Identify the government funding mechanisms (national to local) utilized for the development, maintenance, sustainability and improvement of the EWS and emergency preparedness activities. Please describe how these funding mechanisms have been institutionalized (e.g., designated budget line within the ministries, institutional budgets) and provide specific examples.

Describe which one of the mechanisms you listed above is funding the NMHS role in EWS. If none of the mechanisms are funding the NMHSs role in EWS please state how the NMHS receives funding for its EWS support activities.

2.3 Utilization of risk information in emergency planning and warnings

2.3.1 Organizational responsibilities and arrangements for the development of risk information

Identify key government agencies (e.g. agencies responsible for economic data, demographic data, land use planning, social data, etc.) involved in hazard and vulnerability assessments along with their roles and responsibilities.

Identify legislation or policies mandating the preparation of hazard and vulnerability maps for communities and whether they cover all communities at risk. Describe if and how hazard and risk maps are used in the emergency planning and response operations.

Identify and describe any national standards for the systematic collection, sharing and assessment of hazard and vulnerability data. Additionally, describe the review process that evaluates processes, methods, capacities related to risk knowledge to identify gaps and needs. Describe any review and feedback processes that are in place to identify weaknesses in risk assessment and ensuring corrective actions are taken.

Has the interaction of vulnerabilities with hazards been assessed to determine the risks faced by each region or community? If yes, how has this been accomplished?

Identify and describe the role the NMHS plays in the areas, particularly pertaining to provision of hazard information, participation in risk assessment projects and activities.

2.3.2 Hazard assessment, quantification and mapping (national to local)

Identify the major hazards (please see the hazard list attached in Annex III), in terms of loss of life and property, that affect your country and provide information on their frequency of occurrence, location and level of impacts in your country. Please describe (through examples) if these risks have increased or decreased overtime, due to human-related activities.

Identify and describe 2or 3 major disaster events that have occurred in the past 50 years that have caused serious loss of life or damage to livelihoods in your country. Please describe in what ways these incidents have led to improvements in your countries EWS and emergency preparedness.

How have communities and different stakeholders (e.g., industry, different government ministries, etc) been consulted to ensure risk information is comprehensive, and is this information provided at local and national levels?

Identify and describe the role the NMHS plays in the hazard assessment process.

2.3.3 Assessment of vulnerabilities and exposure (national to local)

Describe how community vulnerability assessments are conducted and for which natural hazards. Describe historical data sources and potential future hazard event scenarios considered in your countries vulnerability assessments.

Identify vulnerabilities which have been mapped (e.g. people or communities along coastlines identified and mapped) and what agency or agencies are mandated/tasked to produce these maps. Please describe how factors such as disability, access to infrastructure, gender, economic diversity and environmental sensitivities have been considered in your countries vulnerability assessments.

Describe the review and feedback process which identifies weaknesses in your vulnerability assessments and ensures corrective actions are taken.

Identify and describe the role the NMHS plays in the vulnerability assessment process.

2.3.4 Storage and accessibility of disaster and national hazard risk information

Please describe your hazard and vulnerability archival system by providing details on whether they are centralized. Please specify which agencies provide input on the various types of hazards.

Is hazard and vulnerability data made available to government, the public, and the international community when appropriate? If yes, what mechanisms are used to disseminate this information?

Describe the quality management framework process in place to keep data current. How often is this process reviewed?

Identify and describe any responsibilities the NMHS has with respect to storage and/or accessibility of disaster and national risk information.

2.3.5 Development and utilization of hazard/risk information to support emergency planning and warnings

Describe how hazard risk information is utilized in emergency planning.

Identify and describe the role the NMHS plays in the development and utilization of hazard risk information in emergency planning and warnings.

Please describe how the results of risk assessments been integrated into local risk management plans.

Does the NMHS incorporate risk information into its warning messages? If yes, what type of information is included? Is the inclusion of risk information into warning messages mandated by the government?

2.4 Hazard monitoring, forecasting, and mandates for warning development

2.4.1 Organizational responsibilities for monitoring, forecasting and development of hazard warnings

Map national agencies that have the mandate (are the authority in the country) for monitoring, forecasting and development of warnings for each of the high risk hazard Identified in item 2.3.2.

Specifically, please identify where the NMHS:

Type I hazards: Has sole mandate for the development of the warning for the hazard (specify the hazard);

Type II hazards - Has joint mandate for the development of the warning hazard for the hazard (specify the hazard)

Type III hazards - Provides information to other agencies that have the mandate for the development of the warning for the hazard (specify the hazard).

2.4.2 Organizational collaboration and coordination for monitoring, forecasting and development of hazard warnings

Identify and describe the coordination mechanism for interaction of the technical agencies having hazard warning mandate Types I, II, III.

Identify and describe the specific coordination mechanisms of the NMHS in the context of Types I, II, III, with other agencies.

Describe the operational observation monitoring, forecasting and warning systems of NMHS in your country and its operational engagement with other technical agencies. Please provide a clear map of end-to-end forecast and warning process, particularly how it engages other agencies.

2.5 Development of timely authoritative, recognizable, and understandable warnings.

2.5.1 Warning message development cycle

Describe the warning and response cycle from the time a threat is detected to the time the event is considered to be ended.

Describe who is responsible for the development of warnings for different hazards. Are warning alerts and messages tailored to the specific needs of those at risk (e.g. for diverse cultural, social, gender, linguistic and educational backgrounds)?

Have studies been undertaken regarding how the public accesses and interprets early warning messages? Have lessons learned been incorporated into message format and dissemination processes? If yes, how often are these studies completed and what mechanisms ensure that corrective actions are taken?

Are the warning readiness levels, linking level of potential risk to actions on the ground? How are these developed, based on what thresholds? How are the readiness levels communicated with the authorities, emergency response units and public at-risk

Identify existing coordination mechanisms for interactions of NMHS with their key stakeholders (disaster risk management agencies) for understanding of their needs and requirements for warning and other specialized forecast products and service (e.g., content, format, delivery, lead-time, communication of technical limitations.)

Discuss the mechanisms for establishment of on-going dialogue between NMHS and the disaster risk management agencies for the understanding of needs and requirements of these agencies as input into the product development of the NMHS.

Describe the different types of NMHS products (e.g., warning messages, specialized forecasts, advisory services, etc) that address stakeholder requirements and help obtain the response that is needed, to support improved community emergency preparedness and response.

Discuss the capacity building and training approaches that has improved product development, delivery, usability, evaluation and interpretation between the NMHS and the stakeholders to understand the technical limitations to maximize effective utilization of these products and services by the users and establish credibility and trust.

2.5.2 Warning message improvement cycle

Describe the review and warning improvement process used in your EWS at all levels.

Describe the role the NMHS plays in the warning review and improvement process.

2.6 Warning dissemination mechanisms

Describe the warning dissemination chain and whether it is enforced through government policy or legislation (e.g. message passed from government to emergency managers and communities etc).

Identify and describe the authoritative entities in your country responsible for the issuance of different warnings (e.g., national government to issue all hazard warnings or meteorological authorities to provide weather messages, health authorities to provide health warnings, etc) within your early warning system?

Describe the functions, roles and responsibilities of each EWS partner within the warning dissemination process as specified in legislation or government policy (e.g. national warning centre, NMHS, media, Red cross Red Crescent Societies, etc.)?

What mechanisms are used to widely disseminate hazard warnings to remote households and communities (e.g., trained and empowered volunteer network)? Please elaborate on the various mechanisms including volunteer networks within the EWS at community level and how they are empowered.

Identify and describe the role of your NMHS within the warning dissemination process.

Identify infrastructures and protocols for dissemination of warnings, specialized forecasts and other products developed by the NMHS to the stakeholders at national to local levels to ensure the data and information reach the target users (e.g., national operations centre, media, Red Cross communication systems)

Identify mechanisms for improving dissemination of warnings by the appropriate agencies and organizations to the national and local level stakeholders through formal and informal channels.

Identify the roles/mandates of the NMHS and other organizations involved in disaster management in warning dissemination (e.g., what can be sent out to the public and by whom; what can the NMHS send to a specific stakeholder).

2.7 Emergency preparedness and response activities (national to local)

2.7.1 Disaster preparedness and response planning and emergency response activation

Describe how the emergency preparedness and response plans are targeted to the individual needs of vulnerable communities, authorities and emergency respondents.

Describe how hazard and vulnerability maps are utilized in the development of emergency preparedness and response plans.

Discuss how emergency preparedness and response plans are developed and disseminated to at risk communities, and how often they are exercised/practiced and evaluated.

Describe and give examples, whether previous disaster events and responses been analysed, and the lessons learned incorporated into updates of disaster management plans.

Discuss how your EWS response plan anticipates the need for large and small scale evacuations. Have evacuation routes been established and exercised? If yes, how often are they exercised?

Identify and describe the role of your NMHS within disaster response planning. Are there joint training programmes between the forecasters and the disaster risk management agencies and emergency responders?

2.7.2 Community response capacities

Describe how the community's ability to respond effectively to early warnings been assessed in your country.

Describe how previous responses to disasters been documented, analysed and lessons learned incorporated into future capacity building strategies. Please provide any examples already documented.

Identify and describe how community-focused organizations are engaged to assist with community preparedness and training of the public.

Describe how community, volunteer education and training programmes have been developed and implemented and how often are such training activities conducted? (e.g., annually, monthly, etc)

Identify and describe the role played by your NMHS within communities' response activities, including advisory and other services.

2.7.3 Public awareness and education

Describe how your local communities are educated on how warnings will be disseminated, which sources are reliable, and how to respond to different types of hazards after an early warning message is received.

Describe how communities are trained to recognise simple hydro-meteorological and geophysical hazard signals to allow for a timely and immediate response.

Identify and describe how on-going public awareness and education programmes are built into school curricula from primary schools to university.

Identify and discuss how the mass media and alternative media (e.g. Internet) are utilized to improve public awareness.

Identify and describe any public awareness and education campaigns tailored to the specific hazards and the needs of each audience (e.g. children, emergency managers, and media).

Discuss how public awareness strategies and programmes are evaluated and updated.

Identify and describe the role your NMHS plays in public awareness and education activities.

2.8 Improvement of overall operational framework of the EWS

Identify and describe the feedback mechanisms within the operational EWS that are utilized during and after an event in order to improve products and services provided by the NMHS to disaster risk management agencies and other stakeholders.

3 Examples of previous events where the operational EWS has led to improvements in emergency preparedness and prevention

Identify two to three specific events where your operational EWS has saved lives and livelihoods and describe the operational experiences and lessons learned.

Identify and describe the role your NMHS played in these specific events and how it supported the early warning system and emergency response operations.

4 Overall lessons learned and future steps for improving NMHS contribution in EWS particularly focusing on institutional coordination and cooperation

Discuss how the lessons learned from previous events have led to improved NMHS contributions to the EWS particularly in the area of institutional coordination and cooperation.

Hazards list

- Tornado (rotational high winds)
- Flash flood
- Strong winds
- Hailstorm
- Thunderstorm or lightning
- Heavy snow
- Freezing rain
- Dense fog
- Tropical cyclone
- Storm surge
- Coastal flooding
- Heat wave: period of abnormally high temperatures
- Cold wave: period of abnormally low temperatures
- Drought
- River flooding
- Marine hazards (storm, sea ice, icebergs, etc.)
- Sandstorm
- Landslide or mudslide
- Airborne hazardous substances (i.e., nuclear, biological, chemical, etc.)
- Waterborne hazards (i.e., nuclear, biological, chemical, oil spills, etc.)
- Desert locust swarm
- Hydrometeorological hazards to aviation (i.e., turbulence, icing)
- Avalanche
- Forest or wild land fire
- Smoke, Dust or Haze
- Earthquakes
- Tsunami
- Volcanic events
- Others, please specify