



Early Warning as a Matter of Policy

The Conclusions of the Second International Conference on Early Warning

16-18 October 2003, Bonn, Germany



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Index

FOREWORDS TO THE PUBLICATION

Foreword by Joschka Fischer	4
Foreword by Jan Egeland	5

Executive Summary	6
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CONFERENCE OUTCOME DOCUMENTS

The Conference Statement	9
The Early Warning Programme	12
The Policy Guidance Paper	17

CONCLUDING REMARKS

Investment in Early Warning Pays Off	21
Conference Agenda	22
Acknowledgements	26
Further Information	28



OVER 400 PARTICIPANTS FROM 68 COUNTRIES IDENTIFIED THE NEED TO FURTHER STRENGTHEN CAPACITIES FOR EARLY WARNING AT THE SECOND INTERNATIONAL CONFERENCE ON EARLY WARNING (PHOTO: M. MALSCH/DKKV)



Joschka Fischer
Federal Foreign Minister
Berlin, February 2004

Foreword

The Second International Conference on Early Warning (EWC II) lent new momentum to the development of early warning practices and disaster reduction around the globe. I am therefore pleased that the Conference papers and conclusions will now be published on CD-ROM and in book form.

The response to the Conference was resounding. The discussions left a deep impression of the many viewpoints and experiences represented at the event. For the first time ever, a forum was provided where scientists and politicians could fully exchange their views on the subject of early warning.

The Federal Foreign Office organized the first International Conference on Early Warning (EWC '98) in Potsdam in collaboration with the local GeoForschungs-Zentrum (national centre for geoscientific research). That conference produced a round-up of existing systems and structures in the fields of early warning and disaster reduction. Back in 1998, the focus was on research and science. However, the event reaffirmed the importance of putting disaster reduction at the heart of international prevention strategies for the twenty-first century.

Since the EWC '98, technology for predicting natural disasters has improved considerably. The problem today is not



so much a lack of viable early-warning systems, but the failure to make efficient use of them. Tackling this problem is a task for the political level. For this reason, the EWC II centred on the integration of early warning in practical politics. The Conference's subtitle, "Integrating Early Warning into Public Policy", reflects this concern. The EWC II demonstrated the importance of regular and intensive exchange between science and politics for effective early warning.

In addition to the Conference Statement, the participants at the EWC II adopted the Early Warning Programme, a plan of action which is to be implemented by 2015. Guidelines intended to help politi-

cal decision-makers implement early warning systems and improve disaster prevention were also passed. The Conference furthermore recommended the establishment of a United Nations early warning office to coordinate developments and discoveries in the field of early warning. I am pleased to report that the office will commence operations in Bonn this spring.

This documentation collection includes selected papers produced for and discussed at the EWC II and the four regional preparatory conferences in Africa, Asia/Pacific, America and Europe. I hope that this reference work will serve as further inspiration for scientists, researchers and politicians, and will also be an interesting read.

J. Fischer



Jan Egeland

Under Secretary-General for Humanitarian Affairs, United Nations

New York, February 2004

Foreword

This report represents the distillation of the wisdom of hundreds of highly motivated experts and practitioners concerned with disaster reduction and the use of early warning to save lives and property. In 2003 under the auspices of the United Nations International Strategy for Disaster Reduction (ISDR), knowledge and experience from around the world on this matter were compiled extensively at the Second International Conference on Early Warning, 16–18 October 2003, in Bonn, Germany.

Amidst today's conflict ridden world, reducing the human, economic and environmental losses from natural disasters remains one of our key collective challenges. Economic and social development, and the escape from poverty, cannot be successful without addressing the problem of disasters.

Early warning is one of the most powerful tools for dealing with this challenge, and the information contained here provides a virtual blueprint for achieving the much-needed development of early warning capacities and effectiveness over the next decade. I recommend the publication to all those involved in and responsible for disaster risk reduction and disaster risk management.

This initiative also demonstrates the power of partnerships, with the joint



overall coordination of the process by the United Nations and the Government of Germany and the willing participation of so many organizations. I note with great appreciation the excellent work of the Federal Ministry of Foreign Affairs, the German Committee for Disaster Reduction, and the UN/ISDR Secretariat, in bringing both the whole process to fruition, and on behalf of the Secretary-General of the United Nations I commend the Government of Germany for its recognition of and continued support for disaster risk reduction.

The proposal of the Conference, to establish a new early warning “platform” to facilitate continued dialogue on the

subject and to promote widespread development of early warning capacities is very timely and I thank the Government of Germany for its offer to support such an initiative.

Let us never forget the silent, suffering millions, especially those who are poor and least able to protect themselves. It is our collective responsibility to build a safer and brighter future for all.

Jan Egeland



Executive Summary

The impacts across the globe of extreme natural events such as floods and droughts and storms are enormous, and are a serious handicap to the advancement of developing societies struggling to achieve sustainable development. Too often those at risk do not have proper early warning of the events and are not well equipped to respond to the warning information that is available.

Against this background, and with the aim of reducing the negative impact of disasters through better early warning systems, the Second International Conference on Early Warning (EWC II) was organized and held in Bonn, Germany, from 16–18 October 2003 under the auspices of the United Nations International Strategy for Disaster Reduction (ISDR). The conference concentrated on the theme of integrating early warning of disasters into relevant public policy, building on the state of the art knowledge of early warning systems that was generated by the first Early Warning Conference (EWC'98) held in Potsdam, Germany in 1998.

DR. KLAUS TÖPFER (UNEP Executive Director):

*“There is a saying:
forwarned is forearmed.
When we know the threats
we face, we are better able
to prepare for them.”*

The high level of interest in the Conference, which was held in the Internationales Kongresszentrum Bundeshaus, Bonn, was demonstrated by the active

participation of government ministers and officials from thirteen countries, representatives of UN and other multilateral organizations, development assistance agencies, technical and research institutions and non-governmental organizations – over 400 participants in all.

The event provided a unique opportunity for dialogue between the different constituencies concerned with early warning – policy makers, local authorities managers, scientists, practitioners and NGO activists. On everyone's mind was the pressing question of how to more effectively translate the accepted principles on early warning – that were clearly set out at the Potsdam conference – into action-oriented modalities.

The conference deliberations were structured to provide for dialogue and the generation of practical guidance and recommendations for future action. Sessions were held on good practices in early warning and on emerging issues. Regional perspectives and recommendations that had been developed in regional preparatory consultations were presented. Panel discussions looked at solutions for integrating early warning into public policy; at linking new technologies and low-technology solutions for early warning systems; at the responsibilities of policy makers in the context of early warning and urban risks; and at early warning as a decision tool for emergency management. Additional sessions were held to discuss the use of hazard maps for effective early warning, integrated approaches to reduce societal vulnerability to droughts, the implementation of trans-boundary early warning systems for floods, and new technologies and scientific networks.

Throughout the conference, it was reiterated and recognised that disaster reduction measures have to be integrated into sustainable development policies and plans of action, across social, economic and environmental dimensions, and at all levels of society. Early warnings have been identified repeatedly as an essential element of disaster reduction strategies and of other critical development agendas.

JAN EGELAND (Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator United Nations):

*“As a key element
of any disaster reduction strategy,
early warning will bring
us closer to the achievement of
the Millennium
Development Goals.”*

Three important output documents were generated by the Conference

1. The *Conference Statement*, which calls upon all national, regional and international authorities to act with resolve to implement the conference recommendations, particularly the implementation of the early warning programme (see below) and the integration of the programme into disaster reduction strategies and policy at all levels. It also calls for the wide dissemination of the recommendations to authorities at all levels and for the Conference organizers to convey the recommendations to the UN General Assembly at its 58th session.



2. A programme document, *Effective Early Warning to Reduce Disasters: The Need for More Coherent International Action*, sets out the goals and priorities for an international programme to advance the development of early warning systems worldwide. It identifies five focuses for action: (i) integration of early warning into relevant development policies and programmes; (ii) improvement of data collection, facilitating access to relevant data and forecasting; (iii) enhancement of early warning capacities; (iv) people-centred warning systems in particular ensuring gender balance; and (v) a platform (organisational capacity) to sustain the early warning dialogue in the future.
3. A policy advice paper *Integrating Early Warning into Relevant Policy* that sets out principles and guidelines for national policymakers and policy advisors. This outlines and stresses such things as the need for political commitment, the coordination of the relevant national agencies and sectors under a high-level authority, legal frameworks and clear responsibilities, and a sound base of understanding of the risks that are faced.

The participants called for a more sustained international effort to advance the implementation of early warning systems. It was recognized that insufficient progress had been made since the Potsdam conference and this was partly a result of inadequate dialogue and activity at the international level. Participants strongly voiced the need to maintain the momentum initiated in Potsdam and Bonn. In particular, it was agreed that a platform should be set up under the ISDR to support this dialogue, as noted above in the programme document.

The tasks envisioned for the platform included assembling and disseminating information such as databases and best practices, identifying and promoting the

LATIN AMERICAN EARLY WARNING EXPERIENCE

Early warning systems have to meet several requirements, including the use of appropriate technology and know-how, clear responsibilities of parties and effective decision taking mechanisms, a functioning communication system and well-prepared evacuation and response structures. Unfortunately, these conditions are often missing in developing countries in Latin America owing to financial, technical and organizational deficiencies.

Based on several case studies, GTZ concluded that effective early warning is possible in Latin America under three conditions. First, the countries of the region need specific international assistance, especially concerning forecast, technology, advice and training. Second, early warning systems have to take into account and be adapted to national circumstances in order to achieve sustainability and cost-benefit efficiency, and the underlying structural deficiencies such as poverty, centralism and high staff turnover, can only be influenced through the long-term development process. Third, early warning cannot take the place of comprehensive disaster risk management, but must be seen rather as part of such an approach.

The analysis by GTZ raised the question by how developed countries can also learn from the Latin American experiences, concerning two aspects: 1) whether participatory early warning systems in the region can be a model for developed countries; 2) whether protection against damages through preventive measures (e.g. land use planning) and improved risk awareness can be more effective and cost-efficient than high-tech early warning systems.

Source: Wolfgang Stiebens and Christina Bollin
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

Good Practice

REDUCING FLOOD IMPACTS IN MOZAMBIQUE

In Mozambique normal life is often disrupted by natural disasters arising from floods, cyclones, droughts and bush fires, with serious consequences in terms of economic growth and productivity. The devastating floods of 2000 and 2001 set back the country's development by several years. The first phase of the disaster management and prevention project funded by the German Federal Foreign Office focused on equipping the National Disaster Management Institute with the necessary capacities to establish, with the participation of relevant actors, an effective network for disaster prevention right down to local level. Another objective was to raise public awareness of natural disasters.

Since flooding is a long-term problem that Mozambique can do little on its own to prevent (the nine major rivers flowing through the country all have their sources elsewhere), the aim for the second phase of the project is to apply the lessons learned from the first phase by supporting a regional network encompassing the whole region of the Southern African Development Community (SADC) and intensifying cross-border cooperation in this context. The project was presented and recognized as a Type II partnership at the World Summit on Sustainable Development held in Johannesburg in 2002. Following the successful completion of the first phase, the second phase covering the whole SADC region has now been launched.

Source: InWent

Good Practice



VOLCANO ERUPTION IN 2002, NYIRAGONGO, CONGO (PHOTO: IFRC)

resolution of technical issues, developing policy tools such as benchmarking, stimulating collaborations and networking, promoting early warning in international policy agendas, and raising awareness in key constituencies. The Government of Germany at the Conference expressed its interest in supporting such a platform and since then, with this support, the ISDR Secretariat has taken steps toward establishing the platform in Bonn.

The participation and inputs of the many institutions, agencies, regional, national and international involved in the early warning field are fundamental to achieving these ends. The commitment expressed by the wide array of Conference

JOSCHKA FISCHER (Federal Foreign Minister, Germany):

“Disaster prevention and management affects many areas of public and private life and is a core dimension of a strategy for sustainable development.”

participants to contribute to sustained efforts to improve early warning systems provides a strong basis for future progress and is one of the main benefits of the EWC II.



Conference Statement

Second International Conference on Early Warning

The Second International Conference on Early Warning (EWC II) met in Bonn, 16–18 October 2003.

The participants, representing political leaders, organisations engaged in disaster risk management and humanitarian aid, the private sector, as well as the scientific community, identified the need to further strengthen capacities for early warning as a crucial element to reduce risk and vulnerability to natural and technological hazards and thus securing sustainable development.

The participants call upon all national, regional and international authorities to act with resolve to implement the following recommendations which build on the four preparatory regional workshops held in 2003 in Bandung, Antigua, Nairobi and Potsdam.

CONSIDERING ...

... that natural and human induced disasters are increasingly becoming an impediment to achieving the Millennium Development Goals and the objectives of the Johannesburg Plan of Implementation for Sustainable Development,

... the ongoing review of the Yokohama Strategy and Plan of Action for a Safer World of 1994.

RECOGNISING ...

... that disasters are a result of natural hazards and of human, social, economic and environmental vulnerability,

... that disaster reduction is an essential component of relevant global agendas such as combating desertification and reducing the effects of drought, mitiga-

tion and adaptation to climate change, conservation of biodiversity, water resource management and effective humanitarian aid,

... the progress achieved in understanding the importance of early warning since the first International Conference on Early Warning held in Potsdam in 1998 and the International Decade for Natural

Disaster Reduction (IDNDR, 1990–1999),

... that the International Strategy for Disaster Reduction, established by the United Nations General Assembly in 2000, provides a suitable framework for advancing early warning as an essential risk management tool for the reduction of risk and vulnerability to natural and technological hazards,

SUSTAINABLE FLOOD MANAGEMENT AND EARLY WARNING SYSTEMS FOR MEKONG RIVER

Extreme floods in the Lower Mekong Basin have in the past caused calamitous socio-economic and human losses. Conversely, the annual Monsoon floods nourish the soil fertility of the flood plains of the Basin, upon whose ecological wealth millions of people living there depend. Flood forecasting and early warning for the Mekong River has been an on-going activity for more than three decades, but it was the devastating floods of 2000 that prompted the Mekong River Commission (MRC) to make the issue of floods a top priority and to adopt a new Flood Management and Mitigation Strategy in late 2001.

The overall objective of the strategy is to ensure that "people's suffering and economic losses due to floods are prevented, minimized, or mitigated, while preserving the environmental benefits of floods". To implement the Strategy, a Flood Management and Mitigation Programme (FMMP) was formulated and later approved in November 2002. The FMMP deals with complex flood problems using an integrated, holistic floodplain management approach in which trans-boundary and regional issues are taken into consideration.

Provision and dissemination of early warning information forms a key element, with emphasis on both improving the forecasting and dissemination system and strengthening the capacity at the community level to use the warnings for preparedness and response action. Different tools and methods for turning the warnings into an understandable set of information for community use are used. Local involvement in the process ensures a long-term ownership and sustainability of the system that will help people mitigate negative flood impacts, adjust themselves to the rhythm of the river and apply the concept of "Living with Floods".

Source: Thanongdeth Insisiengmay



VILLAGERS FIGHTING A GRASS SAVANNA FIRE, IVORY COAST (PHOTO: GFMC)

EARLY WARNING OF FOREST FIRE DANGER

The Scripps Experimental Climate Prediction Center (ECPC) has been making experimental, near real-time, weekly to seasonal forecasts of forest fire danger for the United States on a routine basis for the past 5 years. Maps of the forecasts are regularly shown on the worldwide web (WWW) site (<http://ecpc.ucsd.edu/>), as well as a number of other national and international sites (e.g. the Global Fire Monitoring Center <http://www.fire.uni-freiburg.de/>).

The forecasts are derived from the results of a global climate model that is a version of the US National Centers for Environmental Prediction's (NCEP's) global spectral model used for the NCEP/NCAR reanalysis. To provide higher spatial resolution information, a more detailed resolution regional spectral model is run for various target regions, using the global model's results as its boundary conditions. The initial conditions and the SST driving conditions for the global forecasts come from the NCEP Global Data Assimilation (GDAS) 00UTC operational analysis, which is available nearly every day in near real time on rotating disk archives. Seven-day global and regional forecasts are made every day and every weekend, and the global and regional forecasts are extended to provide forecasts out to 16 weeks.

ECPC's forecast and analysis system of fire danger is based on the US National Fire Danger Rating System (NFDRS). NFDRS fire danger indices currently being forecast include the Ignition Component (IC), Energy Release component (ER), Burning Index (BI), Spread Component (SC), Keetch Byram drought index (KB), and the Fosberg fire weather index (FWI). The FWI is also forecast globally. Experience shows that all of the indices can be predicted well at weekly times scales and have some skill even out to several months ahead in certain locations. Studies are underway to compare the fire danger predictions to the actual incidence and extent of fire characteristics.

Source: John Roads, Experimental Climate Prediction Center (ECPC), Scripps Institution of Oceanography, USA

... that the guiding principles for early warning identified in 1998 are still not effectively implemented.

CALLS FOR ...

... the integration of early warning systems into government policies and requests the organizers to disseminate widely to authorities at all levels the relevant guidelines recommended by the Conference,

... governments and relevant organizations including the private sector to support the implementation of the early warning programme as recommended by the Conference and to integrate the programme into disaster reduction strategies at all levels,

... the early warning programme to focus on: (i) integration of early warning into relevant development policies and programmes; (ii) improvement of data collection, facilitating access to relevant data and forecasting; (iii) enhancement of capacities; (iv) people centred warning systems in particular ensuring gender balance; and (v) a platform to sustain the early warning dialogue.

... the ISDR Secretariat to facilitate the implementation of the proposed early warning programme, to sustain the



dialogue on early warning and mobilize resources to strengthen partnerships and capacities at all levels,

... the organizers of the Conference to convey its recommendations to the UN General Assembly at its 58th session.

WELCOMES ...

... the offer of the German Government to provide additional support to the work of the ISDR Secretariat in the field of early warning and invites other Governments to contribute,

AND EXPRESSES ITS WARM APPRECIATION ...

... to the German Federal Foreign Office, the German National Committee for Disaster Reduction and the City of Bonn for their hospitality.

Bonn, 18 October 2003

JÜRGEN TRITTIN (Federal Environment Minister, Germany):

“It is wiser to take preventive action than to stack sand-bags.”

UNDERSTANDING PUBLIC WEATHER WARNINGS USING THE CARTE DE VIGILANCE

Following the devastating storms and floods that occurred in France in December 1999, Météo-France worked with its partners from civil protection services in order to determine weaknesses of the existing meteorological hazard warnings system. Four items were identified: 1) There were too many warnings, due to the choice of regional criteria, especially for thunderstorms, that result in a lessening of the impact of the warnings; 2) The information for the general public was not well expressed, because the messages are tailored for operational security services, with technical words that are not easily understandable to many people (in addition, the security services warn the departmental authorities, fire authorities, etc, but not directly the media nor general public, which are sometimes informed very late); 3) The impacts of meteorological events are not explained – for instance, the general public would not know what a 130 km/h wind means to them, and; 4) Even if the event was well explained, the general public would not necessarily know how to react to the warning.

After this analysis, Météo-France and its partners decided to develop a new system in order to overcome all these difficulties – this is called the "Carte de Vigilance", or weather watch map system. It is a colour-coded map for France, with each department assigned a colour according to the seriousness of the predicted meteorological risk, from green for no particular risk, to red for the highest level. Each colour is accompanied by a brief explanation of how unusual the predicted conditions are and what sort of response the public should take. The map is updated at least twice a day, and is valid for 24 hours. A more detailed description of the meteorological situation is given for the orange and red areas, where dangerous phenomena are foreseen. Four types of phenomena are considered: strong wind, rain, thunderstorms, snow/ice, and avalanche. The vigilance chart is directly available to the public (see the web site <http://www.meteo.fr/meteonet/index.htm>.)

Source: Météo-France



Effective Early Warning to Reduce Disasters: The Need for More Coherent International Action

Executive summary

Disasters arising from natural hazards are a growing global threat affecting tens of millions of people every year, with devastating impacts on vulnerable communities in developing countries and high costs to developed countries. It is internationally well recognised that effective early warning systems* are

essential to save lives and protect property, and to secure livelihoods and sustainable development. However, despite quite good knowledge of disasters and early warning methods and some outstanding successes, overall progress over the last decade to build warning systems that truly serve those affected and most at risk has been disappointing.

The Second International Conference on Early Warning (EWC II), held in Bonn Germany, 16–18 October 2003, together with its preparatory regional consultation meetings, has concluded that a bolder and more systematic approach is needed to overcome this problem. The Conference identified a number of priority areas for action. Key requirements are the motivation of sustained political commitment and the incorporation of early warning as an integral and sustained part of policy and decision-making. It was agreed that a more systematic, coordinated effort is needed, particularly through better international cooperation, partnerships and programme action. The Conference's recommendations provide the starting point for an international programme to support the development of more efficient and effective early warning systems.

PART I. BACKGROUND

Disasters and early warning

Every year, disasters affect tens of millions of people, cause economic losses of tens of billions of dollars, and kill tens of thousands of people. The impacts are much greater for the poor, in death rates, shattered livelihoods, starvation, and sometimes disease. The economic impacts of disasters are a serious handicap to the economic development of countries, with losses sometimes equal to several years of national growth gains.

* Early warning is used here in a complete "system" sense, encompassing the generation and effective use of advance information on impending risks. It is a key element of overall risk management.

Good Practice

INTERNATIONAL FLOOD NETWORK AND GLOBAL FLOOD ALERT SYSTEM

The Ministry of Land, Infrastructure and Transport, Japan (MLIT) represented by the Water in Rivers Secretariat, Infrastructure Development Institute (IDI), together with other international key partner organizations, have launched the International Flood Network (IFNet). IFNet has been established with the aim of creating a sound mechanism to mobilize the international community and to serve as a platform within which all organizations and individuals with appropriate qualification in flood management issues can exchange information and experiences and seek partnership to improve the effectiveness of their individual programmes and actions.

IFNet programmes integrate the development of a Global Flood Alert System (GFAS) to assist developing countries improve their flood preparedness and enhance local flood control and mitigation measures. GFAS is being developed to support national meteorological organizations in each country for flood alert services and to provide satellite-based information on downpours in the upper reaches of rivers where telemeters and observation data do not exist.

The global accumulated rainfall data are processed to produce a 3-hourly global rainfall maps and numerical weather prediction among other data. Precipitation data measured at the surface of the earth at local river basins will be used as calibration data in this process. The 3-hour precipitation map produced by NASADA will be delivered immediately online via the internet IFNet Global Alert System. Further processing based on local geographic and topographic information such as critical rainfall returns periods will be pioneered by IFNet. If the processed rainfall data exceeds some critical value, a flood alert is automatically issued to the organizations in charge of meteorology and disaster prevention of the affected country.

Source: Ryosuke Kikuchi, Infrastructure Development Institute (IDI), Japan



Ominously, disasters have increased significantly over the last three decades, especially those linked to hydro-meteorological events. These comprise the bulk of all disasters and are projected to increase over time due to climate change. But we know that disasters are a result of human vulnerability to hazards, and that rapid increases in human vulnerability are occurring as a result of population growth and migration, development processes, and environmental degradation.

Early warnings that quickly reach those at risk, and that are effectively acted upon, can substantially reduce loss of life and damage to property. This requires an appreciation of all the sources of risk and vulnerability, and the integration of early warning into public policy and community action.

Recognition of early warning by international community

Early warning has repeatedly been identified as an essential element of disaster reduction strategies and action plans at all levels. Many global frameworks recognise early warning as an important element of sustainable development – for example in Agenda 21, the Millennium Development Goals, the follow-up processes to the 2002 World Summit on Sustainable Development, and the 1994 Yokohama World Conference on Natural Disaster Reduction.

The International Conference on Freshwater, Bonn, Germany, December 2001 identified early warning systems as an integral part of water resources development and planning and a priority area for action. The Marrakesh Accords adopted at the seventh session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP7) call for the strengthening and where needed establishment of early warning systems for extreme climate events in an integrated and interdisciplinary manner, in particular in countries most vulnerable to climate change. Early warning is

identified as an important element under the UN Convention to Combat Desertification.

MICHEL JARRAUD (Secretary-General World Meteorological Organization):

“Warnings are available to all nations, irrespective of their level of development. They should be appropriately integrated in disaster mitigation strategies and policies.”

Early warning is a principal component of the International Strategy for Disaster Reduction (ISDR). The 1998 Potsdam International Conference on Early Warning Systems for the Reduction of Natural Disasters (EWC'98) confirmed early warning as a core component of disaster prevention strategies for the 21st century. The current UN General Assembly mandated review of progress on disaster risk reduction since the 1994 Yokohama conference, will include a thematic review of early warning.

PART II. LESSONS AND RECOMMENDATIONS

Overall

The Conference concluded that significant progress has been made since the Potsdam EWC'98, but that a bolder and more systematic approach to early warning was needed — as a global public good — in order to address the growing disaster problem in both developing and developed countries.

Identified needs and constraints

The regional consultations assessed the current needs and constraints in respect to early warning. Many early warning systems are in place and are well proven. The past decade has seen many technical improvements, arising from better understanding of the physical cau-

ses of disasters, better tools for forecasting and prediction, including seasonal forecasts, and better monitoring and modelling of disaster related factors, e.g. soil moisture, crop status and river levels. Slower progress is being made in developing comprehensive drought monitoring and mitigation programmes and warning methodologies for geological hazards. Resources are an issue, particularly to maintain adequate observation networks for hydro-meteorological hazards.

In contrast, progress in the use of warnings to achieve effective responses and interventions has been inadequate, particularly at the local level and at the national and community levels in developing countries. Major concerns and constraints include the design of warning messages, community engagement, understanding of appropriate responses, the credibility of warnings, issues of responsibility and authority, as well as inadequate access to warnings by high risk groups. The regional consultations recognised that meeting these needs at community and national levels was a clear priority.

A welcome achievement in the risk management and early warning fields is the shift from a focus on the monitoring and warning of hazards toward an emphasis on the socio-economic factors of vulnerability. This emerging trend is most advanced for earthquakes and droughts. There is also increasing awareness of the complexity of disasters, in terms of the variety of hazards, natural and technological, and the interactions with health and conflict issues.

Areas of focus and priorities

The Conference agreed that the development of effective early warning by countries and communities required a significant increase in coordinated support and action. It recognised the need to more clearly define the priority needs and actions and to ensure continued international leadership and coordination, preferably to be achieved through the UN.



DR. KLAUS TÖPFER (UNEP Executive Director):

“While prevention may seem costly, the cost of failing to anticipate and respond appropriately to disasters is even more costly.”

Five key areas of focus for international programme action were identified by the Conference and its preparatory regional consultations, and specific proposals were developed for each area of focus. These provide the basis for the conference's views and recommendations of the priority elements for an international programme of early warning.

► **Area of focus 1:**

Better integration of early warning (and related disaster risk reduction and management) into development processes and public policies

This includes support for the efforts of policymakers and decision makers at all levels, in particular those aimed at:

- Motivating long-term political commitment, particularly through the demonstration of benefit/cost relationships and other value assessments of early warning services.
- Developing legislation and institutional frameworks with defined roles and responsibilities and sustainable budgets.
- Integrating early warning into policies on disaster management and humanitarian assistance.
- Training officials at all levels.
- Seeking better linking of early warning in national economic planning such as debt management and investment in structural measures of disaster risk reduction.
- Identifying needs and approaches in respect to new and complex types of hazards, and building linkages with health and ecology groups and their early warning activities.

- Identifying institutional and individual role models and those who can “champion” early warning.
- Stimulating public/private partnerships to leverage public inputs, and to develop linkages with financial risk management.
- Developing, testing and implementing benchmarks and targets for early warning system performance.
- Strengthening the role of early warning in national development frameworks, national platforms for disaster risk reduction, regional coordinating mechanisms, and international networks.
- Promotion of early warning in important international forums and programmes, e.g. those concerned with the conventions on climate change and combating desertification, the Commission for Sustainable Development's follow up of the World Summit on Sustainable Development, and humanitarian relief.

► **Area of focus 2:**

Improved data availability for investigating, forecasting/predicting and managing risks on different time scales

This involves actions of mainly technical character, particularly:

- Securing basic hazard monitoring and data infrastructure, particularly for hydro-meteorological networks and facilities.
- Improving the sustainability of equipment through international collaboration on more appropriate system design choices.
- Developing and disseminating systematic assessments and maps of hazards, risks and vulnerabilities.
- Making better use of satellite data and spatial data methodologies, and engaging with global initiatives on these technologies.
- Improving the quality of warnings (accuracy, timeliness, relevance).
- Standardizing early warning concepts, terminologies, databases, maps, and information management.

- Developing mechanisms and networks for freely exchanging information and experience among stakeholders and disciplines and enhancing trans-boundary cooperation and data exchange.
- Developing improved information on emerging threats and risk scenarios.

► **Area of focus 3:**

Improved capacities and strengthened early warning systems, particularly in developing countries

This includes capacity building in all countries to fill gaps in skills and technical facilities, such as through:

- Systematic assessment of capacity needs, including compilation of inventories of early warning systems, covering institutional and social factors, system performance, research, and supporting mechanisms.
- Conducting self-assessments of early warning systems, their resource bases, and roles.
- Training people involved in early warning, risk management, and related policy.
- Exchange of early warning knowledge.
- Developing education curricula.
- Engaging private sector networks, especially those concerned with insurance, finance, risk assessment and risk reduction.
- Assisting in the design and provision of warning systems for developing countries.
- Development of user-oriented locally relevant techniques for early warning, including risk assessments, warning dissemination and response methods.
- Building the capacities of relevant national scientific institutions, including social and economic expertise.

► **Area of focus 4:**

Development of people-centred warning systems

This focus area identifies steps needed to make early warning systems much more effective for those at risk. These include:



- Developing community-focused early warning and disaster risk reduction programmes, using participatory approaches to both design and implementation.
- Making the needs of those at risk the explicit focus of warning services, recognising the diversity (age, gender, disability, education, etc.) of those affected, and fostering linkages with end-users.
- Identifying gender-relevant information, guidelines, and policies in early warning systems.
- Accessing and using local wisdom and traditional knowledge relevant to early warning.
- Promoting specific engagement of civil society actors in the warning system.
- Institutionalization of local civil protection units to sustain activities at local levels.
- Development and dissemination of practical response methods for those at risk.
- Broaden the audience and improve public awareness and knowledge through advocacy, publicity, and education.
- Developing guidelines and indicators for achieving people-centred warning services.

► **Area of focus 5:**

Mechanisms for sustaining the early warning dialogue and supporting the development and implementation of a programme

This focus area calls for actions to strengthen the role and capacities of the UN to support early warning stakeholder needs, particularly the following:

- Supporting the development of international strategies and networking to advance early warning, with emphasis on specific priorities, targets, roles and financial support.
- Promoting early warning and its integration into policies in key international forums and programmes, including the Second World Disaster Reduction Conference planned for 2005.



FLOOD IN 2001, MOZAMBIQUE (PHOTO: IFRC)

SOUTH AFRICAN WEATHER EVENT - EARLY WARNING OR MESSAGE MISREAD?

A powerful 'cut-off low' caused three deaths and major impacts to agriculture and the provincial roads network in South Africa in March 2003. An estimated US \$ 30 million in direct economic losses were attributed to the weather system and the riverine floods that followed. Moreover, hundreds of rain-affected households were temporarily evacuated, and in the months following the extreme weather event, significant increases in child illness were recorded in health facilities in the areas affected by the disaster.

The South African Weather Service identified the March 2003 cut-off low as a potential extreme weather event in the days immediately preceding the 22–26 March. Unfortunately, the advisories and warnings did not activate preparedness measures in the areas subsequently affected. It is also significant to note that the advisories and warnings were issued during a long holiday weekend that began on Friday 21 March.

This case-study suggests that a mismatch between the meteorological forecast and its operational interpretation contributed to an institutional response that overlooked 'extreme weather-affected' communities — ie households and communities that were not 'river-flood affected' but nonetheless sustained considerable loss triggered by the extreme weather. In this context, the case-study illustrates the challenges in transforming institutional and human resource capabilities to keep pace with established national weather warning expertise and technologies — and ensuring that warning processes better communicate with user groups with limited understanding of complex weather and its consequences.

Source: Ailsa Holloway, University of Cape Town, South Africa

- Seeking the integration of other strategic frameworks, such as the UNCCD Thematic Programme Framework Network for Early Warning Systems, into the ISDR.
- Stimulating innovation on early warning in areas such as: specific benchmarks, targets and operational protocols; improved data on disasters and early warning; economic valuation of disasters and early warning investments; and supporting partners and networks with information resources.



- Supporting the improvement of early warning capacities, especially in vulnerable countries, through projects to develop, demonstrate and test early warning methodologies, including benchmarking, and to evaluate benefits.

An early warning programme and international platform

The Conference agreed that an internationally coordinated programme approach to early warning was needed, along with a supporting platform (organizational capacity) to advance it. The programme and platform should be integral contributing parts of the international community's strategy for disaster reduction — i.e. of the ISDR. The plat-

form was seen as the means to stimulate, broker and coordinate widespread efforts in support of improved early warning.

The programme should be structured to encourage and facilitate an expanded dialogue among UN agencies, international organizations, academic institutions, non-governmental organizations, and private sector actors, as well as between these entities and their counterparts at regional, national, and local community level. This will require a great deal of network development.

The dialogue should aim to enhance early warning linkages and cooperation between the humanitarian and develop-

ment communities. It should strengthen existing centres for disaster reduction and early warning.

An important outcome of the dialogue will need to be the progressive enhancement of the programme strategy and associated work plans.

The programme should also provide leadership on promoting the development of tools and techniques for improving and evaluating the efficiency and effectiveness of all parts of the early warning system. This could include stimulating methodology development such as on benchmarks, curricula, technical innovation, economic valuation, standardization, research agendas, and international standard reporting of early warning capabilities and progress. It should also include the development of specialized types of information needed by the early warning community.

It needs to be emphasized that such a programme will be “owned” and shaped by many partners and supporters and that its goals will be largely achieved through the ongoing work of the stakeholders. This is the same way that the existing ISDR goals are achieved.

Lastly, additional resources of a substantial and long-term character will be needed to achieve the significant leap in progress intended under the programme and for establishing the supporting platform. The Conference welcomed Germany's offer to assist in the support of the proposed programme and platform, and encouraged other governments to also support it as appropriate.

Note: A draft of this document was distributed at the Conference and was discussed in open session on 18 October. Suggestions and comments made at that time and in a following two-week review period have been accommodated in this final version of 12 November 2003. For more information visit the conference website www.ewc2.org or the ISDR website www.unisdr.org

Good Practice

BUILDING COMMUNITY PREPAREDNESS TO VOLCANIC HAZARD IN GOMA, D R CONGO

The lava flows following the eruption of Mount Nyiragongo on January 17th 2002 caused widespread destruction in and around Goma, eastern Democratic Republic of Congo (DRC). There were no early warning systems in place, despite the continued monitoring of the volcano by the Goma Volcanic Observatory and clear signals that volcanic activity was imminent. One week before the eruption, the volcanologists were already notifying the population that a catastrophe at Mount Nyiragongo was about to take place. However these messages were not well communicated to the population for various reasons.

Concern's Community Preparedness for Volcano Hazards Programme runs from 1 June 2002 – 31 May 2004. Its goal is to contribute towards the strengthening of the response capacities of the population to prevent and reduce risks of damage or losses caused by volcanic activity in the vicinity of Goma by three specific objectives: 1) Strengthen community understanding of volcano-associated risks; 2) Strengthen information networks on volcano-related risks; 3) Strengthen mitigation response of partners and communities.

The programme has helped to raise awareness at a grassroots level, to build the capacity of key local stakeholders — administrative representatives, health and education staff, local Red Cross representatives — and to bridge the gap between the general population and the sub-Commissions for Education and Civil Protection set up in the wake of the volcanic eruption of 2002. Using participative methodologies, Concern has integrated existing civil society structures as fully as possible into the programme and ensured that they are able to replicate risk assessments and extend communication strategies further into the community. It also presented lessons learned so far and possible future avenues of collaboration and support to community-based early warning and response strategies.

Source: Concern Worldwide



Integrating Early Warning into Relevant Policies

The elements for integrating early warning for natural hazards and risks into relevant policies specifically address public authorities and should be seen as a tool to support the successful application of the existing *Guiding Principles for Effective Early Warning* (www.unisdr.org) produced during the International Decade for Natural Disaster Reduction (IDNDR, 1990–1999).

Good governance includes the protection of the public from disasters through the implementation of disaster risk reduction policies. Although natural phenomena, by definition, cannot be prevented, their human, socio-economic and environmental impacts can and should be minimized through appropriate measures, including risk and vulnerability reduction, early warning and preparedness. A strong focus is often given to these problems, during or in the immediate aftermath of a disaster. Disaster

risk reduction measures require ongoing attention in order to effectively reduce the growing vulnerability of communities and assets.

Governments, both national and local are fully expected, by their constituent populations and neighbouring nations, to reduce the exposure of people and

assets to the effects of disasters. Below you will find some suggestions, based on examples and world wide best practices, of elements that need to be taken into account to effectively integrate monitoring, early warning and response systems, into disaster risk reduction policies and plans and programmes supporting sustainable development.

LESSONS LEARNED IN 2002 EUROPEAN FLOODS

The Czech Republic was subject to two extreme weather events resulting in floods in 1997 and 2002. The flood of 2002 was rare and extreme in size, and it provided many lessons concerning early warning, the organizing of civil society and disaster reduction. There has been a significant change in methods and attitudes among governments and civil society, leading to more efficient prevention efforts. For example, it was observed that meteorological and hydrological services in the Czech Republic and neighboring countries could help improve technological and communication systems, such as building removable metal dykes and introducing special "crisis" mobile phones that would still operate when the normal mobile phone network fails.

Two communication-related problems were identified. The first problem was the restricted cooperation among the senior officers in the river authorities who are in charge of the regulation of outflows from reservoirs, the forecast and early warning providers, and the administrative authorities and civil society organizations. The second problem was the restricted cooperation between the early warning providers and the enterprises of the mass transportation systems, particularly subway systems.

The importance of cooperation beyond political boundaries was recognized as crucial. This includes all of the domestic and international boundaries that intersect the rivers and their catchments. The establishment of regional networks of civil society representatives is also important, not only immediately before and during a disaster event, but also on a long term basis, involving education, training and a general exchange of experience on all subjects of mitigation and reduction of disasters. The Central European Disaster Prevention Forum (CEUDIP), involving six Central European countries, has since introduced a number of activities to improve systematic cooperation.

Source: J. Nemeč and I. Obrusnik, Czech Republic

Good Practice

JAN EGELAND (Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator United Nations):

“The commitment of policy makers is essential for achieving an effective early warning system. By accepting political responsibility to promote integrated early warning strategies, governments take a crucial step towards protecting the interests of communities against a possible disaster.”



Public policy for disaster reduction starts with **political commitment and high-level authority** for the coordination of various national agencies and sectors and their participation in policy-making. Warnings are based on technical information and monitoring of risks, but it requires a political decision to act upon a warning. The most critical and immediate response to a disaster will depend on authorities and institutions at various levels. Local government, local institutions and communities must be empowered to participate in the entire policy making process, so they are fully aware and prepared to respond.

Early Warning for disaster reduction is a legitimate matter of public policy at the highest national levels for two main reasons:

- The first one is **public safety, and the protection of human lives**. In the 1970s, natural disasters alone claimed nearly 2 million lives. By the 1990s, even though the occurrence of disasters was greater, fatalities had fallen to under 800,000. Although the total number of people affected by disasters did increase markedly during that time, the above figures show that it is possible to reduce the loss of life.
- The second is the **protection of the nation's resource base and productive assets** (infrastructure and private property or investments) to ensure long-term development and economic growth. Conversely, by reducing the impact of disasters, a government avoids the financial – and political – burden of massive rehabilitation costs. To be effective in that regard, early warning systems must be combined with other risk reduction measures. Again, during the 1990s, direct economic losses reached an estimated US \$629 billion, seven times more than the 1960's.

Investing in early warning systems as part of disaster reduction is neither

SÁLVANO BRICEÑO (Director Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR):

“The role of governments in the early warning process cannot be underestimated. With political commitment to integrate early warning into public policies, we can ensure that people's lives and property can be protected in the face of a disaster.”

simple nor inexpensive, but the benefits of doing so, and the costs of failing to, are considerable.

For instance:

- Early warning and disaster preparedness 'pays for itself' many times over the life of the warning system because of its ability to reduce human and economic loss.
- The reduction of environmental losses can, if properly managed and publicized, have both long-term benefits to the economy, and short-term benefits for the administration in charge.
- A country can strengthen its stature and influence in international relations by a good handling of 'externalities', or indirect effects, on neighbouring nations, and by taking a leading role in the management of common waterways and ecosystems. Coordinated management, including disaster reduction by thirteen nations sharing the Danube river, or by countries along the Mekong, are good examples.

From a public policy viewpoint, early warning, disaster preparedness and prevention must be part of a single, well integrated process and policy. The decision to act upon receipt of warning information is political in character. Normally, action resulting from warnings should

be based on previously established disaster management procedures and capacities of organizations at national and local level. These procedures and capacities may also require strengthening in some cases, in particular in developing countries.

Key elements for successful implementation:

✔ **Understand the most likely risks, likelihood of disasters and their potential consequences.** Although natural disasters are not always predictable, they are most often generally foreseeable. Many natural hazards can be foreseen, or anticipated, from past experience, the analysis of current patterns of land use, or population distribution.

Policy decisions should be based on a sound assessment of risk. Two elements are essential in the formulation of risk: the probability of occurrence for a given threat – **hazard**; and the degree of susceptibility of the element exposed to that hazard – **vulnerability**. The negative impact, or the disaster, will depend on the characteristics, probability and intensity of the hazard, as well as the susceptibility of the exposed elements (both people and assets based on physical, social, economic and environmental conditions).

While considerable advance has been made in forecasting and monitoring of disasters, the accompanying vulnerability and risk information is often missing. Policy makers should utilise standardised methodologies to promote the assessment of hazards and vulnerabilities and generate risk scenarios and risk maps.

Information provided by risk assessments will support the effective application of early warning systems.

✔ **Establish proper priorities.** Scarce resources must be allocated



ted wisely. Decision makers must rely on the above definition of risk assessment, and take decisions which have the highest 'value' in relation to avoided losses, such as investing in local early warning systems, education, or enhanced monitoring and observational systems.

✓ Clarify responsibilities.

Develop institutional networks with clear responsibilities. Multi-disciplinary research, multi-sector policy and planning, multi-stakeholder participation and networking of relevant organizations is essential. This should include fundamental science and research (including social sciences and cultural aspects), land use planning, environment, finance, development, education, health, energy, communications, transportation, labour and social security as well as national defence. This may imply the need for decentralisation in the decision making process and enhancing local government and community responsibilities.

Benefits that accrue from such connections include improved efficiency, credibility, accountability, trust and cost-effectiveness, a unified strategic framework for decision making on issues of common concern, lessening duplication of efforts, as well as mandating an appropriate division of responsibilities.

DR. IRMGARD SCHWAETZER
(Chairperson German Committee for Disaster Reduction (DKKV)):

“Damages from natural disasters can be reduced: for the protection of lives, health, the environment and material assets. Now politicians, scientists and humanitarian organisations are required to realize early warning in their practical work.”

The spectrum of collaborative processes and activities includes various ways of sharing information, joint research and integrated databases through to participatory strategic planning and programming.

✓ Establish and strengthen legal frameworks.

Just as for any other aspect of public policy, early warning systems, as well as other disaster reduction applications, need to be motivated and based within governmental responsibilities, especially since response to disasters may require exceptional executive powers for a specific period of time but its success cannot be accomplished without the benefits of widespread decision-making and the participation of many others.

While disaster management and response co-ordination can benefit from centralized command there is an increasing recognition of the need to decentralize disaster risk reduction, including early warning system responsibilities.

Along with the decentralization of power and devolution of governing authority, disaster risk reduction at the local community level needs to be encouraged, and be coordinated by municipalities, townships, and local communities.

✓ Developing effective communication strategies.

The context of early warning system communications has two aspects; the hardware aspect relates to the maintenance of communication infrastructure,

INDONESIAN EARLY WARNING OF 2001 ERUPTION OF MERAPI VOLCANO

The Indonesian archipelago is exposed to significant geological hazards, particularly volcanic eruption, earthquake, tsunami, and landslide, owing to its location associated with the interacting boundaries of three major tectonic plate systems. The hazards have been mapped in the Volcanic Hazard Map, Landslide Hazard Map, Seismic Hazard Zonation Map, and Tsunami Hazard Zonation Map. These show that about 20 % of Indonesia's 210 million population live in the dangerous areas.

Volcanic hazard mitigation is the most well-developed type of geological hazard mitigation in Indonesia. A good example of the success of Indonesia's Applied Volcanic Hazard Early Warning System is the 2001 Merapi eruption. This volcano has five observation posts on its flanks. Observations include seismic data, visual monitoring, GPS deformation data, and other methods. The information is relayed to and analyzed by the office of the Volcanological Technology Research Center, Directorate of Volcanology and Geological Hazard Mitigation at Yogyakarta. Over 2000 and early 2001, the increasing activity at Merapi led to declarations of increasing risk, from level I through to level IV. When the statement of level IV was issued, the local government called for the evacuation of all people in critical areas according to the Merapi Volcanic Hazard Map 50. The event subsided quickly and by early March 2001 had decreased to level II condition. No one was killed during the eruption.

Throughout the Merapi crisis, information of the daily condition of the volcano was reported to the local government through radio communication. Special advice and education of communities (socialization process) was also carried out periodically. Additional steps were taken, including installing sirens, a raingage using telemetry system for monitoring lahar flows, and gas detectors near the volcano.

Source: Djumarma Wirakusumah



i.e. the necessity to build or strengthen robust hazard-resistant communication systems; the software aspect relates to the maintenance of relationships, i.e. the need to establish and maintain effective links and working relationships among the stakeholders involved in the early warning communication chain.

Wishing not to appear 'alarmist', or to avoid criticism, local and national governments have sometimes kept the public in the dark when receiving technical information on imminent threats. The lack of clear and straightforward information, when contrasted with the reality of a disaster, and a profusion of conflicting news or rumours, can sometimes confuse people and undermine

their confidence in public officials. Conversely, there are quite a few cases where the public may have refused to heed early warnings from authorities, and have therefore exposed themselves to danger or forced governments to impose removal measures. In any case, clear and balanced information is critical, even when some level of uncertainty remains.



Securing resources.

A substantial amount of resources are needed to ensure monitoring mechanisms, effective early warning procedures, concerted disaster reduction. To a great extent, the capacity to secure resources to do this – versus undertaking a competing public program –

depends on the quality and credibility of the overall system: understanding threats, clear priority setting and institutional networks, and appropriate legislative dialogue. Human resources are also essential. Capacities and competences in administrations, in particular at local levels, requires ongoing support.

“More effective prevention strategies would save not only tens of billions of dollars, but save tens of thousands of lives. Funds currently spent on intervention and relief could be devoted to enhancing equitable and sustainable development instead, which would further reduce the risk for war and disaster. Building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; they are the disasters that did NOT happen.”

Kofi Annan, “Facing the Humanitarian Challenge: Towards a Culture of Prevention”, UNGA, A/54/1

These elements for integrating early warning into disaster risk reduction policies are not exhaustive and are a first step in supporting the effective integration of early warning of natural disasters into public policy. Further guidance needs to be provided to different audiences to help in addressing identified constraints and shortcomings in the effective application of early warning systems.

DR. KLAUS TÖPFER (UNEP Executive Director):

“The integration of early warning into policy, into legal frameworks, and into fully described chains of decision making is still weak in most countries. This must become a priority.”

EARLY WARNING AND THE INSURANCE INDUSTRY

Over the last four decades, losses from natural disasters have increased dramatically both for economies and the insurance industry. Consequently, loss prevention measures are becoming increasingly important as a means of minimizing the loss burden from such events.

Methods of forecasting, prediction, early warning and alert have become more sophisticated and reliable. Insurers have been observing these developments very closely and have already started to embed some early warning applications in their strategies, either as part of their customer service or as a means of preparing themselves immediately before or during catastrophic events. The customer-related usage of early warning ranges from use of weather-alert systems to recommendations concerning structural protection measures, and from general information on risks to specific training programs. Sometimes loss adjusters are sent to assess high risk areas.

However, even accurate forecasts and prediction are not helpful if they are not well received by the public. Early warnings must be communicated to the right people, concisely, in due time and comprehensibly. The cooperation of scientific institutions, public authorities, the insurance sector and the media is of vital importance to reach the population effectively and reduce the danger to life and property. There have been promising developments in the recent past, but there is also still a lot of scope for optimization in all components, particularly in the telecommunication area. These opportunities must be identified and implemented in order to make the current knowledge and the technical possibilities accessible everywhere on earth, and improve the chances of people to reduce their risk of becoming victims of a devastating disaster. The insurance industry plays a forceful role in these efforts, and the industry itself functions as a global early warning system.

Source: Gerhard Berz, Wolfgang Kron, Anselm Smolka Munich Reinsurance Company

Good Practices



Investment in Early Warning Pays Off

Worldwide, one of the best-known public agencies is the national weather service or meteorological agency. Almost every country in the world has a weather service that provides round the clock monitoring and early warning services. This widespread commitment by governments demonstrates that public investment in forecasting and early warning is recognised as well justified by the savings of lives and the reduction of financial losses that can be achieved.

The United States alone spends nearly US \$ 1,500 million per year on short-term warning and forecasting services. A study by the US National Institute of Standards and Technology estimated that the economic benefits of a National Weather Service modernization programme were about eight times greater than the costs involved, bringing annual benefits of US \$ 7,000 million.

Reports also indicate that long-range forecasts of the El Nino/Southern Oscillation (ENSO) phenomenon could result in economic benefits of between US \$ 240–US \$324 million per year to US consumers and producers, while a related cost-benefit analysis of investments in research and observing systems to support improved ENSO forecast capabilities could have real economic returns of 13 to 26 percent to the United States.

Another compelling argument arises from a simple assessment of the enormous costs of disasters. UNDP in its World Development Report 2000/2001 notes that the average annual losses from flooding in Asia alone amounts to about US \$ 15,000 million. Even a small percentage reduction in losses through



OBSERVATION STATION HONDURAS (PHOTO: GTZ)

PETER PLATTE (Deputy Head, Humanitarian Aid Task Force of the Federal Foreign Office):

“Humankind finally has to learn to invest in things that will not be of immediate benefit but rather will only bear fruit in the more distant future — using early warning to avoid natural disasters is one such example.”

better early warning will translate into very significant savings, not to mention the benefits of avoiding disruptions of households and businesses and most importantly the saving of lives.

An Australian study stated that the cost-benefit ratio for urban flood warning sys-

tems is “extremely favourable”, and that investment in urban flood warning systems is likely to be the most cost-effective flood mitigation strategy. A benefit to cost ratio of 6 was noted.

In developing countries especially, where sustainable economic growth is often hard won, and where people and their livelihoods are vulnerable, the benefits accruing from early warning are especially important.

At times of threat, the early warning messages provide not only welcome information and a means for action, but also the certain knowledge that the economic losses will be less severe, and that the investment in early warning systems is once again paying off.



1ST DAY	▶ OPENING	<p>OPENING</p> <p>Opening Statements: Federal Environment Minister Jürgen Trittin, United Nations Under-Secretary General for Humaitarian Affairs Jan Egeland</p> <p>Opening Messages: Dahou Ould-Kablia (Algeria), Yang Yanyin (China), Chris Murungaru (Kenya), Jean Seth Rambeloalijaona (Madagascar), Paul-Uwe Söker (Germany), Jagdish Dharamchand Koonjul (AOSIS), Michel Jarraud (WMO), Ad de Raad (UNV), Richard Kinley (UNFCCC), Gregoire de Kalbermatten (UNCCD)</p> <p>Key Note Speech by Klaus Töpfer (UNEP)</p> <p>Presentation of Conference Programme (ISDR)</p>	
	16 OCTOBER 2003	▶ GOOD PRACTICES IN EARLY WARNING IN SIDE ROOMS	<p>GOOD PRACTICES IN EARLY WARNING IN SIDE ROOMS</p> <p>The Roles of the Community</p> <ul style="list-style-type: none"> • Ali Awan (Pakistan): Community oriented early warning for disaster reduction on scientific basis • Auriol Miller (CONCERN, DR Congo): Community Preparedness for Volcano Hazards: Concern Worldwide's experience in Goma, DRC • Ailsa Holloway (South Africa): Early Warning – or message misread <p>Global Early Warning Systems</p> <ul style="list-style-type: none"> • Ryosuke Kikuchi (Japan): Using real time flood forecasting and prediction to support flood control decision-making • Wolfgang Steinborn (Germany): The international Charter Space and Major Disasters and examples of flood warning improvement with information from space • Laura Kong (USA): Early Warning Systems on Tsunamis from Hawaii <p>Early Warning Systems for Geological Hazards</p> <ul style="list-style-type: none"> • Djumarma Wirakusumah (Indonesia): Early warning systems for geological hazards in Indonesia • Charley Douglas (Vanuatu): Vanuatu volcanic early warning system • Dario Tedesco (Italy): The January 2002 volcanic eruption at Mt Nyiragongo: UN Risk reduction strategies for the Nyiragongo volcano activity <p>Special Session on Wildland Fire</p> <ul style="list-style-type: none"> • John Roads (USA): EW wildland fire at global to national level: experimental climate prediction • Helmut Dotzauer (Germany): EW wildland fire at local level: Community-based fire management • Johann Goldammer (Germany): Global synthesis: Global Fire Monitoring Center (GFMC) <p>Integrating Early Warning into Public Policy Processes</p> <ul style="list-style-type: none"> • Integration of disaster reduction and early warning into public policy and development: Jean Seth Rambeloalijaona, Minister of the Interior, Madagascar • Integrating early warning schemes into flood protection management: Stanislaw Tillich, Minister of State, Saxony, Germany • Integrating early warning of environmental threats into policy to achieve sustainable development: Norberto Fernandez, UNEP Division for Early Warning and Assessment • Early Warning, a Tool for Climate Risk Management: Reid Basher, Senior Advisor, ISDR
		▶ PANEL DISCUSSION	<p>PANEL DISCUSSION</p> <p>New Technologies and Low-tech Solutions for Early Warning Systems</p> <p>Panelists: Laban Ogallo (Drought Monitoring Center, Kenya), Juan Carlos Villagran (Guatemala), Maureen Fordham (University of Northumbria, UK), Douglas Pattie (UNCCD), Thomas Schaeff (GTZ)</p>
		▶ UN SASAKAWA AWARD	<p>UN SASAKAWA AWARD FOR DISASTER REDUCTION CEREMONY:</p> <p>Presentation of 2003 Sasakawa Award nominees</p>
▶ COCKTAIL		<p>COCKTAIL HOSTED BY THE CITY OF BONN</p>	



2ND DAY	OVERVIEW	<p>OVERVIEW OF PREPARATORY REGIONAL CONSULTATIONS</p> <p>Africa – Hespina Rukato, NEPAD</p> <p>Asia and the Pacific – LeHuu Ti, United Nations Economic Commission for Asia and the Pacific</p> <p>Europe – Jochen Zschau, GeoForschungsZentrum (GFZ), Potsdam</p> <p>Americas – Juan Carlos Villagran, Guatemala</p> <p>Presentation of AOSIS – Jagdish Dharamchand Koonjul, Mauritius Ambassador to the UN, AOSIS</p> <p>Compilation of Regional Findings and Recommendations – Seth Vordzorgbe, ISDR consultant, Ghana</p>
	PANEL DISCUSSION	<p>PANEL DISCUSSION: Early Warning, a decision tool for emergency management</p> <p>Panelists: Peter Billing (ECHO), Helga Leifsdottir (IFRC), Detlev Runger (Federal Foreign Office)</p>
	GOOD PRACTICES IN EARLY WARNING	<p>GOOD PRACTICES IN EARLY WARNING</p> <p>Integrating Flood Early Warning Systems into National Policies</p> <ul style="list-style-type: none"> • Errol Douglas (Jamaica): The challenges of Community Flood Warning Systems in Jamaica • Insisiengmay Thanongdeth (Cambodia): The Early Warning System for Mekong River • Jean-Marie Carriere (France): Flood early warning in France
		<p>Technological Means for Information Sharing</p> <ul style="list-style-type: none"> • C. Y. Lam (China): Harnessing Internet Power to serve weather warning purposes • Udo Gartner (Germany): Early warnings of severe weather warning management of the Deutsche Wetterdienst • Jaromir Nemec, Ivan Obrusnik (Czech Republic): Lessons learned in early warning, organized civil society efforts and disaster reduction
		<p>Effective Early Warning Systems for Tropical Cyclones</p> <ul style="list-style-type: none"> • Luc Chang-Ko (Mauritius): Cyclone warning in Mauritius • Jeremy Collymore (CDERA): Caribbean early warning system for hurricanes • Jurgen Kronenberger (Red Cross): We were prepared – What communities of Red Cross Cyclone Shelters did during the recent cyclone warning in Orisa
		<p>Early Warning Systems for extreme climate related events</p> <ul style="list-style-type: none"> • Jose-Luis Santos (Ecuador): Presentation of the International Center for Research on El Nio (CIIFEN) • Gerard Le Bars (France): Presentation of the new Meteo-France vigilance (awareness) system • Michael Brundl (Switzerland): Recent developments in avalanche risk management
		<p>PARALLEL WORKING GROUPS</p> <p>WG1: Early Warning Targets 2004–2015</p> <p>WG2: From Potsdam (EWC'98) to Bonn (EWC II) and beyond</p> <p>WG3: Sustaining the Early Warning Dialogue</p>
	<p>Effective Drought Early Warning - An integrated approach to reducing societal vulnerability to drought. (organized by the ISDR Drought Network)</p> <ul style="list-style-type: none"> • Laban Ogallo (Drought Monitoring Center-Nairobi): Drought Early Warning Systems in the Greater Horn of Africa: the role of the drought monitoring centers-experiences and lessons learned • Pak Sum Low (UNESCAP): The role of regional networks in promoting drought early warning and preparedness • Kamal Kishore (UNDP-Bureau for Crisis Prevention and Recovery): Study of the last year's drought in India (ADPC and IRI): some interesting insights on the problem of drought • Orivaldo Brunini (Brazil): Recent experiences with drought early warning in southern Brazil • Henri Josserand (FAO): Food Emergency 	
	PANEL DISCUSSION	<p>PANEL DISCUSSION FOR LOCAL AUTHORITIES: EARLY WARNING AND URBAN RISKS; RESPONSIBILITIES OF POLICY MAKERS</p> <p>Panelists: Barbel Dieckmann, Mayor of Bonn; M. Enkhbold, Governor of the City of Ulaanbaatar; Hugo Marcelo Pineda Luna, Mayor of Baos, Ecuador; Badaoui Rouhban, UNESCO; Evelia Aparicio de Esquivel, President of the Association of Municipalities in Panama and Mayor of the City of David; Hartmut Bosch, Secretary of State, Germany; Aoto Ken-ichi, Superintendent for Emergency Management, Japan</p>
	COCKTAIL	<p>COCKTAIL CRUISE ON THE RHINE HOSTED BY THE FEDERAL FOREIGN OFFICE</p>

17 OCTOBER 2003



3RD DAY	PRESENTATIONS	<p>PRESENTATIONS OF WORKING GROUP DISCUSSIONS</p> <p>Findings and Conclusions of WG1, WG2 and WG3</p>	
	PANEL DISCUSSION	<p>PANEL DISCUSSION</p> <p>High level panel with Ministers and Government Representatives “Solutions for integrating Early Warning into Public Policy”</p> <p>Presentation: Henri Josserand, (FAO)</p> <p>Panelists:</p> <ul style="list-style-type: none"> • Jean Seth Rambeloalijaona, Minister of Interior, Madagascar • Roberto White, Minister of Public Works and Housing, Mozambique • Pubenza María Fuentes, Minister of Development Planning, Ecuador • Abdoukader Doualeh Wais, Minister of Interior, Djibouti • Dahou Ould-Kablia, Deputy Minister of Interior, Algeria • Thomas Broni, Deputy Minister of Interior, Ghana • Yang Yanyin, Vice Minister, Ministry of Civil Affairs, China 	
		<p>Emerging Issues</p> <ul style="list-style-type: none"> • Wolfgang Kron (Munich Re): Early warnings and the insurance industry – Needs and opportunities • Andreas Küppers (Germany): Interventions and responsibility: Some remarks on ethical and legislative aspects of the early warning process • Jürgen Laudien (Germany): ENSO biological versus physical early warning in the East Pacific • Günter Brauch (Germany): Mainstreaming early warning of natural disasters and of conflicts 	
		<p>Lesson Learned Session</p> <ul style="list-style-type: none"> • Anil Sinha (India): Integrating disaster reduction on early warning into public policies in India • Silvano Langa (Mozambique): Human resource development in disaster management in Mozambique • Mohamed Jalil (Morocco): Integrating early warning in disaster preparedness and response in Morocco • Erich Plate (Germany): Expert meetings for assessment of early warning needs 	
		<p>Integration of local Early Warning in national systems (GTZ)</p> <ul style="list-style-type: none"> • Lucas Simão Renco (Mozambique) • Oscar Alcantara (Honduras) Integration of local systems of Early Warning in national systems • Tulio Santoyo (Peru) • Wilson Pereira (Brazil): Early warning to forest fires in Amazon 	
		<p>Implementing Transboundary Early Warning Systems for Floods</p> <ul style="list-style-type: none"> • E. Ruiz-Rodriguez (Germany): Benchmarks of modern flood early warning systems • Helmut Blöch (European Union): Floods – a European challenge • Leszek Ciecwierz (Poland) • T.H. Oetjen, (Germany, Sachsen) Lessons learned from the summer floods of 2002 – considering the goals of sustainable development in the reconstruction process 	
		<p>New Technologies and Scientific Networks</p> <ul style="list-style-type: none"> • Walter Hürster (Germany) Environmental Disasters: Computer Networks for Crisis Management 	
		<p>Scientific Networks</p> <ul style="list-style-type: none"> • Bruno Merz (Germany): Scientific Networks 	
		CLOSING CEREMONY	<p>CLOSING CEREMONY</p> <ul style="list-style-type: none"> • Presentation of Conference Outcome and Follow up • Elements for an international early warning programme and benchmarks and targets 2004—2015 • Presentation of Conference Statement
			<p>Closing remarks</p>

18 OCTOBER 2003



AMBASSADOR HANS-JOACHIM DAERR (DIRECTOR GENERAL FOR GLOBAL ISSUES, THE UNITED NATIONS, HUMAN RIGHTS AND HUMANITARIAN AID), JÜRGEN TRITTIN (FEDERAL ENVIRONMENT MINISTER), JAN EGELAND (UN UNDER-SECRETARY-GENERAL)



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PLENARY HALL



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www.auswaertiges-amt.de



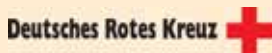
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<http://www.bmz.de>



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German Technical Cooperation
<http://www.gtz.de>



Deutsche Telekom AG
<http://www.telekom3.de>



Deutsches Rotes Kreuz e. V.
German Red Cross
<http://www.drk.de>



EUMETSAT
<http://www.eumetsat.de>



GeoForschungsZentrum Potsdam
<http://www.gfz-potsdam.de>



Government of Japan
<http://www.cao.go.jp>



Helmholtz Gemeinschaft Deutscher Forschungszentren
Helmholtz Association of National Research Centres
<http://www.helmholtz.de/en/index.html>



InWEnt – Internationale Weiterbildung und Entwicklung gGmbH
InWEnt – Capacity Building International
<http://www.inwent.org>



World Meteorological Organization
<http://www.wmo.int>



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and the Steering Committee, composed of representatives from the following organizations:

- Food and Agricultural Organization (FAO)
- German Committee for Disaster Reduction (DKKV)
- Helmholtz Association of National Research Centres
- Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR)
- International Council of Scientific Unions (ICSU)
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- UN Economic Commission for Europe (UN/ECE)
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- World Meteorological Organization (WMO)

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Further Information

ADPC: Asian Disaster Preparedness Centre
www.adpc.ait.ac.th

ADRC: Asian Disaster Reduction Center
www.adrc.or.jp

A safer world in the 21st Century
http://www.unisdr.org/eng/about_isdr/bd-safer-world-eng.htm

Early Warning Systems Workshop
Shanghai, China, 20–23 October 2003
<http://www.esig.ucar.edu/warning/>

EWC '98: The Potsdam International Conference on Early Warning held 7–11 September 1998 in Potsdam, Germany (EWC'98)
www.gfz-potsdam.de/ewc98.

FAO: Food and Agriculture Organization of the United Nations
www.fao.org

IFRC: International Federation of Red Cross and Red Crescent Societies
www.ifrc.org/

Inventory of early warning systems
<http://database.unep.dkkv.org/>

This inventory provides detailed information on existing early warning systems of natural disasters including:

- An institutional contact
- The method of monitoring and warning
- The conditions that trigger a warning
- The way warnings are communicated
- The response to warnings in the past
- The early warning history

The information aims to assist politicians, decision makers and scientists in the field of early warning and disaster management to incorporate early warning into policies and disaster management.

National Disaster Management Conference
National Disaster Management Conference Theme:
Early Warning Systems – Floods & Drought Jamaica,

9–10 September 2003
<http://www.odpem.org.jm>

National Hazard and Vulnerability Atlas of South Africa
<http://sandmc.pwv.gov.za/atlas>

National Strategy for Sustainable Development in Germany
<http://www.dialog-nachhaltigkeit.de>

Programme forum 1999: Geneva Mandate
www.unisdr.org/eng/about_isdr/bd-geneva-mandate-eng.htm

Second International Conference on Early Warning
www.ewc2.org

UNDP: United Nations Development Programme
www.undp.org

UNEP: United Nations Environment Programme
www.unep.org

UNESCAP: United Nations Economic and Social Commission for Asia and the Pacific
www.unescap.org

WMO: World Meteorological Organization
<http://www.wmo.int>

Yokohama Strategy and Plan of Action for a Safer World
www.unisdr.org/eng/about_isdr/bd-yokohama-strat-eng.htm

UN Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR)
Palais des Nations
CH-1211 Geneva 10
Switzerland
www.unisdr.org

German Committee for Disaster Reduction (DKKV)
Tulpenfeld 4
D-53113 Bonn
Germany
www.dkkv.org

For the compilation of the conference outcome documents and detailed documentation from the Second International Conference on Early Warning please refer to www.ewc2.org

