Early Warning – From concept to action

The Conclusions of the Third International Conference on Early Warning
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27–29 March 2006, Bonn, Germany
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We are all familiar with the horrific pictures of the major disasters of recent years. We are all aware that natural disasters can happen everywhere and cause death and destruction. Many people even now still feel powerless and afraid, and ask, “how can we protect ourselves?”.

This unsolved problem prompted the Federal Government to host the Third International Conference on Early Warning. Over 1,300 participants from 132 countries and representatives of numerous organizations met under the auspices of the United Nations in Bonn from 27 to 29 March 2006. This response shows how important this issue is. Only together can we successfully meet the huge challenges.

At this conference scientists, experts and practitioners of early warning drew up a checklist to identify weak points in disaster early warning. With the help of this checklist existing early-warning systems can be examined and new ones made sustainable.

With the second result we are complying with the request made by Kofi Annan shortly after the 2004 tsunami disaster. In future we will, thanks to the Compendium of Early Warning Projects, be able to close possible gaps in existing early-warning procedures. This compendium was based on the experiences gained from over 100 projects. The Platform for the Promotion of Early Warning (PPEW) in Bonn will constantly update this list.

Whenever we succeed in preventing a natural event from turning into a disaster, we spare countless people unimaginable suffering. This conference represented a major step on the road from the culture of reaction, often practiced up to now, towards a culture of prevention.

I want to thank all those involved, without whose help this major success could not have been possible. Let me single out the Secretariat of the UN’s International Strategy for Disaster Reduction (ISDR) based in Geneva. Finally, I would like to express my gratitude to the organizers and the citizens of Bonn for their generous and cosmopolitan hospitality.

Dr. Frank-Walter Steinmeier
Federal Minister for Foreign Affairs
Berlin, March 2006

The Third International Conference on Early Warning was announced in the aftermath of the devastating tsunami that struck the Indian Ocean region on 26 December 2004. Building on the commitments made at the second conference in 2003, the German Government proposed a third conference in March 2006 to underscore the urgent need to develop early warning systems worldwide.

The German Government’s initiative was welcomed by the United Nations as an important step in translating early warning concepts into practical actions that ultimately can save lives and reduce the catastrophic effects of natural hazards.

Conference delegates were presented with key recommendations from the Global Survey of Early Warning Systems, a report requested by Secretary-General Kofi Annan in the aftermath of the tsunami disaster. This Global Survey; undertaken by the ISDR secretariat and its key partners, stressed the importance of filling gaps and improving early warning capabilities worldwide, with a focus on people-centred systems.

Mankind will never be able to master natural hazards – they will continue to strike, as we have seen in recent years, despite the increased sophistication of technological means. But by being better prepared and by devising realistic and practical early warning mechanisms for all communities, we will decrease the risk of hazards turning into disasters. At the end of the day, this is our common goal: making the world a safer place for all people in all regions.

Jan Egeland
Under-Secretary General for Humanitarian Affairs, United Nations
New York, March 2006
Conference Overview

Early warning is a major element of disaster risk reduction. It helps prevent loss of life and reduces the potential economic impact of disasters. To be effective, early warning systems need to actively involve the communities at risk, facilitate public education and awareness, communicate and disseminate warnings and messages, and ensure there is a constant state of preparedness.

The Third International Conference on Early Warning (EWC III) was organized and held in Bonn, Germany, from 27–29 March 2006 under the auspices of the United Nations. The major objectives of the conference were to showcase innovative early warning projects for potential financial support and implementation, to identify unused potential in early warning, and to facilitate multi-disciplinary scientific debate on latest practices and research.

The conference centred around the theme “from concept to action” and was initiated by the German Government in response to the devastating Indian Ocean Tsunami in December 2004. It builds on two previous early warning conferences: the first Early Warning Conference (EWC’98) held in Potsdam, Germany in 1998, which focused on state of the art knowledge of early warning systems, and the Second International Conference on Early Warning (EWC II) held in Bonn, Germany in 2003, which concentrated on integrating early warning into relevant public policy.

EWC III adopted a unique format which involved two parallel streams tackling the same issues from different perspectives. The presentation of early warning projects and debate of key policy themes during the Priorities and Projects Forum was complemented by discussion of the scientific elements of early warning during the Scientific and Technical Symposium. No other forum has brought together so many stakeholders from such a wide range of early warning backgrounds from around the world.

To facilitate the funding, design and implementation of concrete people-centred early warning systems, as well as to provide good examples of projects for presentation at the conference, a call for proposals was initiated by the conference organizers. The guidelines for the submission of proposals stressed the need for projects to consider all four elements of effective early warning systems – the assessment of risk, the technical warning service, the communication needs, and the preparedness of those at risk.

Project proposals were subjected to a quality control process managed by the UN/ISDR Platform for the Promotion of Early Warning (PPEW), which included an initial screening process to ensure that proposals met the basic requirements of relevance and completeness, followed by a comprehensive review and assessment of the proposal against the submission guidelines, by two or more expert reviewers.

In total, more than 100 proposals were accepted and entered into both the Compendium of Early Warning Projects and a web-accessible database containing detailed information on each project. Donors and those involved in the early warning community have been encouraged to make use of this valuable resource.

To further help turn more projects into reality the PPEW will continue to follow-up with project submitters on the progress and funding of their proposals, maintain the projects database and promote the projects with donors during 2006.

The discussion in the Priorities and Projects Forum was stimulated by the presentation of proposed early warning projects on the key themes of hazards of the earth, water and air. Professional moderators encouraged open dialogue amongst conference participants on issues ranging from technical monitoring systems through to international and regional cooperation on early warning and the challenges and benefits of multi-hazard early warning systems.

Acknowledging early warning as a complex and multi-faceted concept, the thematic structure of the Scientific and Technical Symposium facilitated cross-fertilization between various disciplines and sectors involved in early warning. The participation of a diverse range of stakeholders demonstrated that early warning has to be carried out by all parts of society. The key themes discussed during the symposium were multi-hazard early warning, mega-events, and people, politics and economics.

The presentations for each of the thematic sessions were selected through a review process undertaken by an international board of experts. The latitude and diversity of the presented issues underlined that the hazard and risk landscape is dynamic: new risks are emerging and other risks become more or less of a priority. Early warning, as well as disaster risk management, must take those dynamic changes into account. Multi-hazard approaches in early warning were considered very promising with respect to efficiency and synergy. Lively discussions also arose around the issue of trends and new risks so that policies can be future oriented, longer-lasting and more effective.

It was also very important that representatives of the civil society could voice their comments and concerns on the presented scientific issues and approaches in early warning.

Five workshops, covering topical early warning issues, were also open to conference participants:

- Wildland Fire
- African Centre for Early Warning and Disaster Reduction in the Indian Ocean (AFREDI)
- Education and Knowledge: Protecting Schools and Promoting Disaster Risk Awareness to Save Lives
- Tsunami Early Warning Strengthening Project in the Indian Ocean: Partnerships for Building Resilience
- Risk Management of Extreme Floods
Two key outcome documents were presented at the conference:

1. **Developing Early Warning Systems: A Checklist** was developed as part of the conference process and aims to be a simple list of key elements and actions to assist governments and communities implement more effective early warning systems. The checklist was prepared by the secretariat of EWC III, with the assistance the United Nations international system and other key stakeholders, ahead of time, and was refined to reflect the key issues, concerns and practical tips raised by conference participants.

   During 2006 the checklist will be translated into a wide range of languages and distributed throughout the world as a key tool to help facilitate the development of people-centred early warning systems.

2. **Compendium of Early Warning Projects** and its associated on-line database resulted from a call for project proposals and the project-oriented approach chosen for the conference. The compendium contains over one hundred individual projects focused on early warning and represents a diverse array of initiatives, expertise and capacity to develop early warning systems which can save lives and protect livelihoods around the world.

   The compendium was circulated to all conference participants to promote interest in new early warning projects and to encourage donors to fund individual projects.

   The conference also welcomed the **Global Survey of Early Warning Systems**, requested by the Secretary-General of the United Nations, and encouraged participants to act upon its recommendations. The survey presents an assessment of capacities, gaps and opportunities towards building a comprehensive global early warning system for all natural hazards.

While it is true there is still a long way to go and many gaps to fill, the discussions, debate and openness encouraged during the conference allowed all participants to share knowledge, good practices and ideas that will help progress the common goal of implementing effective, people-centred early warning systems into the future.

“Early warning systems are the key to effective risk reduction. They do save lives and livelihoods (and) in the world we live in, with so much division between rich and poor, they also save an enormous amount of investment for the donor countries who will be called upon to help when people die from such disasters. (…) We know that the most effective early warning takes more than scientifically advanced monitoring systems. All the sophisticated technology won't matter if we don't reach communities and people. Satellites, buoys, data networks will make us safer, but we must invest in the training, the institution building, the awareness raising on the ground. If we want effective global early warning systems, we must work together, government to government, federal and local officials, scientists with policy makers, legislators with teachers and community leaders.”

Excerpt from the United Nations Special Envoy for Tsunami Recovery, President William J. Clinton’s statement at EWC III, on 27 March 2006
Final Statement

Third International Conference on Early Warning (EWC III)

Guided by the motto “from concept to action”, the Third International Conference on Early Warning (EWC III) took place in Bonn, Germany, from 27 to 29 March under the auspices of the United Nations. It convened more than 1,250 participants active in the field of early warning from 132 countries, including ministers, senior government officials, as well as representatives of international organizations, experts, and members of civil society.

Building on the two previous international early warning conferences in 1998 and 2003, the conference was an initiative of the German Government to respond to the devastating effects of the Indian Ocean tsunami in December 2004 and in the recognition that had an effective early warning system been in place, many lives would have been saved. Through its outcomes, the conference contributed to the translation into concrete measures of the “Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters” adopted at the World Conference on Disaster Reduction in January 2005 in Kobe, Japan.

Through presentations, discussions and inputs at the forum, in the symposium, and in the workshops, the participants:

- Reiterated that effective early warning systems must be an integral part of disaster risk reduction strategies in all countries, as well as the role of local communities, of increased regional cooperation, as well as of training, education and awareness-raising;
- Welcomed the Global Survey of Early Warning Systems requested by the UN Secretary-General and encouraged all partners to act upon its recommendations;
- Welcomed the Compendium of Early Warning Projects as a catalogue of valuable projects to be promoted by the International Strategy for Disaster Reduction system (ISDR) and invited potential donors to support their implementation;
- Acknowledged existing support provided to early warning and called for additional financial resources in this area, recognizing the cost-effectiveness of investing in disaster risk reduction;
- Encouraged national governments, local communities and agencies to utilize the Early Warning Checklist when developing and evaluating their early warning systems;
- Underlined the need for further scientific research to better address early warnings and future risks, developing multi-hazard approaches, with a special focus on people at risk, their vulnerability and their socio-cultural context;
- Recognized the need to further mobilize political commitment, to expand the dialogue on early warning and to fill identified gaps in early warning capacities, and therefore encouraged the strengthening of the International Early Warning Programme (IEWP) and its Platform for the Promotion of Early Warning, as part of the reformed ISDR system and to facilitate the implementation of the Hyogo Framework for Action; and
- Encouraged the wide dissemination of the outcomes of the conference.

Finally, participants expressed their sincere gratitude to the Government of Germany, to the German National Platform for Disaster Reduction (DOKV) and the ISDR secretariat for organizing the conference, and thanked the City of Bonn for their warm welcome.

Bonn, 29 March 2006
The Priorities and Projects Forum of the conference centred around the presentation of fourteen new and innovative early warning projects covering a wide range of natural hazards and geographical regions. Each project was chosen for its illustrative value in terms of early warning and served as a starting point to stimulate a rich and wide exchange of views on the technical, social and environmental aspects of early warning.

Professional moderators facilitated discussion and debate during the three conference sessions, earth, water and air, on a series of pre-identified themes relevant to early warning. Key issues and comments raised have been summarized below under the most appropriate session and sorted according to the key elements of early warning (risk knowledge, monitoring and warning services, dissemination and communication, and response capability) or identified as an overarching issue.

### Hazards of the Earth Session

Projects presented during the Hazards of Earth session focused on hazards associated with shaking, blasting and sliding. Various geological hazards were discussed, and how communities can be ready and resilient to them.

Five projects, chosen for their illustrative value were presented from Asia, Central Asia and Latin America and highlighted problems encountered and solutions offered in relation to earthquakes, landslides and volcanic activity.

- The importance of undertaking hazard mapping and risk assessment with the involvement of the community. This is critical to help raise awareness and knowledge, maintain momentum on disaster risk reduction, and to improve relationships between local and national organizations.

- Incorporating local and traditional experience and knowledge into early warning systems, especially in relation to hazard and vulnerability assessment.

- Improving access to reliable data, information and technology. Regional repositories and more coordinated arrangements could assist in transferring knowledge between developed and developing countries.

- More effort is required to help close the gap between scientific information and knowledge, and how this can best be used to help people and local communities.

### Hazards of the Water Session

The Hazards of the Water session highlighted early warning projects that addressed natural hazards that involve either too much water, such as the result of a flood or tsunami, or too little, due to the impact of climate risks and changes such as drought. Being prepared and developing early warning systems can help to significantly minimize the impact of these hazards on people’s lives and livelihoods. Projects from West Africa, Europe, Asia and the Caribbean were presented that highlighted problems in relation to managing natural hazards and disasters and offered innovative solutions in relation to floods, tsunamis and climate risks.

### Issues Identified on Risk Knowledge

During the conference key points raised by participants in relation to risk knowledge, such as the systematic collection of data and the processes of undertaking risk assessments, included:

- The importance of undertaking hazard mapping and risk assessment with the involvement of the community. This is critical to help raise awareness and knowledge, maintain momentum on disaster risk reduction, and to improve relationships between local and national organizations.

- Incorporating local and traditional experience and knowledge into early warning systems, especially in relation to hazard and vulnerability assessment.

- Improving access to reliable data, information and technology. Regional repositories and more coordinated arrangements could assist in transferring knowledge between developed and developing countries.

- More effort is required to help close the gap between scientific information and knowledge, and how this can best be used to help people and local communities.

### Issues Raised on Monitoring and Warning Services

Reliable monitoring and warning services lie at the core of effective early warning systems. Conference participants noted that some improvements could be made in this area:

- Technical monitoring and warning systems must account for the needs of recipients, include local knowledge, and be coupled with effective communication systems to ensure warnings are understood and acted upon.
Issues Raised on Dissemination and Communication

Conference participants and presenters highlighted ways in which warnings could better get to those at risk, and contain clear and useful information that enables proper responses:

- A one-size-fits-all approach will not take the message the critical ‘last mile’. The individual needs of each community must be considered.
- Volunteers and their networks are vital to both disseminating warnings and building community capacity.
- Building and maintaining trust in the authorities that issue and disseminate warning is critical.
- Disseminating information and warnings to remote areas remains a challenge and reinforces the need to use both technical and non-technical dissemination methods and technologies.

Hazards of the Air Session

The impact of natural Hazards of the Air such as cyclones, sand and dust storms, locust plagues, and severe storms affect the lives of millions of people around the world each year. The session on hazards of the air provided an opportunity to learn how to live with these phenomena and help communities be ready and prepared though the implementation and maintenance of early warning systems.

Four projects were presented from Asia, the Pacific and Western Africa that illustrated problems in relation to natural hazards and disasters and how best to prepare, and hopefully avoid some of the consequences.

Issues Raised on Response Capability

Communities must understand their risks and warning messages must contain clear useful information to enable proper responses. Key issues include:

- Building local and national capacities through involving and empowering people.
- Better education of local people and communities regarding warning and forecasting systems is required.
- There is a need to better interconnect existing monitoring and forecasting systems to develop an efficient global early warning system.
- It is important to identify ways in which technical specialists and scientists can interact more effectively with the local communities in the development of early warning systems.
- Better use should be made of existing monitoring and forecasting technologies, such as satellite and spatial data and equipment for early warning purposes.

Key Overarching Issues Discussed

A number of important cross-cutting issues were also raised throughout the conference by participants:

- The critical role of education and public awareness in building understanding of hazards, vulnerabilities and response mechanisms.
- Focused training to ensure people know how to respond to warnings, understand how to use equipment and interpret data, and feel empowered and motivated to maintain early warning systems.
- Better understanding is required in relation to how people behave and respond to warnings.
- Maintaining trust and credibility in early warning systems remains a challenge, particularly if false alarms are common.
- Learning from previous disasters is critical to enhance education and awareness and to improve existing early warning systems.

Overarching Issue of the Hazards of the Air Session by Eunice Mucache (Photo: DKKV/U. Grabowski)
Summary of the Scientific and Technical Symposium

The Scientific and Technical Symposium of the conference underlined the call for a move from concept to action in early warning. The multidisciplinary presentations served as a basis to discuss the latest research and approaches in early warning worldwide and raised the awareness of new and growing hazards. Topics ranged from technical novelties to new approaches with a focus on social sciences and local early warning praxis. The symposium was structured into three sessions:

- **Multi-hazard Early Warning** – underlining the importance of multi-hazard early warning systems in the context of their sustainability.
- **Mega-events** – calling for multi-regional, international and even global cooperation and coordination in early warning for particularly rare and large events, and
- **People, Politics and Economics** – emphasizing the role of community involvement, communication, legal and policy issues, cost-benefit, and other issues important for functioning and sustainable early warning.

### Multi-hazard Approaches Session

Many regions in the world are affected by more than one hazard, such as floods, storms, droughts or earthquakes with devastating socio-economic impacts. Early warning systems have been recognized as key elements for preventing and reducing the impact of disasters. As most communities face the threat of numerous hazards, it is important that integrated, multi-hazard warning systems are established. The functionality of a multi-hazard warning system will be improved by using shared structures and communication channels. A multi-hazard system will be triggered more often and hence, processes and links will remain better ‘exercised’.

Accuracy of monitoring plays an important role in early warning, not only in a technical sense. It also helps to prevent false alarms and therefore helps to build up trust in the warnings. Monitoring has to adapt continuously to the changing hazard landscape, especially in light of climate and environmental change. Examples such as the evacuation of 4.000 people in the Popocatépetl region, Mexico, in December 2000 just hours before a major eruption are noteworthy examples of successful early warning from which we can learn.

Some regions are today prone to hazards that were practically irrelevant in the past but will be even more threatening in the future, such as droughts and heat waves in Europe or tsunamis in the Mediterranean, or dust and sand storms in North East Asia. Some regions, particularly in the developing world, are still lacking monitoring capacities. International efforts are not only needed to support capacity building in those areas but also to enhance and facilitate the accessibility and exchange of data and information across national and regional borders.

Using synergies in the generation of data and knowledge, serving multiple purposes and target groups, will result in much more favourable cost-benefit ratios. That issue was discussed on the basis of the multi-purpose benefit inherent in earth observation that could simultaneously cater to the early warning, science, and military communities. Cost-benefit ratios play an important role in raising the political will to invest in early warning and prevention.

The observation and analyses of past events, including the emergency response is important to understand, predict and react in a better way to future natural hazards. Databases collecting information and experience are a basis to adapt models and early warning systems in general to be better tailored to the needs of the target groups.

Various multi-hazard warning centres focus in particular on the improvement of the public information system. The communication infrastructure plays a key role in the warning chain, but is often affected by disasters themselves. To implement an effective communication system is a major challenge for the years to come. The possibility of using available broadcast capability for the distribution of warning messages provides one solution for the improvement of the communication system. In multi-hazard warning systems the warnings are often distributed to operating centres of key services and institutions of the integrated crisis management and rescue system. These systems involve close coordination with civil protection authorities as well as collaboration between different institutions at the federal, state and municipality levels. Multi-hazard risk assessment must be incorporated into long-term land use and national development plans and strategies.

### Mega Events Session

Mega events are as much the result of the magnitude of the natural phenomenon as of the size, density and vulnerability of the population subjected to the hazard. Large cities are particularly exposed to mega events. Furthermore, with the increasing trend of urbanization, more and more people will be living in large cities, hence, offering mega events more and more exposure.

In regions where our collective memory does not provide any record of disasters, the hazard events can be inevitable but characterized by very long return periods. Statistical

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**Poster Exhibition** (Photo: DKKV / M. Malsch)

**Scientific and Technical Symposium at the Waterworks Building** (Photo: DKKV / U. Grabowski)
methods that provide good hazard estimates for small to large events fail when it comes to assessing the frequency of mega events. The risks are known and bound to affect a largely unprepared population. The Indian Ocean Tsunami is one example of such a known but neglected hazard, a tsunami in the Mediterranean should not be the next. To scientists, the Mediterranean is one of the most tsunami prone areas worldwide, but the population is widely unaware and unprepared. Hazard and risk mapping with the involvement of communities can help change that.

Getting to know the risk involves not only the physical characteristics of the hazard, but also the vulnerability of communities at risk and taking into account the trends in landuse and population development. Examples during the symposium demonstrated how flood risk can be evaluated on the basis of precipitation, geomorphology, and settlement patterns.

Mega events can also happen rather unnoticed and almost in a sustained way, such as malaria and other vector-borne diseases. Their omnipresence in certain areas, but lack of spectacular events and images, tend to make the call for action go unheeded. New methods were discussed to improve the risk mapping of such diseases.

Other hazards are characterized by slow onsets, such as famine. Improved crop monitoring and early warning methods were presented that should lead to enhanced food security.

For some hazards early warning has to rely more on technology. Early warning for earthquakes provides such a short lead time that state of the art technology is crucial. Warning for earthquakes necessarily has a slightly different focus than warning systems for other hazards. In large urban areas, high impact damage has to be prevented such as nuclear reactor accidents, power and gas pipeline failures or high speed train accidents. Early warning for other hazards, such as floods, storms etc. strive for timely protection and evacuation of the communities at risk.

When mega events affect a large geographic area the concerted efforts of all countries involved are needed. In that case, regional, national and local institutions and policies have to be in place. Building up a tsunami early warning system for the Indian Ocean is one such effort that involves stakeholders from the regional to the local level in multiple countries.

The complex structure of large cities for example requires different arrangements than a rural environment.

Early warning systems must be ‘people-centred’: they have to support and empower people in protecting themselves. In order to ‘go the last mile’, an integrated approach to early warning has to be based on the needs, priorities, capacities, and cultures of those at risk. People at risk must be partners in the system, not controlled by it.

Presentations in this session demonstrated the effectiveness of people-centred early warning systems that utilize and develop community capacities, create genuine local ownership of the system, and are based on a shared understanding of needs and purpose. Such initiatives are sustainable, replicable - they can be scaled up – and, importantly they are adaptable and resilient.

To implement early warning systems on a sustainable basis multiannual, long term strategies are needed. What makes a system sustainable under different conditions and contexts needs to be better understood. Early warning systems need to continue to innovate and adapt, not only by developing new technologies but also by continuously reviewing their aims and performance and renegotiating the multiple organizational and community relationships of the system.

Early warnings must be credible and reliable. This applies equally to scientific components, to emergency management structures and other agencies in the system. It is not just a question of believing the message, people have to trust the messenger, too. The pluralistic nature of the new information age does not favour a single, authoritative voice issuing warnings. Rapid advances in information and communication technology (ICT) and the growth of global media have widened public access to early warning information. The decision to take protective action will often be the outcome of an integrated approach to early warning.

Informing citizens will make their own, informed choices. They are in a sense consumers of early warning information.

Early warning pays off. A prerequisite for an effective early warning system is the recognition of its benefit by the general public, policy makers and the private sector. Cost-benefit analysis and related tools help to foster the necessary political engagement and the will to develop and promote early warning as an instrument of disaster risk management. Early warning systems are complex, multi-jurisdictional and multi-disciplinary by nature. Collaboration between the multiple stakeholders involved has to be supported by appropriate legal and policy frameworks.

At the same time – especially under the aspect of sustainability of the systems – new findings on the effects of climate change and environmental degradation must be integrated into the design of early warning systems.
Conference Generated Outcome Documents

In order to help governments and communities implement effective people-centred early warning systems, a simple checklist of key elements and actions was generated through the conference. The document is structured around the four key elements of early warning and contains non-technical information that national governments or community organizations can refer to when developing new early warning systems, evaluating existing arrangements or simply checking that crucial procedures are in place. The Checklist is not intended to be a comprehensive design manual, but instead a practical, non-technical reference tool to ensure that the major elements of a good early warning system are in place.

The Checklist was prepared by the secretariat of the Third Early Warning Conference ahead of time and was refined to reflect the key issues, concerns and practical tips raised by conference participants. In addition to inputs gathered during the two and a half days of the conference, significant and substantive input was received from organizations involved in early warning and disaster risk reduction, in the United Nations international system and beyond, including from the secretariat of the International Strategy for Disaster Reduction (ISDR) and its Platform for the Promotion of Early Warning (PPEW), as well as from the German government and within the German disaster reduction community.

During 2006 the Checklist will be translated into a wide range of languages and distributed throughout the world as a key tool to help facilitate the development of people-centred early warning systems that will save both lives and livelihoods. The document is available electronically at:

www.unisdr-earlywarning.org
and
www.ewc3.org

The Conference generated two key documents which are intended to serve as functional tools for practitioners and policy makers in the field of early warning.

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The Compendium of Early Warning Projects and its associated on-line database is the result of a call for project proposals and the project-oriented approach chosen for the conference. The Compendium contains over one hundred individual projects focused on early warning and represents a rich vein of initiatives, expertise and capacity to develop early warning systems which can save lives and protect livelihoods throughout the world. The proposals cover all major natural hazard types across a diverse array of geographic regions, and span technical systems through to community-based action on early warning.

Many of the initiatives contained in the Compendium are brand new, while others are adaptations of existing projects. Submitting organizations include government bodies, non-governmental organizations, scientific institutions and private companies. All project proposals were accompanied by a written endorsement from an appropriate government department or international authority.

To help ensure projects were of suitable standard, a quality control process was managed by the UN/ISDR Platform for the Promotion of Early Warning (PPEW). This included a screening process to ensure that proposals met the basic requirements of relevance and completeness, followed by the review and assessment of proposals against submission guidelines by expert reviewers.

To help turn more projects into reality the UN/ISDR PPEW will continue to maintain the projects database and promote the projects with donors during 2006. The Compendium can be accessed at:

www.unisdr-earlywarning.org
and
www.ewc3.org

During 2006 the Compendium was circulated to all conference participants to promote interest in new early warning projects and to encourage donor support. In addition, a number of the high quality projects were showcased at the conference, with fourteen projects presented in the plenary session and nine projects displayed in the poster session.

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Developing Early Warning Systems: A Checklist

The Conference generated two key documents which are intended to serve as functional tools for practitioners and policy makers in the field of early warning.

Compendium of Early Warning Projects

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Workshops

On the second day of the conference, participants had the opportunity to attend one of five workshops covering pertinent issues, which could not be accommodated within the main plenary discussions. The topics ranged from wildfires, extreme floods and tsunami early warning to the African Centre for Early Warning and Disaster Reduction in the Indian Ocean (AfrEDI) initiative in Sub-Saharan Africa and the link between early warning and education. The five events were organized by relevant actors in the field, who were entirely responsible for the content and outcomes of the workshops.

Wildland Fire Workshop

Participants agreed that a global early warning system for wildland fire should be part of the global multi-hazard early warning system coordinated by UN, and that the mobilisation of resources for the proposed project would require strong support from the ISDR Secretariat and from key donors. To promote the project in the context of the global multi-hazard early warning system, it was emphasized that:

a) Disasters resulting from wildland fires are not solitary events but are closely linked to other hazards such as flooding, mudslides, landslides or rock falls. The have far-reaching social, economic and environmental consequences;

b) Activities need to be ‘people-centred’, focusing on local awareness raising;

c) The global early warning system for wildland fire will link regional and national systems; and

d) The proposed project would significantly advance science and help translate existing knowledge into tangible benefits in global early warning.

To maximise the success of such a system, participants agreed that it is important to link the early warning topic to related questions about air quality, insurance and health industry matters. The presentations and outcomes of this side event can also be viewed on the website of the Global Fire Monitoring Center (GFMC) at:

www.fire.uni-freiburg.de/fwf/ews.htm

AfrEDI – African Centre for Early Warning and Disaster Reduction in the Indian Ocean

At a UN/ISDR consultative meeting in Nairobi, Kenya during October 2005, delegates from 10 African nations bordering the Western Indian Ocean (WIO) agreed on an association to establish the African Centre for Early Warning and Disaster Reduction in the Indian Ocean (AfrEDI).

The 2004 tsunami seriously affected Somali (150 deaths) and Tanzania (10 deaths) in this region, and even caused a fatality near Port Elizabeth in South Africa, 8400 km away from its source. The frequent hazards of major tropical cyclones in the South-west Indian Ocean, and the danger of another tsunami within the next 20 years or less from the 1797 and 1833 sources along the Sumatran margin, make the need for AfrEDI more acute in the southern sector of the West Indian Ocean. The countries of Mauritius, Madagascar and South Africa lie directly along the axis of the energy-beaming pattern from the 1797/1833 zones.

Education and Knowledge: Protecting Schools and Promoting Disaster Risk Awareness to Save Lives

The event benefited from the presence of government representatives, NGOs, researchers, experts, UN agencies, associations and other actors interested in the subject. Two presentations and a brief summary of the elements of the UN/ISDR campaign on knowledge, education and disaster risk reduction set the stage for an intense exchange among participants, who shared initiatives, examples and opportunities. They discussed and confirmed the following:

- A keen and active interest in the subject of education (formal and informal), knowledge related to disaster risk reduction and school safety;
- The value of presentations of experiences from a national point of view in terms of good practices and lessons learned;
- The extensive use and appreciation of the key findings of the world review presented at the workshop;
- A commitment to the Education Campaign’s focus and outcomes;
- A willingness to have further exchanges on the subject and to capitalize on similar opportunities to raise awareness of the subject of disaster risk reduction and education; and
- A call for the inclusion of disaster risk reduction in school curricula.

The well-attended AfrEDI workshop took notice of these risks, and also the recent major earthquakes in the southern part of the East African Rift System, such as that in Mozambique in February 2006. An inaugural meeting to establish the constitutional basis of AfrEDI was discussed, but no definite time line was set for it.

www.unisdr.org/knowledge-education
Tsunami Early Warning Strengthening Project in the Indian Ocean

Recognizing the urgency to establish an early warning system for the Indian Ocean region, a multi-partner, multi-donor initiative “Evaluation and Strengthening of Early Warning Systems in countries affected by the 26 December 2004 Tsunami” was launched in early 2005 with funding through the UN Flash Appeal for the Indian Ocean. The initiative has provided an overall integrated framework and has been focusing on key components that include core system implementation, integrated risk management, public awareness and education, community-based approaches, and coordination and partnership building.

This workshop was organized to brief participants on progress towards strengthening tsunami early warning systems in the Indian Ocean, and to offer an opportunity to exchange information and experiences with regard to the implementation of activities and delivery of results at the regional, national, and local levels. Participants also discussed the prospects for cooperation and partnership towards building resilience to tsunamis in the Indian Ocean region. The workshop included presentations on tsunami hotspots and risk assessment, the ‘past, present and future’ of the Tsunami Early Warning Project, as well as regional, intergovernmental, national and local tsunami early warning systems.

Risk Management of Extreme Floods

It is not possible to completely eliminate floods. Even after implementing comprehensive flood defence measures, we may be confronted with situations for which these measures have not been designed. Therefore, the international discussion on flood risks and flood loss reduction recognizes the need to improve the potential of people at risk and of disaster managers to respond to extreme events. In many cases, forecasting, early warning and operational flood risk management can significantly improve coping capacity, leading to dramatic reductions of fatalities, property losses and environmental effects.

This workshop, organized by scientists of the GeoForschungsZentrum Potsdam and the University of Karlsruhe, discussed the need and possibilities for improved capacities in crisis management. It presented the perspectives of the International Flood Initiative, a UN inter-agency activity, and presented new tools for local authorities and flood managers.

“Losses from natural disasters are a severe threat to all of our efforts at poverty reduction in developing countries. At the World Bank, part of our work is to assess the economic impact of disasters. What we know is this: it is now clear that natural disasters can have long-term impacts on economic growth and development, especially in developing countries. For countries at high risk of natural disaster, not integrating these risks in development planning makes economic projections unrealistic, and it makes meeting any poverty reduction goals much more difficult. This connection between disaster risk and economic growth, poverty, and planning makes disaster reduction a core development issue for all of us, including my own institution.”

Katherine Sierra, World Bank, Vice-President Infrastructure

(Photo: World Bank)
### Conference Agenda

#### Monday 27 March 2006

**Welcome Address by Federal Minister for Foreign Affairs, Dr. Frank-Walter Steinmeier**

**Opening Address by United Nations Under-Secretary-General for Humanitarian Affairs, Jan Egeland**

**Message from the Mayors' Conference on Early Warning delivered by Juan del Granado Cosio, Lord Mayor of the City of La Paz**

**Key Note Address by Katherine Sierra, World Bank, Vice-President Infrastructure**

**Organizational Matters**

**Address by Special Guest President William J. Clinton, UN Special Envoy for Tsunami Recovery**

### Priorities and Projects Forum (Plenary Chamber)

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<td>Introduction to Session 1: EARTH Staking, Blasting and Sliding - Ready and Resilient for the Hazards of the Earth</td>
<td>Multi-hazard Early Warning Service for Emergency System in the Czech Republic</td>
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<td>During this session, the following projects will be presented that illustrate problems encountered and solutions offered in relation to earthquakes, landslides and volcanic activity</td>
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<td>Short Presentation of Geographical Analysis of the Watershed of the Mocotíes and Líncamintos Valley and Urban Local Plan for Sustainable Development for the Community of Santa Cruz de Mérida, Venezuela</td>
<td>Integrated Climate Early Warning Activities Being Undertaken in the Greater Horn of Africa Within the Framework of the ICAD Centre for Climate Prediction and Applications (ICFAC)</td>
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### Scientific and Technical Symposium (Waterworks)

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#### Poster Session

**Reception hosted by the Federal Foreign Office**
Introduction to Session 3: AIR

Crop Monitoring and Early Warning for Food Security, the MARS-FOOD Approach

F. Rembold

SCIENTIFIC AND TECHNICAL SYMPOSIUM

PRIORITY AND PROJECTS FORUM

Tuesday 28 March 2006

Feedback from Symposium Session 1:

Multi-hazard Approaches

S.-K. Roh, et al.

Overarching Issue 2: National Warning Systems for all Hazards and all People

Welding the Best Players into the Best Team for the Best Results: Politicians, Stakeholders, Community Leaders

Keynote: B. Corby

Introduction to Session 2: WATER

Too Much or Too little—Coping with the Hazards of Water

The Global Framework: Intergovernmental Coordination of Regional Tsunami Warning Systems

P. Bernal, et al.

Participants will present the following results to illustrate problems and solutions related to climate hazards, floods and tsunamis:

- **Vulnerability Assessment**
  - Enhancing Hydroclimate Monitoring Early Warning and Applications for the Reduction of Climate Related Risks in the Greater Horn of Africa
    - J. Ojago

- **Understanding and Respecting Warnings**
  - Implementing a Real-time Flood Forecasting System for East Black Sea Region
    - F. Keskin

- **Reliability of Warnings**
  - Towards a Multi-hazard Early Warning and Response System in West Africa: A Multi-hazard Approach to Forecasting Adverse Health Impacts in Africa
    - D. Rogers

- **Benefits and Challenges of a Multi-hazard Approach**
  - Early Warning of Earthquakes Using Earth, Ocean and Atmospheric Parameters Observed from Satellite Data

- **International Regional Cooperation and Coordination**
  - From Sudden Local Wildland Fire Disasters to Transboundary Impacts of Creeping Wildland Fire Mega Events: Needs for Global Early Warning of Wildland Fire Within a UN Multi-hazard Global Early Warning System
    - J.G. Goldammer, et al.

- **National Cooperation and Coordination**
  - Establishing an Information Chain to Influence the Behaviour of Populations Exposed to Atmospheric and Geological Risks (Cyclones and Tsunamis) in the Caribbean Basin and the Atlantic Ocean, with A View to Reducing their Vulnerability
    - V. Loubenkovsky, et al.

- **Integrating Early Warning into Development Plans and Poverty Reduction Strategies; People Centred Early Warning Systems; Tsunami**
  - Automated Mosquito Identification and Monitoring: A New Tool for Early Warning of Vector-borne Disease Outbreaks
    - E. Anderson

Participants will be presented with the following projects to illustrate problems and solutions related to climate change, floods and tsunamis:

**Themes Projects**

- **Early Warning Communications System for Kingdom of Tonga**
  - J. Sopahleuwakan, J. Lauterjung

- **National Warning Systems for all Hazards**
  - Development of a Regional Sand and Dust Storm Early Warning System (SDS-EWS) in North East Asia
    - Z. Xiao-Ye

- **Central Asia Small Valleys Flood Alert and Vulnerability Reduction Programme (SVP) Regional Platform Development**
  - M. Takai

- **Development of a Regional Sand and Dust Storm Early Warning System (SDS-EWS) in North East Asia**
  - M. Takai

**Knowledge Transfer**

- **People Centred Dissemination Systems**
  - Supporting End to End Flood Early Warning Systems in South East Asia
    - K. Tsuru

**Mega Events**

- **The Global Framework: Intergovernmental Coordination of Regional Tsunami Warning Systems**
  - P. Bernal, et al.

**Discussion Themes**

- **Overarching Issue 3:**
  - The Ultimate Question Who Gets the Message and What Should They do? Engaging Communities, Building Awareness and Preparedness, and Making Early Warning Systems People-centred
    - E. Mucache

- **Overarching Issue 4:**
  - Early Warning for Early Action— Mobilizing the International Community
    - N. Jasseur

Feedback from Symposium Session 2: Mega Events

Supporting End to End Flood Early Warning Systems in South East Asia

E. Tsuru

Wednesday 29 March 2006

**Priorities and Projects Forum (Plenary Chamber)**

**Themes Projects**

- **Strengthening Institutional Capacities and Mechanisms**
  - Development of an Advanced Tropical Cyclone Early Warning System for the Philippines
    - P. Nilo

- **Early Warning Pays Off**
  - Legal and Policy Frameworks; Making Early Warning a Long Term Priority
    - M. Nadig, M.V.K. Sivakumar

- **From Sudden Local Wildland Fire Disasters to Transboundary Impacts of Creeping Wildland Fire Mega Events: Needs for Global Early Warning of Wildland Fire Within a UN Multi-hazard Global Early Warning System**
  - J.G. Goldammer, et al.

- **Early Warning of Earthquakes Using Earth, Ocean and Atmospheric Parameters Observed from Satellite Data**

**Benefits of an Integrated Early Warning System:**

The Jamaican Experience

B. Corby

**Multi-purposes Information System for Early Warning**

D. Raval

**The Helmholtz Association’s Integrated Earth Observation System (ILOS): A German Contribution to Disaster Management**

H. Mehl, et al.

**Predict An Initiative to Help Communities to Anticipate and Manage the Crisis Situations due to Floods**

A. Rousmaghi, K. Moneu

**The National Commission for the Knowledge and Use of Biodiversity**

The African Centre for Early Warning and Disaster Reduction in the Indian Ocean (AFED), and Risk Management of Extreme Floods, GeoForschungsZentrum Potsdam and Universität Karlsruhe

**Wildland Fire, Global Fire Monitoring Centre:**

This will include presentation of two projects:

- **Global Early Warning System for Wildland Fire:**

- **Early Alert, Monitoring and Impact Assessment System for Forest Fires in Mexico and Central America:**
  - E. Rivas

**The National Commission for the Knowledge and Use of Biodiversity**

The African Centre for Early Warning and Disaster Reduction in the Indian Ocean (AFED), and Risk Management of Extreme Floods, GeoForschungsZentrum Potsdam and Universität Karlsruhe

**Workshops**

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The National Commission for the Knowledge and Use of Biodiversity

**Tsunami Early Warning Strengthening Project in the Indian Ocean:**

Partnership for Building Resilience to Tsunamis, UN ISDR Platform for the Promotion of Early Warning and Partners; and Education and Knowledge: Protecting Schools and Promoting Disaster Risk Awareness to Save Lives (Knowledge and Education UN ISDR System Cluster)
Acknowledgements

We would like to thank the following institutions for their generous support in various forms:

- Auswärtiges Amt
  Federal Foreign Office
  www.auswaertiges-amt.de
- City of Bonn
  www.bonn.de
- Deutsche Post World Net
  www.dpwn.de
- ESRI Geoinformatik GmbH
  www.esri-germany.de
- ETON Corporation USA (LEXTRONIX)
  www.etoncorp.com
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- Helmholtz Gemeinschaft
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- United Nations Development Programme (UNDP)
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- United Nations Educational, Scientific and Cultural Organization (UNESCO)
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- United Nations University (UNU)
- United Nations World Food Programme (WFP)
- The World Bank
- World Health Organization (WHO)
- World Meteorological Organization (WMO)

The Third International Conference on Early Warning was organized jointly by ISDR Secretariat staff John Horekens (conference coordinator), Mário Barrantes, Reid Basher, Elena Dohikil, Ulrike Hellmann, Debbie Hixson, Brigitte Leoni, Caro-lin Schaepef, Ana Cristina Thorlund, Florian Wiehneke and Alison Wilshire, by DKKV Secretariat staff Karl-Otto Zentel, Sandra Amlang, Tanja Dähnhardt and Birgit Kley-Fiquet, and by Federal Foreign Office staff Peter Woeste, Jérôme Hamacher, Stefanie Schulze, Katharina Thywissen and Susanne Wiedlich. This core team was supported by numerous other colleagues in UN/ISDR, DKKV and the German Federal Foreign Office.
“Disaster prevention and mitigation are essential to sustainable development, especially for the developing countries and the Least-developed Countries (LDCs). Today, the advances made in meteorology, hydrology and climate research, coupled with progress in telecommunications and computers, can allow the National Meteorological and Hydrological Services of WMO’s Members to issue warnings of hazards from a few hours to several months in advance, thus performing a quantum leap forward in terms of reducing loss of life and property. The challenge for countries is, therefore, to empower each community to apply these tools optimally, through networking and partnerships.”

Michael Jarraud, Secretary-General of WMO
This document is an outcome of the Third International Conference on Early Warning (EWC III) hosted by the Government of Germany under the auspices of the United Nations, from 27 to 29 March 2006 in Bonn, Germany.