



SYMPOSIUM ON MULTI-HAZARD EARLY WARNING SYSTEMS FOR INTEGRATED DISASTER RISK MANAGEMENT

23-24 May 2006, WMO Headquarters, Geneva, Switzerland

OUTCOME REPORT

1. Background

1.1. International Developments Related to Early Warning Systems

Over the last decade there has been an increasing political and public awareness on the importance of early warning systems as an integral part of disaster risk reduction, reflected in various international forums and publications. The [Johannesburg Plan of Implementation](#) of the World Summit on Sustainable Development, held in 2002, requests an integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery.

In 2003, the [Second International Conference on Early Warning](#) (EWC-II, 16-18 October 2003, Bonn, Germany) provided principles and guidelines for national policymakers and policy advisors, and has set the goals and priorities for an International Early Warning Programme (IEWP) to advance the development of early warning systems worldwide. Following EWC-II, a Platform for Promotion of Early Warning was created as an organisational capacity to assist with the implementation of IEWP.

During the Second World Conference on Disaster Reduction (Hyogo, Kobe, Japan, 18-22 January 2005), 168 countries adopted the [Hyogo Framework for Action 2005-2015 \(HFA\)](#) and identified five high priority areas of which the second stresses the need for “identifying, assessing and monitoring disaster risks and enhancing early warnings” as a critical component of disaster risk reduction. Furthermore, HFA stresses that disaster risk reduction must be addressed with an *integrated* and *multi-hazard* approach. Following the Second World Conference on Disaster Reduction, the G8 2005 Summit (Greeneagles, July 2005) recognised that early warning systems need to be multi-hazard and global, should cover as many hazards as possible, should build on existing systems at national and regional levels, and that agencies involved in early warning systems need to coordinate their activities. Furthermore, at the 2005 United Nations World Summit (New York, September 2005), Governments requested the establishment of worldwide early warning systems for all natural hazards, building on existing national and regional capacities to complement broader disaster preparedness and mitigation initiatives.

In 2006, the preliminary report of the [Global Survey of Early Warning Systems](#)¹ and the outcomes from the Third International Early Warning Conference (EWC-III, Bonn, Germany, 27-29 March 2006), have indicated that while there has been progress in different aspects of early warnings for different hazards, there still remain gaps and challenges to ensure that early warning systems are integrated in disaster risk reduction strategies, in all countries, particularly those with the least resources.

Initiatives worldwide have emerged towards development of national and regional strategic plans for disaster risk reduction. Furthermore, in 2006, an Integrated Work Programme (IWP) is being developed for the International Strategy for Disaster Reduction (ISDR) System for implementation of HFA, for consultations with governments and various organizations’ networks.

¹ Global Survey of Early Warning Systems: the Survey was requested by UN Secretary-General, in his report “In Larger Freedom: towards development, security and human rights for all,” A/59/2005, to the UN General Assembly on 21 March 2005. The preliminary report of this Survey was launched at the Third International Early Warning Conference, 27-29 March 2006, Bonn, Germany.

1.2. Components of Early Warning Systems

The Second International Early Warning Conference (EWC-II) identified four inter-related components that contribute to effective early warning systems: (i) risk knowledge, (ii) monitoring and warning service, (iii) dissemination and communication and (iv) response capability. According to the Global Survey of Early Warning Systems, "a weakness or failure in any one part could result in failure of the whole system."

In this regard, multidisciplinary partnerships, supported by governance and legislation, as well as organisational coordination and operational frameworks, are critical to address linkages needed along these four components.

1.3. Importance of Early Warning Systems as an Integral Part of Disaster Risk Reduction

A fundamental precondition for national disaster risk reduction is availability of well-functioning early warning systems that deliver accurate, reliable and understandable warnings, in a timely manner, to authorities, operational disaster managers and populations at risk, to enable early actions to reduce the impacts of potential disasters. Such systems must rely on commitment, collaboration, coordination, and information sharing among different stakeholders, at different levels (international, regional, national, local).

Over the years, many international and regional agencies and organisations of the United Nations (including specialised agencies) have worked with their Members on different aspects of early warning systems and disaster risk reduction, such as development of specialised technical capacities for monitoring, detecting, and forecasting for different natural hazards,² governance and organisational aspects, emergency preparedness and response planning, coordination of humanitarian response, community-based mechanisms for emergency preparedness/response and public education. Hazard-specific early warning systems have been developed, which in some cases have similarities and common crosscutting elements. There may be the potential that enhanced integration among different components of early warning systems could lead to strengthened capacities and economies of these systems at national to international levels, and enhanced capacities for disaster risk reduction. However, there is need for identification and prioritisation of actions that can lead to more effective and sustainable early warning systems.

1.4. Concept of Multi-Hazard Approach

The concept of *multi-hazard approach* to early warning systems has been referenced in various international events, and documents; however, there is still no clear understanding of this concept. It has been suggested that a multi-hazard approach could result in enhanced operational effectiveness, cost effectiveness and sustainability of early warning systems through building on and complementing existing early warning systems capacities, infrastructures and activities of various stakeholders and strengthening cooperation among agencies involved in different stages of early warning systems to ensure that countries have access to warnings for different hazards posing risk and can take appropriate actions. The feasibility and achievable benefits of multi-hazard approach need to be further explored and demonstrated practically and operationally, and the implications on governance, organisational and operational aspects need to be better understood.

² For example, WMO through a coordinated network of National Meteorological and Hydrological Services of its 187 Members, has developed the operational infrastructure for national warnings of weather-, water-, and climate-related hazards. UNESCO-IOC is coordinating the development of regional tsunami warning systems (TWS), through Intergovernmental Coordination Groups (ICG). Other international agencies, such as FAO and WHO, have developed global mechanisms for issuance of warnings for food security and health, respectively.

2. Symposium Goals

This Symposium brought together nearly 100 experts from various disciplines and organisations; working at national to international levels, to address two main goals:

1. To provide recommendations for an integrated approach to warning systems for enhanced disaster risk reduction, building on and linking existing capacities of different stakeholders, including identification of actions at national level for strengthening of early warning capabilities and what needs to be done at the regional and international levels to support strengthening of these national capacities.
2. To explore further the concept of “multi-hazard approach” to early warning systems, related potential economies and synergies that may result from such approach, and provide recommendations on additional studies and/or demonstrations that may be required to fully assess all aspects of such approach.

These recommendations would be used to stimulate partnerships and a more coordinated approach among stakeholders.

3. Structure of the Symposium

3.1. Participants

The Symposium was participated by nearly 100 experts from the national, regional and international networks of 20 international and regional agencies. Participants' list is included as Annex 1. The participants represented a wide range of expertise such as policy, development and financing, scientific and technical, humanitarian, educational and capacity-building, community-based planning related to the different aspects of early warning systems.

3.2. Sessions and Working Groups

The format of the two-day Symposium was designed to maximize opportunities for discussions. It was organized around five thematic areas related to early warning systems. The agenda of the Symposium is attached as Annex 2.

Thematic Area I, on “governance and organisational aspect” addressed crosscutting issues related to the development and sustainability of early warning systems as an integral part of disaster risk reduction. This Session, which was held at the beginning of the Symposium, was designed to lay out the framework for governance and organisational aspects, to be further explored during the other four thematic areas. Chaired by Ms Margareta Wahlström (OCHA),³ the session involved five presentations on topics including, i) International movement in disaster risk reduction and the strengthened International Strategy for Disaster Risk Reduction, ii) Hyogo Framework for Action 2005-2015 (HFA) and related governance and organizational aspects of Early Warning systems, iii) Interagency approach within the humanitarian community for utilisation of early warnings for early actions, iv) Example from Inter-American Development Bank of the critical role of financial institutions in providing incentives to link development and disaster risk reduction agendas with particular focus on early warning systems, and finally, v) An example of integrated multi-agency, multi-disciplinary approach to early warning systems for disaster risk management in the City of Shanghai.

The other four Thematic Areas involved panel discussions followed by working group discussions. The corresponding panel discussion and working group was co-chaired by two experts with complementary experiences, to consider different aspects and more comprehensive discussions.

Thematic Area II, on “Risk Identification and Linkages to Early Warnings,” was co-chaired by Dr Maxx Dilley (UNDP) and Dr Carlos Costa-Posada (Instituto de Hidrologia y Estudios Ambientales,

³ UN Assistant-Secretary-General for Humanitarian Affairs, and Deputy to Mr Jan Egeland, Leader of the ISDR System.

Colombia). During the panel discussions, five presentations were delivered, including, i) Emerging issues and new risk patterns, ii) Adding risk information to early warnings for decision-support, iii) Role of technical agencies responsible for hazard monitoring, observations, data and analysis, iv) Flood risk assessment for emergency preparedness and response, and finally, v) An example of how risk identification is linked to early warnings in Tana River. Issues related to risk identification and linkages to early warnings were further explored and discussed in the working group.

Thematic Area III, on "Technical and Operational Capacities for Observing, Detecting, Monitoring, Forecasting and Warnings of Hazards," was co-chaired by Mr Dieter Schiesl (WMO) and Ms Zoe Trohanis (The World Bank). During the panel discussions, six presentations were delivered, including, i) Status of existing observing networks for weather-, water-, and climate-related hazards: gaps and needs in current observing networks, ii) Modelling and forecasting technologies for hydro-meteorological events from the next hour to climate time frames, iii) Viability of a multi-hazard approach to operational regional centre in support of early warning systems, iv) Tsunami early warning system: viability of a multi-hazard approach for enhanced coastal risk management, v) Status of scientific and technical capacities in developing and least developed countries in support of early warning systems: needs, gaps and challenges.

Thematic Area IV, on "Communication and Dissemination Mechanisms," was co-chaired by Ms Tanja Cegnar (Slovenia Environmental Agency) and Mr Jean-Michel Rainer (WMO). The panel discussions were separated in two main streams. Three presentations presented telecommunication infrastructures and mechanisms, including, i) National challenges and needs for emergency communication, ii) Global communication needs for multi-hazard data and information at international and regional levels in support of national early warning systems, and iii) Satellite-based technologies for the national and regional dissemination of early warnings and related critical data and information. Three other presentations dealt with dissemination of effective warning messages to different target audiences, including, iv) Disseminating messages to vulnerable communities, v) Critical need for education, training and public outreach programmes between technical agencies, and their stakeholders, vi) Finally, an example about the experience of Cuba in disseminating warnings and triggering preventive actions was presented.

Thematic Area V, on "Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response," was co-chaired by Mr Ricardo Mena (OCHA) and Dr Horst Letz (IFRC). During the panel discussions, five presentations were delivered, including, i) Integrating early warnings in disaster preparedness and response plans, ii) The anticipated response: an essential element in end-to-end community-early warning systems. Three examples were presented, about iii) flood hazard warning and preparedness in Japan, iv) France's vigilance system for enhanced emergency preparedness and response, vi) UNDP's capacity building programme for disaster risk reduction and opportunities for capacity building in early warning systems.

A Synthesis Session at the end of the conference reviewed the outcomes and formulated recommendations from the discussions in each of the five thematic areas. The details of the discussions, including recommendations for follow up actions are presented at the end of each section.

4. Synthesis of Presentations, Discussions of the Working Groups

In his opening statement, Mr Michel Jarraud identified similarities among various hazard-specific early warning systems, and potentials for enhanced utilisation of existing systems. These potentials could be realised through strong partnerships, to build on common strengths, infrastructure and capacities of different agencies and stakeholders.⁴

Ms Margareta Wahlström delivered the keynote address, highlighting the broad consultative process through which, over many years, the concepts of what constitutes an effective early

⁴ Michel Jarraud: [Opening Statement](#)

warning system have been developed internationally. The adoption of the Hyogo Framework for Action (HFA) was presented as a major milestone of the strengthened ISDR System for reducing risks of disasters with wider participation of governments and a stronger focus on achieving specific agreed priorities.

The Symposium identified critical issues and challenges along the five sessions and four working groups, based on discussions and presentations of case studies from national to international levels.

4.1. Governance and Organisational Issues

The presentations and discussions focused on a number of critical issues, including:

- i) Integration of early warning systems in the national and regional disaster risk reduction plans supported by legislation and legal frameworks
- ii) Building and sustaining political commitment
- iii) Strengthened coordination and cooperation (e.g., multi-stakeholder approach) to the development of the national early warning and response plans for linking the multiple hazards and identification of different agencies' roles and responsibilities
- iv) Incentive mechanisms for collaboration and coordination across agencies, sectors and at different government levels (national to local).
- v) Organisational capacity development (facilities, staff, training) and cross-agency training
- vi) Cross-sectoral utilisation of early warning information
- vii) Financial challenges and implications for countries and donors in development and sustainability of early warning systems
- viii) Specific needs and challenges for developing and least developed countries

Specifically, the progress with the development of an international disaster risk reduction movement built upon a reformed and strengthened ISDR System, to ensure wider participation of governments and other stakeholders, was discussed. The objective of such a movement would be to reduce disaster risk, worldwide, focusing on national and communities. The meeting reviewed the latest developments with the reformed ISDR system (See Annex 3).⁵

The meeting reviewed the Hyogo Framework for Action as the guiding framework for implementation of disaster risk reduction, specifically focusing on those aspects related to early warning systems. It was discussed that HFA identified five high priority areas of which the second stresses the need for "identifying, assessing and monitoring disaster risks and enhancing early warnings" as a critical component of disaster risk reduction. Furthermore, HFA stresses that disaster risk reduction must be addressed with an *integrated* and *multi-hazard* approach. The HFA clearly identifies roles of states, international, regional and United Nations agencies in the area of early warning systems.

The preliminary results of the Global Survey of Early Warning Systems,⁶ confirmed that,

- There remain many gaps and shortcomings in early warning systems, especially in the developing countries;
- Dissemination, preparedness and response to early warnings are the weakest link worldwide;
- There are major constraints with respect to lack of political commitment and significant weaknesses with institutional capacities, and public participation.

⁵ Margareta Wahlström: [Building a Disaster Risk Reduction Movement](#)

⁶ The Global Early Warning Survey was coordinated by the ISDR Secretariat and guided by an Inter-Agency Task Force (IATF) Working Group, co-chaired by WMO and OCHA, was conducted, and the preliminary report was launched at the EWC-III.

Furthermore, shortcomings related to governance and organizational challenges for integration of early warning systems in disaster risk reduction were discussed. It was specifically noted that:

- There is still lack of political commitment to development of early warning systems;
- Early warnings are not yet well integrated into policy and not part of risk management approach;
- There is need to link technical aspects of early warnings to preparedness and response actions at the local level;
- National operational early warnings systems do not exist for some hazards;
- Early warning Systems remain underdeveloped in many developing countries, Least Developed Countries (LDC) and Small Island Developing States (SIDS), which are highly vulnerable to natural hazards.

In addition, it was noted that there is fragmented approach among scientific and technical, humanitarian and development communities' for coordination and action at the international, regional, national and local levels.

However, the Global Survey of Early Warning Systems confirmed that extensive capacities and early warning systems are available. These could be linked and built upon to expand and strengthen early warning capacities to all countries, particularly those with least resources. The Global Survey identified roles of different agencies related to different components of early warning systems, confirming that major gaps and challenges lie at the interfaces of organisations and disciplines. Thus, better integration of activities to link different components of early warning systems would be critical. It was discussed that the Global Survey provided a set of recommendations for addressing the key gaps and needs, however, the actual implementation of these recommendation requires further evaluation and prioritization.

During this session, the latest developments within the humanitarian reform towards more proactive approach to anticipate potential disasters that might require coordinated humanitarian response were discussed. Specifically, the work of the IASC sub-working group on preparedness and contingency planning was presented, demonstrating how early warning information from multiple agencies and multiple disciplines (brought together into the [HewsWeb](#) interface) could improve contingency planning, preparedness and early actions. It was also presented that the lack of response is not only due to a lack of early information or warnings, but also the need to identify what decisional mechanisms need to be in place to enable early actions. As an example, the meeting presented the action-oriented report updated by IASC members before each IASC meeting (3-4 times a year) from both objective and subjective information from country offices' of several agencies (UNICEF, WFP).

The meeting discussed that new technological developments provide tremendous opportunities for better development and sharing of information among different stakeholders, enabling more effective planning and response actions. Also, a need for more effective integration among different early warning systems (built upon the "system of systems" concept, not paradoxical with specialisation) with common standards and definitions, was recognized. The meeting discussed the humanitarian community needs to respond to various complex emergencies and that the division between natural and man-made disasters is a simplistic approach and not necessarily the most effective. It was discussed that solutions need to be developed based on complexity of the communities and their vulnerability rather than hazard-driven approach. Furthermore, it was stressed that early warning systems need to be both bottom-up and top-down, with adequate feedback mechanisms. With the humanitarian community reforms, there is tremendous opportunity for shifting from post disaster response to preparedness, contingency planning and anticipated response. However, this would require more effective linkages and partnerships between humanitarian as well as scientific and technical communities to ensure that the most reliable warning information supports the humanitarian planning and response to potential disasters.

The meeting discussed latest activities in the development community and the critical need for linking the development and disaster risk reduction policies with the goal to shift from reactive to preventive approaches to reduce long-term risks. Furthermore, the discussion addressed that development and sustainability of early warning systems as an integral part of disaster risk reduction should be considered as an investment in the countries, and promoted by the regional development banks through various financial instruments and technical assistance to improve preventive capacities such as early warning systems at the regional, national and local levels. It was discussed that the regional development banks could play a critical role in mainstreaming disaster risk reduction as part of the national development policies and provide financial and technical support for prevention, mitigation and preparedness activities including among others, development and sustainability of capacities for risk identification, forecasting and early warning systems. The new disaster risk management policy of Inter-American Development Bank (IDB) was presented as an example. This procedure mandates IDB to proactively include disaster risk management in the programming process, where the bank-country loan framework is discussed. IDB has established disaster prevention funding mechanisms to strengthen coordination between the financial institutions, the governments, and international, regional and national agencies.⁷ Following on this example, the meeting discussed that if all regional development banks follow similar policies, they could provide incentives to the governments for mainstreaming disaster risk reduction and early warning systems in the national and regional development policies.

Shanghai's experience was presented, highlighting the coordinated approach to early warning systems built upon a response plan for multi-hazard preparedness and response supported by legislative and organizational frameworks issued by Shanghai Municipal Government. This system involves effective coordination among various agencies through the City Emergency Response and Mitigation Committee and involves clear sub-plans for actions at different levels (prefecture and county level) and different agencies. This system involves a community-centred approach built on, i) multi-hazard information integration, ii) multi-agency preparedness, and iii) coordinated multi-phase response.⁸ The meeting discussed that such systems have to be developed within the social, organizational, and cultural context and there is no unique solution that can be replicated to all countries. To this end, the meeting discussed that Shanghai System along with several other systems in which early warning systems are well integrated in disaster risk reduction (e.g., Cuba, Bangladesh, France) should be systematically documented particularly related to the governance and organizational issues and coordination mechanisms.

4.2. Risk Identification and Linkages to Early Warnings

The presentations and discussions focused on a number of critical issues, including:

- i) Role of evidence on disaster risks in disaster risk reduction policies and decision-making;
- ii) Practical challenges of risk identification (assessment);
- iii) The importance of hydrometeorological hazards and the need for high-quality hazard observations;
- iv) Multi-stakeholder approach to risk identification. Importance of coordination and partnerships;
- v) Linkage between risk information and development of early warnings, incorporation of risk information in warning messages;
- vi) Specific needs and challenges for developing and least developed countries.

The meeting discussed how risk identification (combining hazards and vulnerability) contributes to setting priorities for risk management strategies, and evaluating policies and measures needed to achieve an appropriate balance between risk minimization and other development priorities. Ability to foresee risks and identification of risk factors can support the shift from post-disaster relief and reconstruction towards a balanced approach including preventive and preparedness measures.

⁷ [IDB Disaster Risk Management and Examples of Early Warning Projects](#)

⁸ Xu Tang: [Lessons Learned and Recommendations from Managing Disaster Risks in Mega-Cities](#)

Specifically, the Session highlighted several factors contributing to the changing patterns of risk, including: i) the trend towards concentration of human population in urban areas and in slums⁹; ii) environmental degradation; iii) potential changes in the frequency, strength and location of hazards due to climate variability and change; and iv) increased vulnerabilities due to conflicts, health epidemics and poverty.

The meeting also identified needs to develop capacities for quantifying and mapping the risks and their changing trends. This would require i) ongoing, systematic and consistent observations of natural hazards and availability and accessibility of related datasets; ii) socio-economic databases, and iii) multi-disciplinary risk modelling and scenario analysis methodologies and iv) multi-disciplinary partnerships and collaborations.¹⁰

During the Session, a number of examples were discussed, demonstrating benefits from various risk identification and warnings approaches in support of decision processes for sectoral risk management. Examples included i) an approach for utilisation of climate information and probabilistic climate forecasts (with several month lead-times) for anticipation of malaria outbreaks in Botswana and food security outlooks in Greater Horn of Africa¹¹; ii) multi-disciplinary methodologies for risk identification and warnings in support of contingency plans for food security in Kenya¹²; iii) flood risk modelling in support of emergency planning in Netherlands¹³. These case studies demonstrated the benefits of coordination and multi-disciplinary cooperation, combining various technical and sectoral information, for risk assessment in support of decision-making.

Finally, the critical role of operational agencies such as National Meteorological and Hydrological Services, responsible for observing, monitoring, detecting, forecasting and warning of hazards, was highlighted. It was noted that significant benefits could be realized through effective linkages of these services to agencies responsible for risk assessment and management, and development of tailored products, drawing on international expertise to support and enhance those when needed.¹⁴ The Session also gave evidence that a range of physical and socio-economic data and expertise can often be used for multiple purposes.

For specific cases of developing and least developed countries, a major challenge identified is to strengthen political commitment within legal frameworks, as many national agencies and public services do not consider provision of risk information to the population as part of their mandate, or don't have enough resources or access to data to provide this kind of information. Prioritisation of needs can enable to concentrate efforts on few major demand-driven products and get satisfactory results, generating incentives for further developments of products.

⁹ 31.6% of urban population live in slums. 50% of world's population is prospected to live in urban areas by 2010.

¹⁰ Pascal Peduzzi: [Emerging Issues and New risk Patterns, What is Needed for Identifying Risk](#)

¹¹ Steve Zebiak: [Adding Risk Information to Early Warnings for Decision-Support](#)

¹² Hussein Gadain: [Adding Risk Information to Early Warnings for Decision-Support](#)

¹³ Paolo Reggiani: [Flood Risk Assessment for Emergency Preparedness and Response](#)

¹⁴ David Green: [Role of Technical Agencies for Hazard Monitoring, Observations, Data and Analysis](#)

4.3. Technical and Operational Capacities for Observing, Detecting, Monitoring, Forecasting and Warnings of Hazards

The presentations and discussions focused on a number of critical issues, including:

- i) Taking stock - Which hazard-specific early warning systems are in existence? Who are the stakeholders and partners? What are their coordination mechanisms? Which are the major deficiencies, if any?
- ii) What are the implications of a multi-hazard approach for existing systems? Would they need to change, and if so, how?
- iii) Can we identify synergies and economies that may be achievable through a multi-hazard approach?
- iv) Which governance and organizational aspects are particular to multi-hazard early warning systems?
- v) Can we show that the basic infrastructure for observations and information exchange could be more efficiently used in a multi-hazard approach?
- vi) Are there multi-hazard multi-disciplinary potentials for development of hazard forecast and outputs (e.g. numerical weather prediction models, flood forecasting models, etc.)?
- vii) Is there a conceptual difference between regional and national multi-hazard approach?
- viii) What are the challenges and needs of developing and least-developed countries with respect to development and sustainability of technical capacities for multi-hazard early warning systems? What should be the priorities for strengthening their infrastructure for early warning systems? Can synergies and economies be achieved through enhanced collaboration at regional level? Does a multi-hazard approach open up new opportunities for developing countries and least developed countries?

The Session opened with an overview of the global observing networks. While the amount of observations being exchanged is significant, many inconsistencies remain with the coverage of land areas, gaps being above all in developing and least developed countries. Comments from the audience also indicated inconsistencies with the systematic observation of sea areas, with particular gaps in Southern hemisphere, and that new ship routes should be explored.

The presentations highlighted that while sustainability of systems is resource intensive, multi-use of observation networks and processing capacities, where practical, is an economic necessity: there are in many cases potentials to utilize systems beyond what they have been designed for. In this regards, a "multi-hazard" approach would imply placement of additional sensors on existing observing infrastructures.¹⁵

The first presentation demonstrated how available scientific and technical capacities, particularly with respect to forecasting and modelling, can support development of hazard warnings. The coordinated approach of The Observing System Research and Predictability Experiment (THORPEX) was presented. This initiative is pulling resources from various forecasting centres to enable best forecasting capacities, by enhancing quality and lead-time of forecasts. For example, in the case of the combination of climate forecasting models (probabilistic) with weather forecasting models, an inter-disciplinary approach and close collaboration among scientific and technical fields (meteorology, climatology, hydrology, oceanography) could facilitate development of models that benefits to each of them, and transform timely and accurate weather forecasts into specific and definite information in support of decisions.¹⁶

The Session then illustrated governments and technical agencies' need for clear procedural guidelines on how to implement and operate the early warning systems, from the actual experience of implementing the Indian Ocean Warning System (IOTWS). As an example, the presentation provided an outline of a "Concept of Operations" that is being produced by USA-NOAA for Indian

¹⁵ Alan Douglas: [Status of Existing Observing Networks](#)

¹⁶ David BurrIDGE: [Forecasting systems: WMO Atmospheric Research and Environment Programme](#)

Ocean Warning System (IOTWS), including a framework for tsunami warning services, defines regional/national responsibilities and operational framework of every agency involved. Various issues linked with the feasibility and implications of preparing of a multi-hazard "Concept of operations" were introduced.¹⁷

UNESCO-IOC presented the latest developments in the implementation of tsunami warning systems, recalling that there were no tsunami warning capacities except for Pacific prior to the tragic tsunami in the Indian Ocean in 2004. The presentation highlighted that the 23rd IOC Assembly (June 21-30, 2005) approved resolutions for the establishment of a global strategy and three regional Intergovernmental Coordination Groups on tsunami early warning systems. The issue of receiving data from various sensors and various networks was also addressed through a concrete example: while there are many types of seismic sensor around the world, only those of CTBTO can provide timely information for seismic early warning. Inter-operability of those networks is still a major challenge with respect to tsunami warning system under the coordination of IOC.¹⁸

For the specific issue of operating and developing products based on latest technologies in the developing countries and least developed countries, the meeting recommended that regional centres support the countries through advisories for development of their own warnings, and that resources be centralised in those centres for development of products for the use by all countries in the region.¹⁹

Finally, the Session stressed the potential of existing multi-disciplinary expert structures such as JCOMM, which brings oceanographic and meteorological experts together to address cross disciplinary issues, including early warning systems for oceanic.²⁰

¹⁷ Curtis Barrett: [Viability of a Multi Hazard Approach to a Regional Center in Support of Building an End-to-End Indian Ocean Tsunami Warning System](#)

¹⁸ Patricio Bernal: [IOC contributions to a Global Tsunami EWS and other Ocean Generated Hazards](#)

¹⁹ Filipe Lucio: [Status of Scientific and Technical Capabilities in Developing and Least Developed Countries \(LDCs\) in Support of EWS](#)

²⁰ Philippe Dandin: [A JCOMM Perspective: Enhanced Early Warning for Better Coastal or Marine Risk Management Thanks to a Multi-Stakeholder Approach](#)

4.4. Communication and Dissemination Mechanisms

A presentation of the challenges for communication and dissemination of warning messages introduced the Session²¹. Issues to be addressed included:

- i) Need for redundant, proven, operational telecommunication mechanisms at international and regional levels for exchange of critical data and information in support of early warnings for multi-hazards.
- ii) Needs for reliable, tailored warning messages for different categories of end-users (e.g. scientists, journalists, decision makers, general public) to communicate uncertainty, increase credibility, and link with decision supporting tools.
- iii) Need for alert mechanisms to get the early warning messages to local communities for all hazards posing risk to the communities. Need for alignment of these mechanisms with national needs, resources, and culture (e.g., ranging from utilisation of technologies to volunteers at national to local levels).
- iv) Need for collaboration of technical agencies responsible for development of hazard warnings with agencies involved in risk assessment and emergency response to develop understandable warning messages including information about risk.
- v) Need for single, authoritative source for warnings to avoid confusion? Who is responsible for disseminating warnings of which hazards. Centralized versus decentralized approach.
- vi) Role of community-based agencies, volunteers, media in dissemination of warnings to the public at risk? Critical importance of for ensuring credibility of the information and source of warning?
- vii) Need for cross-training between the technical agencies responsible for development of hazard warnings and agencies involved in dissemination of information and emergency preparedness and response authorities.
- viii) Economies and synergies that can be achieved through a multi-hazard approach to preparedness, training, communication and alert systems.

The Session addressed the critical importance of information and communication technologies (ICT) for emergency telecommunication in disaster mitigation. Regulatory frameworks for technology, industry, media, telecommunication, such as international treaties, use of open standards for enhanced inter-operability, licences, frequency management, interconnection agreements, were discussed. Networks for emergency telecommunications should be designed to integrate all kinds of (including future) technologies, and should enable both vertical (from a reliable source to communities) and horizontal (from citizen to citizen) communication.²²

The multi-hazard nature of some events or disasters was also addressed. As different hazards involve different time and spatial scales, the need for accommodation of these in the communication and dissemination mechanisms at the national, regional and international levels. In this regards, communication do involve pre-event, real-time and post-event warning and follow-up. The great potential of the Global Telecommunication System (GTS), which is expanding to the WMO Information System (WIS) was stressed for the effective, sustained, reliable, inter-operable, and cost-effective communication of warning information between countries.²³

The Session presented the experience of Cuba in early warning of hurricanes and related multi-hazard indirect impacts (strong wind, storm surge, torrential rains and tornadoes). The National Forecasting Service, the Media and the Civil Defence, in close partnership, to educate and prepare the public. When a hurricane threat is indicated in the probabilistic forecasts, warnings are disseminated through a number of mechanisms including TV and radio as the main communication tool, and information updates (every 6 hours or less) through regular warnings including many

²¹ Tanja Cegnar: [Communication and Dissemination Mechanisms, Introduction](#)

²² Cosmas Zavazava: [The Critical Role of Emergency Telecommunications in Disaster Mitigation](#)

²³ Fred Branski: [Global Communication Needs](#)

details about the risks and how to behave, with references to past events. The uncertainty about the track of hurricanes and their geographic coverage is symbolized with probabilistic cones.²⁴

The role of the many agencies involved in communication and dissemination of warning messages in Mozambique was also presented. The Red Cross and Red Crescent specifically contributes in the "last-mile to communities" dissemination process, with the involvement of volunteers at the community level when governments do not have enough capacities. The Mozambique Red Cross Society presented its actions for the dissemination of warning messages to the people at-risk (including elderly, disabled, pregnant women, and geographically isolated), mainly through radio and TV. Major gaps consist of coordination of decision-making powers, framework to define the need for warning, training of local media, translation of technical information into concrete advices, lack of alternatives when evacuation is required and cultural aspects (e.g. attachment to the land, belief in other signs).²⁵

A project initiated through the Hong Kong Meteorological Service illustrated how technical information provided by National Meteorological and Hydrological Services can be integrated into decision processes, through training and community outreach activities.²⁶

Finally, Worldspace France presented Anny Network products, a satellite radio network covering western Europe, Africa and Asia, enabling dissemination of authenticated warning messages (any digital object) for various hazards, to various types of generic or dedicated receivers.²⁷

4.5. Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response

The presentations and discussions focused on a number of critical issues, including:

- i) Needs for hazard, risk and early warning information for development of national to local emergency preparedness and response mechanisms;
- ii) Need for readiness level mechanisms (traffic light concept based on potential risk of emerging hazards). Need for simulation exercises and emergency drills for responding to warnings;
- iii) Major stakeholders. Importance of coordination, collaboration and partnerships;
- iv) Economies and synergies that can be achieved through a multi-hazard approach in the integration of risk knowledge and warnings for emergency preparedness and response;
- v) Specific needs and challenges for developing and least developed countries.

During this Session, five case studies illustrated how risk information and early warnings can be integrated in disaster preparedness and response plans.

The Red Cross Society of Mozambique presented a national assessment of the capacities pointing out some gaps related to involvement of scientists in the disaster management plans, use of local languages to disseminate the warnings, policies focusing on strategies for preparedness rather than on reaction and contingency plans, and public education (inclusion of disaster risk reduction in the school curricula). Major recommendations from this Mozambican experience were, i) to follow-up the implementation process of early warning systems (using a disaster management database) in order to measure its impact and get feedback from it, ii) to assign clear roles and responsibilities to each relevant entity, while strengthening their coordination and complementarities, iii) to make public education as a continuous and permanent process and iv) to train volunteers at the community-level to communicate about the risk with their counterparts using understandable language.²⁸

²⁴ JoseRubiera: [Experience of Cuba in Early Warnings](#)

²⁵ Eunice Mucache: [Disseminating Messages to Vulnerable Communities](#)

²⁶ Haleh Kootval: [Public Education, Outreach and User Interface](#)

²⁷ Pierre-Alexandre Genillon: [Anny Network for National and Regional Dissemination](#)

²⁸ Eunice Mucache: [Integrating Early Warning into Disaster Preparedness and Response Plans](#)

Meteo-France presented the France Vigilance System and feedbacks and lessons learned from the implementation of the heat/health and flood warning and preparedness mechanisms, targeting ministries, local authorities, civil defence and the public. Both capacities are multi-disciplinary, and involve the National Meteorological Services together with respectively the National Institute of Health Survey and the National Hydrological Services, working together to define distributed thresholds.²⁹

The Session also exchanged recommendations about how risk knowledge and early warning systems should trigger "anticipated response".³⁰

The United Nations Disaster Management Training Programme was presented. This Programme recognized the critical importance of capacity development in the field of early warning systems. Whereas the main gaps identified by the Global Survey of Early Warning Systems are related to dissemination and preparedness to react, capacity development can develop local ownership and enabling environments for cross-cutting cooperation between agencies and the people at-risk. Whereas the Hyogo Framework for Action provides a common framework for disaster reduction, there is need for a framework for capacity development, to help technical assistance becoming more demand-driven than supply-driven. This Programme is a way for donor countries to promote the implementation of early warning systems as part of emergency preparedness, planning and response in all countries.³¹

Finally, a last example introduced experiences handled in Japan for flood hazard warning and preparedness. Whereas discharge rates are high in watersheds, and population is concentrated in alluvial plains and highly vulnerable, indigenous technologies and adaptive lifestyles, together with recent technologies (early warning using radar-based forecasts, flood diversion channels and flood retarding basins, dissemination of warning information via internet, TV and cell phones, real-time monitoring of meteo-hydrological conditions during extreme events) have enabled Japan to reduce significantly flood-related losses. A monitoring of cost-benefits of mitigation and preparedness measures since 1947 in Japan was presented. Final recommendations for this experience include i) clear definition and regulation of responsibilities of every national to local body by the National law, ii) passing of lessons learned down to future generations, as disasters occur when people forget them, and iii) combining traditional knowledge with latest technologies adapted to the local circumstances.³²

²⁹ Françoise Bénichou: [Lessons Learned from France Vigilance System](#)

³⁰ Juan Carlos Villagrán de León: [Anticipated Response in End-to-End Community-Early Warning Systems](#)

³¹ Joanne Burke: [Lessons Learned through UNDP Disaster Management Training Programme](#)

³² Kazuhiko Fukami, [A discussion on flood hazard warning](#)

5. Recommendations Emerging from Sessions and Working Groups

5.1. Recommendations Related to Governance and Organisational Issues

1. Early warning systems should be considered as an integral part of national and regional disaster risk management plans and strategies, supported by clear political ownership, organisational structures, operational capacities, and legislation defining roles and responsibilities of different agencies;
2. Demonstrating costs and benefits of early warning systems compared with costs related to alternative actions could provide incentive for investments in such systems;
3. Enhancement and sustainability of those systems could be ensured through adequate funding mechanisms attached to conditionality about data sharing policies;
4. Regulatory frameworks, international treaties, open standards (licences, frequency management, interconnection agreements) for enhanced inter-operability of various technologies (including future) for horizontal and vertical communication need to be further developed or reinforced;
5. Implementation and availability of early warning systems for different hazards and locations should be monitored (using disaster management databases); This monitoring could be linked with annual assessment review that would enable recognition of lessons learned and feedbacks;
6. There is need for standards for early warning systems, harmonizing definitions of warnings, use of scales and colour codes linking levels of warning to action, while taking into account local resiliencies and vulnerabilities;
7. Decisional mechanisms and frameworks (e.g. response plans) need to be in place so that warnings and outlooks lead to "early actions" and anticipated response;
8. Cross-sectoral utilisation of early warning information should be promoted, building upon the "system of systems" concept, not paradoxical with specialisation. Common standards and definitions still need to be developed;
9. In developing countries, priorities should be clearly identified and efforts concentrated on demand-driven products.

5.2. Recommendations Related to Risk Identification and Linkages to Early Warnings

1. Incorporating risk information in warning messages is critical to better support decision processes leading to action;
2. Risk information (combining hazards and vulnerability) should be expressed in terms of potential impacts and associated probability. Information about risk factors could enable setting priorities for risk management strategies (balance between risk minimization and other development priorities);
3. Hazards probability (intensity & frequency) needs to be taken into account together with the complexity of the communities and their vulnerability (bottom-up and top-down);
4. Hazards and vulnerability should be considered as dynamic, with local trends and patterns;
5. Community skills, effectiveness monitoring, feedbacks and lessons learned should be used to refine the distributed thresholds according to evolving patterns of vulnerability and hazard risks and identify customized solutions;
6. Decisions based on risk identification should be tracked, in terms of outcomes and avoided losses, in order to raise awareness among financial decision makers (e.g. ministry of finance and international finance agencies) about the importance of incorporating information about risks of losses into development of loan projects, and to ensure risk information supports decision processes leading to action;
7. Data related to risk assessment should be accessible, almost in real time;
8. Forward looking risk assessment should be considered in context of the changing patterns of risks associated with climate change and vulnerabilities.

5.3. Recommendations Related to Technical and Operational Capacities for Observing, Detecting, Monitoring, Forecasting and Warnings of Hazards

1. Earth observation systems need to be further developed and strengthened in developing countries, and in the oceans;
2. Need for identification of requirements of users (e.g., agencies involved in disaster risk reduction and planning) for tailored meteorological, hydrological and climate data and warning products;
3. Capacities from regional specialised centres should be improved for development of products based on latest technologies to support developing countries and least developed countries, through provision of advisories for development of their own warnings;
4. Maintaining and sharing information on status of observing networks, their purpose, the planned needs for investments, opportunities for enlarging their utilisation to other purposes, could help in concentration and raising of resources;
5. Users and the private sector can be involved in leveraging resources for observing networks;
6. Funding mechanisms for observing networks could be attached to conditions related to data exchange policies;
7. Within observing networks, opportunities for multi-use of observing systems (including beyond their initial purpose) need to be systematically identified.

5.4. Recommendations Related to Communication and Dissemination Mechanisms

1. Operational telecommunication mechanisms at international and regional levels for exchange of critical data and information in support of early warnings need to be redundant and regularly quality assured;
2. Traditional methods could be combined with latest technologies to reach the most vulnerable communities;
3. Cross-training between the technical agencies responsible for development of hazard warnings and agencies involved in dissemination of information to public (e.g. national warning centre, media) can enhance both dissemination mechanisms and warning messages.
4. Public education, simulation exercises and emergency drills need to be used to maintain an adequate level of readiness and awareness, even for events with low periodicity;
5. Media should be empowered to not only transmit the warnings but also educate the public;
6. The source of the warning needs to be credible, authoritative and identified as part of the warning messages to ensure the legitimacy of warnings;
7. Warning-specific communication tools can be used for other purposes between crisis in order to generate and maintain public awareness;
8. Dissemination mechanisms within countries have to be sustainable, reliable and redundant and sustainable within the resources, (e.g., volunteers at the community-level can assist in the dissemination; SMS/cell broadcasting systems, police outposts, hand operated sirens, etc.);
9. Parallel development of inter-operable communication and dissemination mechanisms (tiered-based systems) at the national, regional and international levels can enable to cope with different hazards involving different time and spatial scales.

5.5. Recommendations Related to Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response

1. Warning and awareness levels could be harmonized at the international level according to risk-based thresholds that take into account local vulnerabilities, cultural differences;
2. Clear emergency preparedness and response plans should be developed at all levels and regularly updated, linking warning levels to actions at relevant levels;
3. Joint training between agencies responsible for developments and issuance of warnings and emergency operators and response staff could enhance development of warnings and response;
4. Awareness raising and educational programmes targeted at public need to be strengthened and developed;
5. Socio-cultural aspect of the community (including reaction time) should be kept into consideration;
6. NGOs and Ministries can be involved together;
7. Major gaps can be addressed through regional cooperation.

7. Overall recommendations and follow-up actions

The Symposium stressed the importance of partnerships, supported by governance and legislation, as well as organisational coordination and operational frameworks, to address linkages needed along the four components of early warning systems and ensure warnings trigger appropriate response from the relevant authorities, stakeholders, and communities at-risk. In this regard, the meeting recommended to share knowledge and experience from institutionalised early warning systems in some countries.

The Meeting proposed that case studies where early warning systems are established with a strong institutional basis be documented and demonstrated, with a modular approach. Modules would include:

- a) Legal, organisational and operational frameworks for coordination and collaborations from international to local levels among various stakeholders involved in development of and response to early warnings;
- b) Understanding of the utilisation of resources (cost-benefit) and capacities, for delivery of products and services to support early detection and warnings of hazards; assessment of the added value of coordination and collaborations;
- c) Understanding of the concept of multi-hazard approach to early warning systems, and analysis of its viability, applications and benefits that may be achieved through such approach.

The following elements were identified as criteria for selection of good practices:

- i) Political commitment to incorporation of early warning systems in the disaster risk reduction strategies and development of organizational capacities;
- ii) Disaster risk reduction plans and legislations, defining explicitly the roles and responsibilities of various stakeholders;
- iii) Coordination mechanism among agencies at different levels and in different stages of early warning systems;
- iv) Development of authoritative, understandable warnings, combining information about hazards, risks and recommendations for response, supported by reliable dissemination mechanisms;
- v) Integration of warning information in emergency preparedness and response plans at local to national levels;
- vi) Early warning systems are developed within the context of national and local resources and culture;
- vii) Community-based emergency preparedness and training programmes;
- viii) Feedback mechanisms to improve the system at all levels;
- ix) Sustainability, interoperability, and reliability of the system.

Examples of good practices matching the above-mentioned criteria were discussed including:

- i) Shanghai Emergency Preparedness Programme;
- ii) France "Vigilance" System;
- iii) Cuba tropical cyclone early warning system;
- iv) Bangladesh Cyclone Preparedness Programme.

As a follow-up to this Symposium, it was proposed that:

- i) Case studies be documented, where different stakeholders involved in the four components of early warning systems are supporting risk identification, detection and warning, dissemination, and preparedness / early response mechanisms.
- ii) An international multi-agency task team be established to coordinate agencies' activities in supporting strengthening of early warning systems at national and regional levels.

ANNEXES

NATIONAL

AUSTRALIA

Bruce Stewart

Assistant Director (National Operations), National Operations Branch

Bureau of Meteorology

GPO Box 1289
Melbourne, Victoria 3001
Australia
Tel: +61 3 9669 4179
Fax: +61 3 9669 4075
Email: b.stewart@bom.gov.au

COLOMBIA

Mr Carlos Costa-Posada

Permanent Representative of Colombia with WMO
Ministerio del Medio Ambiente, Instituto de Hidrología y Estudios Ambientales

Carrera 10 No. 20-30
Bogota, D.C.
Colombia
Tel: +57 1 352 7111
Fax: +57 1 352 7131
Email: direccion@ideam.gov.co

CAMEROON

Mr Michel Legrand Saah

Sub Director of Meteorological Assistance
Direction de la météorologie nationale

33, rue Ivy
B. P. 186
Douala
Cameroon
Tel: +237 342 1635
Fax: + 237 342 1635
Email: mlsaah@yahoo.com

CUBA

Mr José Rubiera

Director, Forecasting Department
Instituto de Meteorología

Loma de Casablanca, Regla, Apartado 17032
C.P. 11700
La Habana 17
Cuba
Tel: +537 867 0708
Fax: +537 866 8010
Email: jose.rubiera@insmet.cu

CANADA

Ms Magda Little

Business Policy Directorate
Meteorological Service of Canada

North Tower, 4th Floor, TLC
10 Wellington St.
Gatineau, QC, K1A 0H3
Tel: +1 819 934 5185
Fax: +1 819 994 8854
Email : Magda.Little@ec.gc.ca

EL SALVADOR

Ms Hilda Aguilar Cressent

First Secretary
Permanent Mission of El Salvador

65 Avenue Lausanne
CH-1202 Geneva
Switzerland
Tel: +41 22 730 2360
Email: hildaaguilar711@hotmail.com

CHINA

Mr Xu Tang

Director-General
Shanghai Regional Meteorological Centre - China Meteorological Administration

166 PuXi Road
Shanghai P.R.C. 200030
China
Tel: +86 21 646 93 640
Fax: +86 21 648 75 023
Email: tangxu570512@vip.sina.com

Mr Luis Garcia

Servicio de Meteorología y Climatología del Servicio Nacional de Estudios Territoriales

Km. 5 1/2 carretera a Nueva San Salvador
Calle Las Mercedes
San Salvador
El Salvador
Tel: +503 223 7791 / 283 2246 / 47
Fax: +503 283 2269 / 223 7898
E-mail: lgarcia@snet.gob.sv

Ms Elda Vásquez de Godoy

Acting Director, Department of Risk Management
Servicio Nacional de Estudios Territoriales

Km. 5 1/2 carretera a Nueva San Salvador
Calle Las Mercedes
San Salvador
El Salvador
Tel: +503 2223 7791
Fax: + 503 283 2269
Email: edegodoy@snet.gob.sv

FRANCE

Ms Francoise Bénichou

Deputy Director, Forecasting Department

Météo-France

42, avenue Coriolis
31057 Toulouse Cedex 1
France

Tel: +33 5 61 07 83 11

Fax: +33 5 61 07 83 09

Email: francoise.benichou@meteo.fr

Mr Philippe Dandin

Directeur de la Climatologie

Météo-France

42, avenue Coriolis
31057 Toulouse Cedex 1
France

Tel: +33 5 61 07 83 00

Fax: +33 5 61 07 83 09

Email: philippe.dandin@meteo.fr

Mr Pierre-Alexandre Genillon

WorldSpace France

28 boulevard du General LeClerc
92200 Neuilly
France

Tel: +33 6 68 97 73 91

Email: pierre.genillon@mediaport.net

Mr Jean-Michel Tanguy

*Director, French National Hydrometeorological and
Flood Forecasting Service (SCHAPI)*

Météo-France

42, Avenue Gaspard Coriolis
31057 Toulouse Cedex 1
France

Tel : + 33 534 63 85 50

Fax : + 33 534 63 85 78

Email: jean-michel.tanguy@schapi.ecologie.gouv.fr

GERMANY

Mr Michael Bittner

Head, Climate and Atmosphere

Deutsches Zentrum für Luft und Raumfahrt (DLR) e.V. in der Helmholtzgesellschaft, DFD-KA

Oberpfaffenhofen
D-82234 Wessling
Germany

Tel: +49 8153 28 1379

Fax: +49 8153 28 1363

Email: michael.bittner@dlr.de

Mr Andreas Pfaffernoschke

Counsellor

Permanent Mission of Germany

28C, Chemin du Petit-Saconnex
1209 Geneva
Switzerland

Tel: +41 22 730 1255

Fax: +41 22 7301295

Email: wi_z_io@genf.diplo.de

Mr Karl-Otto Zentel

Deutsches Komitee Katastrophenvorsorge (DKKV)

Friedrich-Ebert-Allee 40
D-53113 Bonn
Germany

Tel: +49 228 44601828

Fax: +49 228 44601836

Email: zentel@dkkv.org

ITALY

Mr Ezio Bussoletti

Advisor to the Ministry

Ministero dell'Ambiente e della Tutela del Territorio

Via Cristoforo Colombo 44
00147 Roma
Italy

Tel: +39 06 57 22 55 50

Email: bussoletti@minambiente.it

JAPAN

Mr Kazuhiko Fukami

Chief, Hydrologic Engineering Research Team

International Centre for Water Hazard and Risk Management (ICHARM) - Public Works Research Institute

1-6 Minamihara
Tsukuba

Ibaraki 305-8516
Japan

Tel: +81 29 879 6778

Fax: +81 29 879 6737

Email: k-fukami@pwri.go.jp

KENYA

Mr Hussein Gadain

Regional Hydrologist

U. S. Geological Survey, Famine Early Warning Systems Network

P. O. Box 66613-00800

Nairobi

Kenya

Tel: +254 20 386 1475/6/9

Fax: +254 20 386 1480

Email: hgadain@fews.net & gadain@yahoo.com

MOZAMBIQUE

Eunice Mucache

Cruz Vermelha de Mozambique (Mozambique Red Cross Society)

Avenida Agostinho Neto, 284

Caixa Postal 2986

Maputo

Mozambique

Tel : +258 21492561

Fax : +258 21497715

Email: eunice.mucache@redcross.org.mz

Mr Filipe Domingos Freires Lúcio
*Permanent Representative of Mozambique with WMO;
Director*
Instituto Nacional de Meteorologia
Rua de Mukumbura 164
C.P. 256
Maputo
Mozambique
Tel: + 258 21 493 193
Fax: +258 21 491 150
Email: flucio@inam.gov.mz

NETHERLANDS

Mr Paolo Reggiani
WL Delft Hydraulics, Inland Water Systems
P.O. Box 177
2600MH Delft
Netherlands
Tel: +31 15 285 8882
Fax: +31 15 285 8782
Email: paolo.reggiani@wldelft.nl

SLOVENIA

Ms Tanja Cegnar
Head of Climatological Department
Environmental Agency
Vojkova Ulica 1/B
1000 Ljubljana
Slovenia
Tel: +386 1 478 4079
Fax: +386 1 478 4054
Email: Tanja.Cegnar@rzs-hm.si

SRI LANKA

Mr P.M. Jayatilaka Banda
Deputy Director General
Department of Meteorology
Buddhaloka Mawatha
Colombo 7
Sri Lanka
Tel: + 941 694 104
Fax: + 941 698 311 / 691 443
Email: metpmj@hotmail.com

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

Mr David Burridge
Former Director
**European Centre for Medium-Range Weather
Forecasts (ECMWF)**
Tel: +41 22 730 8054
Fax: + 41 22 730 8049
Email: DBurridge@wmo.int

Mr Alan Douglas
Group Head Observations Supply
UK Met Office
FitzRoy Road
Exeter EX1 3PB
UK
Tel: +44 1392 88 5600
Fax: +44 1392 88 5681
Email: alan.douglas@metoffice.gov.uk

UNITED STATES OF AMERICA

Mr Curtis B. Barrett
Manager, NWS International Hydromet Projects
**US Department of Commerce, National Oceanic &
Atmospheric Administration**
1325 East West Highway
Silver Spring
MD 20910
USA
Tel: +1 301 713 1784 ext 136
Fax: +1 301 587 4524
Email: curt.barrett@noaa.gov

Mr Fredrick Branski
*Team Leader, Data Management Team, Office of Chief
Information Officer*
National Oceanic & Atmospheric Administration
1325 East West Highway
Silver Spring
MD 20910
USA
Tel: +1 301 713 0864 ; +1 240 355 4468
Fax: +1 301 713 1409
Email: fred.branski@noaa.gov

Mr David S. Green
*Leader, Program Planning & Integration National
Weather Service, Office of Science & Technology*
**National Oceanographic & Atmospheric
Administration**
1325 East West Highway
SSMC-2 Rm-15426
Silver Spring
MD 20910
USA
Tel: +1 301 713 3557 ext 172
Fax: +1 301 713 0173
Email: david.green@noaa.gov

Mr Chris Hill
Weather Forecast Office
7600 Sand Point Way NE
Seattle
WA 98115
USA
Tel: +1 206 526 6095 x224/222
Email: chris.hill@noaa.gov

Mr Steve Zebiak

Director-General

**International Research Institute for Climate and
Society (IRI) - The Earth Institute at Columbia
University**

61 Rt. 9W, 128 Monell Building

Palisades

NY 10964

USA

Tel: +1 845 680 4497

Fax: +1 845 680 4866

Email: steve@iri.columbia.edu

ZIMBABWE

Mr Brad Garanganga

Acting Coordinator

SADC Drought Monitoring Centre

P.O. Box 150

Belvedere

Harare

Zimbabwe

Tel: +263 4 778 172

Fax: +263 4 778 172

Email: garangan@dmc.co.zw

REGIONAL

**ASIAN DISASTER REDUCTION CENTER
(ADRC)**

Mr Akihiro Teranishi

Senior Researcher

Hitomiraikan 5F, 1-5-2

Wakinohama-kaigan-dori

Chuo-ku

Kobe City, 651-0073

Japan

Tel: +81 78 262 5540

Fax: +81 78 262 5546

Email: teranishi@adrc.or.jp

**COUNCIL OF EUROPE DEVELOPMENT BANK
(CEB)**

Ms Michèle Meunier

Directeur, Département Etudes et Analyses

55, avenue Kléber

75116 Paris

France

Tel: +33 1 47 55 55 08

Fax: +33 1 47 55 37 52

Email: michele.meunier@coebank.org

INTERNATIONAL

FOOD AND AGRICULTURE ORGANIZATION (FAO)

Mr Paul Paredes-Portella

Liaison Officer

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 9173683

Email: pparedes-portella@unog.ch

GROUP ON EARTH OBSERVATIONS (GEO)

Ms Alexia Massacand

Senior Scientific Expert

GEO Secretariat
Case postale 2300
1211 Geneva 2
Switzerland

Tel: +41 22 730 8382

Fax: +41 22 730 8520

Email: AMassacand@geosec.org

INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES (IFRC)

Mr Horst Letz

Disaster Preparedness and Response Department

P.O. Box 372
17, Ch. Des Crêts
1211 Geneva 19
Switzerland

Tel: +41 22 730 4222

Fax: +41 22 733 0395

Email: horst.letz@ifrc.org

Mr Johan Schaar

Special representative

P.O. Box 372
17, Ch. Des Crêts
1211 Geneva 19
Switzerland

Tel: +41 22 730 4231

Fax: +41 22 733 0395

Email: johan.schaar@ifrc.org

INTERNATIONAL MARITIME ORGANIZATION (IMO)

Mr Gurpreet Singhota

*Senior Technical Officer, Operational Safety Section,
Sub-Division for Operational Safety, Security and
Human Element, Maritime Safety Division*

4 Albert Embankment
London SE1 7SR
United Kingdom

Email: gsinghot@imo.org

INTERNATIONAL STRATEGY FOR DISASTER REDUCTION (ISDR)

Mr Pedro Basabe

Senior Officer

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 917 8861

Email: basabe@un.org

Mr Reid Basher

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 917 8902

Email: reid.basher@un.org

Ms Stefanie Dannenmann

*Programme Officer, UN/ISDR Platform for the
Promotion of Early Warning*

Görresstrasse 30
53113 Bonn
Germany

Tel: +49 228 249 8813

Fax: +49 228 249 8888

Email: dannenmann@un.org

Mr John Harding

Associate Officer, Scientific and Technical Coordination

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 917 2785

Fax: +41 22 917 0563

Email: harding@un.org

Mr Terry Jeggle

Senior Advisor

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 730 8304

Email: jeggle@un.org

Mr Sujit Mohanty

Programme Officer

Palais des Nations
1211 Geneva 10
Switzerland

Tel: +41 22 917 8064

Email: mohanty@un.org

Ms Margareta Wahlström

*UN Assistant-Secretary-General, Deputy Emergency
Relief coordinator*

United Nations, S-3600A
New York
NY 10017
USA

Tel: +1 212 963 2740

Fax: +1 212 963 1312

Email: wahlstromm@un.org

**INTERNATIONAL TELECOMMUNICATION
UNION (ITU)**

Ms Melissa Arditto Delgado

Administrative Officer

Place des Nations
CH-1211 Geneva 20
Switzerland
Tel: +41 22 730 6340
Fax: +41 22 730 5484
Email: melissa.arditto@itu.int

Mr Simão Ferraz de Campos Neto

*Counsellor, Studies Strategy and Cooperation
Departement*

Place des Nations
CH-1211 Geneva 20
Switzerland
Tel: +41 22 730 68 05
Fax: +41 22 730 5853
Email: simao.campos@itu.int

Mr William Effah

Administrative Officer

Place des Nations
CH-1211 Geneva 20
Switzerland
Email: william.effah@itu.int

Mr Cosmas L. Zavazava

*Head, Least Developed Countries, Small Island
Developing States, and Emergency
Telecommunications*

Place des Nations
CH-1211 Geneva 20
Switzerland
Tel: +41 22 730 5447
Fax: +41 22 730 5484
Email: cosmas.zavazava@itu.int

**OFFICE FOR THE COORDINATION OF
HUMANITARIAN AFFAIRS (OCHA)**

Mr Ricardo Mena

*Humanitarian Affairs Officer, Coordination Response
Division*

Palais des Nations
1211 Geneva
Switzerland
Tel: +41 22 917 1455
Fax: +41 22 917 0023
Email: menar@un.org

Ms Magali Salazar

Intern

Ms Yvette Stevens

*Assistant Emergency Relief Coordinator and Director
OCHA Geneva*

Palais des Nations
1211 Geneva
Switzerland
Tel: +41 22 917 1234
Fax: +41 22 917 0023
Email: stevens@un.org

PROVENTION CONSORTIUM

Mr Ian O'Donnell

Senior Officer

P.O. Box 372
1211 Geneva 19
Switzerland
Tel: +41 22 730 4373
Fax: +41 22 733 0395
Email: ian.odonnell@ifrc.org

UN HABITAT

Mr Esteban Leon

Disaster Management Specialist

Palais des Nations
1211 Geneva 10
Tel: +41 22 917 8757
Fax: +41 22 917 8046
Email: leon.unhabitat@unog.ch

UN UNIVERSITY

Ms Katharina Thywissen

*Senior Scientific Adviser, Task Force Early Warning
Conference*

Goerresstr. 15
53113 Bonn
Germany
Tel: +49 30 5000 1581
Fax: +49 30 5000 5 1581
Email: Katharina.Thywissen@dipl.de

Mr Juan Carlos Villagran de Leon

*Scientific Advisor, Institute for Environment and Human
Security*

Goerresstr. 15
53113 Bonn
Germany
Tel: +49 228 422.85513
Fax: +49 228 422 85599
Email: villagran@ehs.unu.edu

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

Ms Joanne Burke

*UN Disaster Management Training Programme
Coordinator, Bureau for Crisis Prevention & Recovery*

International Environment House
11-13 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8357

Email: joanne.burke@undp.org

Mr Maxx Dilley

*Policy Advisor, Crisis Prevention and Recovery,
Disaster Reduction Unit, Bureau for Crisis Prevention &
Recovery*

International Environment House
11-13 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8285

Fax: +41 22 917 8060

Email: maxx.dilley@undp.org

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

Mr Glenn Dolcemascolo

International Environment House
11 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8448

Fax: +41 22 797 3420

Email: glenn.dolcemascolo@unep.ch

Mr Norberto Fernandez

Head, Early Warning & Observing Systems Section

P.O. Box 30552
Nairobi 00100
Kenya

Tel: +254 20 623 450

Fax: +254 20 624 309

Email: norberto.fernandez@unep.org

Mr Pascal Peduzzi

Head, Early Warning Unit

International Environment House
11 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8237

Fax: +41 22 797 3420

Email: Pascal.Peduzzi@grid.unep.ch

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

Mr Keith Alverson

*GOOS Project Officer, UNESCO Intergovernmental
Oceanographic Commission (IOC)*

1, rue Miollis
75732 Paris Cedex 15
France

Tel: +33 1 45 68 40 42

Fax: +33 1 45 68 58 10

Email: k.alverson@unesco.org

Mr Patricio Bernal

*Assistant Director-General
Executive Secretary, UNESCO Intergovernmental
Oceanographic Commission (IOC)*

1, rue Miollis
75732 Paris Cedex 15
France

Tel: +33 1 45 68 39 83

Fax: +33 1 45 68 58 10

Email: p.bernal@unesco.org

Mr Masahiro Yamamoto

*Senior Advisor, Tsunami Unit of the UNESCO
Intergovernmental Oceanographic Commission (IOC)*

1 Rue Miollis
75732 Paris Cedex 15
France

Tel: +33 1 45 68 39 60

Fax: +33 1 45 68 58 10

Email: masahiro.yamamoto-a@met.kishou.go.jp

UNITED NATIONS CHILDREN'S FUND (UNICEF)

Ms Heidi Peugeot

Office of Emergency Programmes

5-7 av Paix
1211 Geneva 10
Switzerland

Tel: +41 22 909 5643

Fax: +41 22 909 5902

Email: hpeugeot@unicef.org

Mr Everett Ressler

Office of Emergency Programmes

5-7 av Paix
1211 Geneva 10
Switzerland

Tel: +41 22 909 5610

Fax: +41 22 909 5902

Email: eressler@unicef.org

UNITAR

Mr Francesco Pisano

UNOSAT Senior Programme Officer

International Environment House 2
11 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8720

Fax: +41 22 917 8047

Email: francesco.pisano@unitar.org

Mr Alain Retière

UNOSAT Director

International Environment House 2
11 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8455

Fax: +41 22 917 8047

Email: alain.retiere@cern.ch

Mr Olivier Van Damme

UNOSAT Programme Officer

International Environment House 2
11 Chemin des Anémones
1219 Châtelaine
Switzerland

Tel: +41 22 917 8650

Fax: +41 22 917 8062

Email: olivier.vandamme@unitar.org

THE WORLD BANK

Mr Saroj Kumar Jha

*Senior Infrastructure Specialist,
Hazard Risk Management Team*

1818 H Street, NW
Washington, DC 20433
USA

Tel: +1 202 458 2726

Fax: +1 202 522 3227

Email: Sjh1@worldbank.org

Ms Zoe Trohanis

1818 H Street, NW
Washington, DC 20433
USA

Tel: +1 202 458 1378

Email: ztrohanis@worldbank.org

WORLD FOOD PROGRAMME

Mr Menghestab Haile

*Programme Adviser, Vulnerability Analysis and
Mapping (VAM)*

Via Cesare Giulio Viola 68/70
Parco de' Medici
00148 Rome
Italy

Tel: +39 06 6513 2276

Fax: +39 06 6513 2962

Email: menghestab.haile@wfp.org

Mr Paolo Mattei

*Early Warning Officer, Emergency Preparedness &
Response Branch (ODAP)*

Via Cesare Giulio Viola 68/70
Parco de' Medici
00148 Rome
Italy

Tel: +39 06 6513 2981

Fax: +39 06 6513 2962

Email: paolo.mattei@wfp.org

**WORLD METEOROLOGICAL ORGANIZATION
(WMO)**

7 bis, Avenue de la Paix
Case Postale 2300
CH-1211 GENEVA 2
Switzerland

Mr Michel Jarraud

Secretary-General

Tel: + 41 22 730 8200
Fax: +41 22 730 8154
Email: MJarraud@wmo.int

Mr Hong Yan

Deputy Secretary-General

Tel: + 41 22 730 8230
Fax: +41 22 730 8023
Email: HYan@wmo.int

Mr Georgi Kortchev

Director, Applications Programme Department

Tel: + 41 22 730 8221
Fax: + 41 22 730 8128
Email: GKortchev@wmo.int

Ms Elena Manaenkova

Director, Cabinet and External Relations

Tel : + 41 22 730 8232
Fax : + 41 22 730 8037
E-mail : EManaenkova@wmo.int

Mr Dieter Schiessl

Director, Cross-cutting Activities

Tel: + 41 22 730 8369
Fax: + 41 22 730 8021
Email: DSchiessl@wmo.int

Mr Avinash Tyagi

Director, Hydrology and Water Resources Programme

Tel: +41 22 730 8354
Fax: +41 22 730 8043
Email: ATyagi@wmo.int

Ms Maryam Golnaraghi

Chief, Natural Disaster Prevention and Mitigation Programme

Tel: +41 22 730 8006
Fax: +41 22 730 8023
Email: MGolnaraghi@wmo.int

Ms Haleh Kootval

Chief, Public Weather Services Division

Tel: + 41 22 730 8333
Fax: + 41 22 730 8128
Email: HKootval@wmo.int

Mr Jean-Michel Rainer

Chief, Information Systems and Services Division

Tel: + 41 22 730 8219
Fax: + 41 22 730 8021
Email: JRainer@wmo.int

Mr Gabriel Arduino

Scientific Adviser, Hydrology and Water Resources Programme

Tel: + 41 22 730 8231
Fax: + 41 22 730 8043
Email: GArduno@wmo.int

Mr Amir Delju

Senior Scientific Coordinator, World Climate Programme Department

Tel: + 41 22 730 8360
Fax: + 41 22 730 8548
Email: ADelju@wmo.int

Ms Liisa Jalkanen

Senior Scientific Officer, Atmospheric Research and Environment Programme Department

Tel: + 41 22 730 8587
Fax: + 41 22 730 8049
Email: LJalkanen@WMO.int

Mr James Douris

Natural Disaster Prevention and Mitigation Programme

Tel: + 41 22 730 8229
Fax: + 41 22 730 8023
Email: JDouris@wmo.int

Mr Jean-Baptiste Migraine

Natural Disaster Prevention and Mitigation Programme

Tel: + 41 22 730 8350
Fax: + 41 22 730 8023
Email: JMigraine@wmo.int

Mr David Rogers

Atmospheric Research and Environment Programme Department

Tel: + 41 22 730 8071
Fax: + 41 22 730 8049
Email: DRogers@wmo.int

Mr Giacomo Teruggi

Consultant, Hydrology and Water Resources Programme

Tel: +41 22 730 8355
Fax: +41 22 730 8043
Email: GTeruggi@wmo.int

+ Representatives from RCD, Space Programme.



SYMPOSIUM ON MULTI-HAZARD EARLY WARNING SYSTEMS FOR INTEGRATED DISASTER RISK MANAGEMENT

23-24 May 2006, WMO Headquarters, Geneva, Switzerland

ANNEX 2: ANNOTATED AGENDA

Day 1 - Tuesday, 23 May 2006

(Room: C1-C2)

7.30 – 9.00 Registration

9.00 – 9.45 **OPENING SESSION (Room C1)**

[Welcome Address and Official Opening](#) by Mr Michel Jarraud,
Secretary-General of WMO (5 minutes)

[Keynote speech](#) by Ms Margareta Wahlström, UN Assistant-Secretary-General for Humanitarian
Affairs, and Deputy to Mr Jan Egeland, Leader of the ISDR System (15 minutes)

Opening Remarks by Representatives of Co-Sponsoring Agencies (15 minutes)

- Dr Maxx Dilley (UNDP) (3 minutes)
- Ms Yvette Stevens (OCHA) (3 minutes)
- Mr Johan Schaar (IFRC) (3 minutes)
- Mr Saroj Kumar Jha (The World Bank) (3 minutes)
- Dr Patricio Bernal (UNESCO) (3 minutes)

9.45 – 11.15 **SESSION I: Governance and Organisational Issues Related to Early Warning Systems for Integrated Disaster Risk Reduction (Room C1)**

Chair: [Ms Margareta Wahlström](#)

Panellists:

- Mr Reid Basher (ISDR Secretariat)
[Review of the Hyogo Framework for Action: Governance and Organisational Framework and Reference to Early Warning Systems.](#)
- Dr Xu Tang (China Meteorological Administration)
[Lessons Learned and Recommendations from Managing Disaster Risks in Mega-Cities.](#)
- Mr Everett Ressler (UNICEF)
[Lessons Learnt through an Inter-Agency Approach for Early Warning / Early Action of Different Hazards.](#)
- Dr Maxx Dilley (on behalf of Inter American Development Bank)
[Disaster Risk Management and Examples of Early Warning Projects.](#)

Format:

- Chairperson to present key issues, goals and objectives of Session I and relation to all Panels and Working Groups (10 minutes)
- 10-minute presentations by each panellist (50 minutes)
- Discussion session and Chairperson Summary (30 minutes)

Background documentation for Session I:

- [Hyogo Framework for Action: Building the Resilience of Nations and Communities to Disasters](#) (World Conference on Disaster Reduction, 18-22 January 2005, Kobe)
- [Global Survey of Early Warning Systems: An assessment of capacities, gaps and opportunities toward building a comprehensive global early warning system for all natural hazard](#) (Third International Early Warning Conference, 27-29 March 2006, Bonn)
- Filipe Lucio : [Challenges and Issues for Implementation of Multi-Hazard Early Warning Systems for Integrated Risk Reduction in Developing and Least Developed Countries](#)
- Mostafa Mohaghegh : [Early Warnings and Late Reactions? Challenges and Opportunities for Effective National and Global Early Warning Systems](#)

11.15 – 11.45 Coffee break: Bar – ground floor (just above the spiral staircase)

11.45 – 13.00 SESSION II: Risk Identification and Linkages to Early Warnings (Room C1)

Co-chairs: Dr Maxx Dilley (UNDP)
& Dr Carlos Costa-Posada (Instituto de Hidrologia y Estudios Ambientales, Colombia)

Panellists:

- Mr Pascal Peduzzi (UNEP)
Emerging Issues and New Risk Patterns: What is Needed for Identifying Risk?
- Dr Steve Zebiak (International Research Institute for Climate and Society (IRI), USA)
Adding Risk Information to Early Warnings for Decision-Support.
- Dr Hussein Gadain (Famine Early Warning Systems (FEWS), Kenya)
How Risk Identification is Linked to Early Warnings: Tana River Example.
- Dr David Green (National Oceanic and Atmospheric Administration, USA)
Role of Technical Agencies Responsible for Hazard monitoring, Observations, Data and Analysis.
- Mr Paolo Reggiani (WL Delft Hydraulics, Netherlands)
Flood Risk Assessment for Emergency Preparedness and Response.

Format of the Session:

- Co-Chairs to present key issues, goals and objectives of *Session II* and *Working Group A* (10 minutes)
- 10-minute presentations by each panellist (50 minutes)
- Discussion session and Summary by Co-Chairs (15 minutes)

Background documentation for Session II and Working Group A:

- Maxx Dilley: *Risk Identification, a Critical Component of Disaster Risk Management*, WMO Bulletin 55 (1), Jan 2006
- Maxx Dilley, Robert S. Chen, Uwe Deichmann, Arthur L. Lerner-Lam, Margaret Arnold, Jonathan Agwe, Piet Buys, Oddvar Kjekstad, Bradfield Lyon and Gregory Yetman: *Natural Disaster Hotspots: a Global Risk Analysis*, The World Bank and Columbia University, March 2005

13.00 – 14.00 Lunch - WMO Cafeteria - Attic level (sitting reserved in Room D for symposium participants)

14.00 – 15.30 SESSION III: Technical and Operational Capacities for Observing, Detecting, Monitoring, Forecasting and Warnings of Hazards (Room C1)

Co-chairs: Mr Dieter Schiessl (WMO)
& Ms Zoe Trohanis (The World Bank)

Panellists:

- Dr Alan Douglas (UK Met Office, UK)
Status of Existing Observing Networks for Weather-, Water-, and Climate-Related Hazards: Gaps and Needs in Current Observing Networks.
- Dr David Burridge (Former Executive Director of ECMWF, UK)
Modelling and Forecasting Technologies for Hydro-Meteorological Events from the Next Hour to Climate Time Frames: Gaps and Needs for Enhancing Forecasting Capabilities and Technologies.
- Mr Curtis Barrett (National Weather Service, USA)
Viability of a Multi-hazard Approach to Operational Regional Centre in Support of Early Warning Systems.
- Dr Patricio Bernal (UNESCO-IOC)
Tsunami Early Warning System: Viability of a Multi-Hazard Approach for Enhanced Coastal Risk Management.
- Mr Filipe D. F. Lucio (Instituto Nacional de Meteorologia, Mozambique)
Status of Scientific and Technical Capacities in Developing and Least Developed Countries in Support of Early Warning Systems: Needs, Gaps and Challenges.
- Mr Philippe Dandin (Météo-France)
Enhanced early warning for better coastal or marine risk management.

Format:

- Co-Chairs to identify key issues, goals and objectives of *Session III* and *Working Group B* (10 minutes)
- 10-minute presentations by each panellists (60 minutes)
- Discussion session and Summary by Co-Chairs (20 minutes)

Background documentation for Session III and Working Group B:

- John Kelly: *The Global Observing System: its impacts and future*
- Susan Barrell: *Benefits, challenges and issues of multi-hazard approach to observing networks*
- WMO-HWR: *Benefits, challenges and issues of multi-hazard (e.g. hydro-meteorological) approach for the development of warnings*

15.30 – 16.00 Coffee break: Bar – ground floor (just above the spiral staircase)

16.00 – 17.30 Parallel Working Groups A and B

<p>WORKING GROUP A: Risk Identification and Linkages to Early Warnings</p> <p>Co-chairs: Dr Maxx Dilley (UNDP) & Dr Carlos Costa-Posada (Colombia)</p> <p>Discussion format</p> <p>Room: C2</p>	<p>WORKING GROUP B: Technical and Operational Capacities for Observing, Detecting, Monitoring, Forecasting and Warnings of Hazards</p> <p>Co-chairs: Mr Dieter Schiessl (WMO) & Ms Zoe Trohanis (The World Bank)</p> <p>Presentation by Dr Philippe Dandin (10 min)</p> <p>Discussion format</p> <p>Room: C1</p>
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17.30 Closing of the meeting for Day 1.

18.00 – 20.00 Welcome Cocktails (sponsored by WMO) WMO Cafeteria – Attic

Day 2 - Wednesday, 24 May 2006

(Room: C1-C2)

9.00 – 10.30 SESSION IV: Communication and Dissemination Mechanisms (Room C1)

Co-chairs: Ms Tanja Cegnar (Slovenia Environmental Agency)
& Mr Jean-Michel Rainer (WMO, to be confirmed)

Panellists:

- Telecommunication Infrastructures and Mechanisms:

- Dr Cosmas Zavazava (ITU)
National Challenges and Needs for Emergency Communication.
- Mr Fredrick Branski (NOAA, USA)
Global Communication Needs for multi-hazard data and information at International and Regional levels in support of National Early Warning Systems.
- Mr Pierre-Alexandre Genillon (WorldSpace France)
Satellite-Based Technologies for the National and Regional Dissemination of Early Warnings and Related Critical Data and Information.

- Communication and Information Sharing:

- Mr José Rubiera (Met Service of Cuba)
Experience of Cuba in Early Warnings.
- Ms Eunice Mucache (Mozambique Red Cross Society)
Disseminating messages to vulnerable communities.
- Ms Haleh Kootval (WMO)
Critical Need for Education, Training and Public Outreach Programmes between Technical Agencies, and their Stakeholders (Emergency Preparedness Authorities, Media, other Relevant National Agencies).

Format:

- Presentation by Chairperson to identify key issues, goals and objectives of *Session IV* and *Working Group C* (10 minutes)
- 10-minute presentations by each panellist (60 minutes)
- Discussion session (input from the audience and summary of recommendations) (20 minutes)

10.30 – 11.00 Coffee break: Bar – ground floor (just above the spiral staircase)

11.00 – 12.30 **SESSION V: Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response (Room C1)**

Co-chairs: [Mr Ricardo Mena](#) (OCHA)
& [Dr Horst Letz](#) (IFRC)

Panellists:

- Ms Eunice Mucache (Mozambique Red Cross Society)
[Integrating Early Warnings in Disaster Preparedness and Response Plans.](#)
- Dr Francoise Bénichou (Météo-France) & Mr Jean-Michel Tanguy (SCHAPI)
[Lessons Learned from France's Vigilance System for Enhanced Emergency Preparedness and Response.](#)
- Dr Juan Carlos Villagran de Leon (Institute for Environment and Human Security, UNU)
[The Anticipated Response: an Essential Element in End-to-End Community-Early Warning Systems.](#)
- Ms Joanne Burke (UNDP Disaster Management Training Programme)
[Lessons Learnt through UNDP's Capacity Building Programme for Disaster Risk Reduction and Opportunities for Capacity Building in Early Warning Systems.](#)
- Mr Kazuhiko Fukami (International Centre for Water Hazard and Risk Management)
[A Discussion on Flood Hazard Warning and Preparedness - Experiences in Japan](#)

Format:

- Co-Chairs to identify key issues, goals and objectives of *Session V* and *Working Group D* (10 minutes)
- 10-minute presentations by each panellist (60 minutes)
- Discussion session and Summary of Co-Chairs (20 minutes)

Background Documentation for Session V and Working Group D:

- Ricardo Mena: [Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response](#)
- Horst Letz: [Community-Based Preparedness and Response to Multi-Hazard Early Warning](#)
- WMO-HWR: [Building Resilience through Community Participation: A Report on the Pilot Project on Community Flood Management in Bangladesh, India and Nepal](#)

12.30 – 13.30 Lunch - WMO Cafeteria - Attic level - (sitting reserved in Room D for symposium participants)

13.30 – 15.00 **Parallel Working Groups C and D**

<p>WORKING GROUP C: Communication and Dissemination Mechanisms</p> <p>Co-chairs: Ms Tanja Cegnar (Slovenia) & Mr Jean-Michel Rainer (WMO)</p> <p>Discussion format</p> <p>Room: C2</p>	<p>WORKING GROUP D: Integration of Risk Information and Early Warnings in Emergency Preparedness, Planning and Response</p> <p>Co-chairs: Mr Ricardo Mena (OCHA) & Mr Horst Letz (IFRC)</p> <p>Discussion format</p> <p>Room: C1</p>
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15.00 – 15.30 Coffee break: Bar – ground floor (just above the spiral staircase)

15.30 – 17.15 **SYNTHESIS SESSION: Review of the Outcomes of Sessions and Working Groups and Finalisation and Prioritization of Recommendations. (Room C1)**

Chair: Professor Hong Yan, Deputy Secretary-General of WMO

Presentations by Chairpersons from all four Working Groups (15 minutes each) followed by discussions (10 minutes) after each presentation. Final discussions and follow up actions.

17.15 – 17.30 **Official Closing of the Symposium**

Professor Hong Yan, Deputy Secretary General of WMO



SYMPOSIUM ON MULTI-HAZARD EARLY WARNING SYSTEMS FOR INTEGRATED DISASTER RISK MANAGEMENT

23-24 May 2006, WMO Headquarters, Geneva, Switzerland

ANNEX 3: RESTRUCTURED ISDR SYSTEM "IN A NUTSHELL"

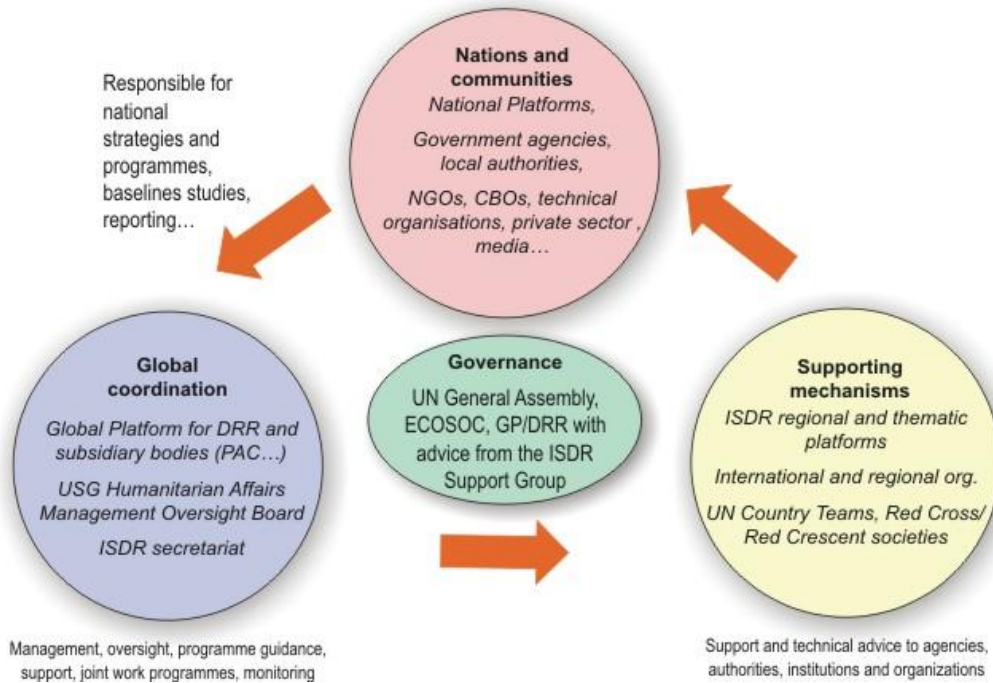
The adoption of the [Hyogo Framework for Action 2005-2015: Building the resilience of Nations and Communities to Disasters](#) has given impetus to disaster reduction activities worldwide. Governments, UN agencies and regional organizations have already embarked on redefining national plans and strategies and in setting up promotional campaigns and institutional plans for further action. As agreed in the Hyogo Framework for Action, the ISDR system will work with national, regional and international partners in carrying out support functions to provide coordination and assistance in the promotion of the implementation of the Hyogo Framework.

In Kobe, at the World Conference on Disaster Reduction, the Under Secretary-General for Humanitarian Affairs, Mr. Jan Egeland, expressed the commitment to strengthen the ISDR network to focus on the achievements of the goals set by the Hyogo Framework for Action. The [11th IATF/DR](#) session that took place in Geneva on 24-26 May 2005 discussed the elements for a reform system. The proposal was further discussed and refined at the [ISDR Stakeholder workshop](#) that took place on 10-11 October 2005 in Geneva, and at the [12th IATF/DR](#) that took place in Geneva on 22-24 November 2005. Mr. Egeland presented a [revised proposal for reform](#) on 19 December 2005, which is currently being implemented on a preliminary basis.

In summary, the main elements of the proposed strengthened ISDR system, as presented in the SG report to the UN General Assembly on August 2005 ([A/60/180](#)) are:

- A global forum called the [Global Platform for Disaster Risk Reduction \(GP/DRR\)](#) with participation of Governments in addition to UN agencies, regional organizations and civil society, with a particular role to advise on and commit to support the implementation of the Hyogo Framework, and to guide the various associated networks and platforms (this builds on the Inter-Agency Task Force on Disaster Reduction, functioning 2000-2005). It also has a **Programme Advisory Committee (PAC)**, to ensure programmatic support and coherence. An integrated work programme for the ISDR system will be developed by PAC, supported by the ISDR secretariat;
- A **Management Oversight Board (MOB)** with the function to provide advice on strategic, managerial and resource mobilization related issues to the Under-Secretary-General for Humanitarian Affairs (Jan Egeland) in his functions as leader of the ISDR international system, with a representative from the UN Development Group as vice-chair (Kathleen Cravero, UNDP, has been appointed for this function already).
- An [ISDR secretariat](#) as an independent entity within the United Nations Secretariat, with a line of accountability to the Under-Secretary-General for Humanitarian Affairs, to serve as "honest broker", catalyst and main focal point within the UN system on disaster risk reduction issues, to continue to promote ownership and commitment to disaster risk reduction with national, regional and international constituencies, and report on progress;
- [National platforms for disaster risk reduction](#) defined by Governments in each country, with designated responsibility as national forums for coordination and follow-up for Hyogo Framework implementation and with appropriate links to the UN Country Teams, where applicable;
- **Regional networks** or coordination platforms for disaster reduction cooperation at regional and sub-regional level, including inter-agency task forces and networks of national platforms, for coordination and mainstreaming of disaster risk reduction in regional settings, and for advocacy and information networking;
- **Thematic platforms** or networks of expertise in support of priority areas identified in the Hyogo Framework led or supported by the Global Platform (Scientific panel/s- to be developed)

Main elements of the strengthened ISDR System in support of the Hyogo Framework for Action



For more information about the restructured and strengthened ISDR System, please see <http://www.unisdr.org/eng/gpdr/ docs/background-ISDR-doc.doc>

For more information about WMO activities related to disaster risk reduction and the follow-up to this Symposium, please contact:

Dr Maryam Golnaraghi
Chief, Natural Disaster Prevention and Mitigation Programme
World Meteorological Organization
Tel: 41.22.730.8006
Fax: 41.22.730.8023
Email: mgolnaraghi@wmo.int
Web: http://www.wmo.int/pages/prog/dpm/ews_symposium_2006/index_en.html