Four Elements of People Centered Early Warning Systems

UN-ISDR/Platform for the Promotion of Early Warning

Disaster Trends and Early Warning

Countries have long been concerned about the huge impacts that natural disasters have on society in developed and especially in developing countries. Nearly a million people have been killed over the last decade from disasters caused by storms, droughts, floods and earthquakes. However, a third have died in the December 26 2004 Indian Ocean tsunami. Global annual disaster costs of fifty billion US dollars are common. In the period between 1960 -1990 the economic losses of disasters increased five times due to rising vulnerability. Our vulnerability to natural hazards is growing because population increases and more people are living in risky places. Poor people and countries are most affected, which is a major handicap to development. At the same time drought and storm death tolls, mainly through early warning systems and food aid, are being reduced.

The problem with the increasing number of people affected by natural disaster is serious, and it may delay the achievement of the Millennium Development Goals. Early warning systems, coupled with better preparedness and response mechanisms, have proved to be very effective at reducing disaster risks. On the other hand, the December tsunami showed the tragic impacts of having no effective early warning system in place.

Basics of Early Warning

Natural hazards, such as storms, droughts, volcanic eruptions, or earthquakes, become disasters only if a community or population is exposed to the natural hazard and cannot cope with its effects. Torrential rain in the middle of an ocean will not cause a disaster, but the same heavy rainfall on a vulnerable population – say a shanty town on the side of a hillside stripped of trees - may result in landslides and a huge loss of life. A minor drought may cause a famine if a region's agricultural production is already highly stressed by civil war. A community that lacks an early warning system for volcanic eruptions will be devastated when volcanic ash clouds bear down upon them. Vulnerability is the potential additive that mixes with natural hazards to cause disasters.

Millions of people worldwide owe their lives and livelihoods to effective early warning systems. People-centred early warning systems empower communities to prepare for and confront the power of natural hazards. They bring safety, security and peace of mind. Early warning systems provide resilience to natural hazards, and protect economic assets and development gains. They help society adapt to and defend against the uncertainties of climate change. Early warning systems are widely recognized as worthwhile and necessary investments. However in many cases, early warning systems do not exist, are ineffective, or break down at critical points – risking devastation, death, and destitution.

The Four Elements of Early Warning Systems

A complete and effective early warning system comprises four elements, spanning knowledge of the risks faced through to preparedness to act on early warning. Failure in any one part can mean failure of the whole system. The Platform for the Promotion of Early Warning (PPEW) aims to build these four elements into early warning systems world wide.

Risk Knowledge - Prior Knowledge of the Risks Faced by Communities

Risks arise from both the hazards and the vulnerabilities that are present. What are the patterns and trends in these factors?

Risk assessment and mapping will help to prioritize early warning system needs and to guide preparations for response and disaster prevention activities. Risk assessment could be based on historic experience and human, social, economic, and environmental vulnerabilities.

In many parts of the world there is a trend of increasing risk caused by intense coastal urbanization, population movements, and environmental pressures.

Warning Service – Technical Monitoring and Warning Service for These Risks

There is a need for a sound scientific basis for predicting the risks faced. Therefore constant monitoring of possible disaster precursors is necessary to generate accurate warnings in timely fashion. Multi-hazard approaches must involve various monitoring agencies.

Dissemination of Understandable Warnings to Those at Risk

The warnings need to get to those at risk. Consequently, people at risk need to understand these warnings, which have to contain useful information that enables proper responses.

Communication channels from regional to national to community levels have to be pre-identified and it is necessary to have one authoritative voice. Many countries need to increase their capacity in disaster risk management and link various disaster management organizations from national to local levels.

Response Capability - Knowledge and Preparedness to Act

It is essential that communities understand their risks; they have to respect the warning service and should know how to react.

Building up a prepared community requires participation of formal and informal education sectors, addressing broader concept of risk and vulnerability.

People Centered Early Warning Systems

Effective early warning systems require strong technical foundations and good knowledge of the risks. But they also must be strongly "people centred" – with clear messages, dissemination systems that reach those at risk, and practiced and knowledgeable responses, by risk managers and the public. Public awareness and education are critical; in addition, many sectors must be involved.

A core message of the session "People Centered Early Warning Systems" held at the World Conference on Disaster Reduction, in January 2005, in Kobe Japan was that effective early warning systems must be embedded in an understandable manner and relevant to the communities which they serve. Therefore, systems must be developed which ensure that they are functioning when needed and that warnings are timely, understood, and viewed as legitimate and ultimately acted upon by the diverse array of individuals at risk in any emergency. The following core components of people centered early warning systems were defined:

Incorporation of a Combination of 'Bottom-up' and 'Top-down' Elements

Both approaches are crucial for an effective system. On the one hand, a community approach is essential to identify needs, patterns of vulnerability and to develop the legitimacy required to ensure that warnings are acted upon. At the other end, information on regional weather conditions or other factors relating to a specific risk need to flow down from regional and global monitoring systems. Therefore, warning systems are hardly effective if they are not supported at higher levels including scientific and analytical capacity and policy frameworks.

Involvement of Local Communities in the Early Warning Process

Some good practices from Central America, Haiti, Africa and other regions demonstrated that data collection by local people using readily available technologies can provide information which is of critical use for the early warning system. Simple technologies, such as rainfall and river gauges combined with equally simple rules of thumb can often enable communities to monitor threats and provide effective warnings.

Multi-hazard Approach

In Central America, the use of radio systems was initially developed to provide flood warnings. Nowadays it has expanded to serve basic communication functions. The radios are in daily use and central to the life of the communities they serve. As a result they are well maintained and available when warning is needed. Even if the warning is for a very rare event, the equipment will be maintained because it has become a living part of the communities. It is important to recognize that multi-functionality does not always have to imply regular use by the communities served, therefore linking warning functions to systems that serve scientific or any other on-going use can serve the same purpose.

Building Awareness into the Structure of Communities

Without awareness people will not respond and risk cannot be reduced. Education – particularly if it can be promoted as a core part of the curriculum in schools – training, and a wide variety of outreach activities can serve this purpose.

Pulling it All Together

Good early warning systems need to have strong linkages between the four elements. The major players concerned with the different elements have to meet regularly to ensure they understand all of the other components and what other parties need from them.

- Risk scenarios need to be constructed and reviewed and specific responsibilities throughout the four elements are agreed and implemented.
- Studying past events will help to improve the early warning system.
- Manuals and procedures needs to be agreed on in consultation with communities.
- Information material should be distributed to the communities at risk.
- Operational procedures such as evacuations have to be practiced and tested on a regular basis.

Behind all of these activities has to be a solid base of political support, laws and regulations, institutional responsibility, and trained people. Early warning systems need to be established and supported as a matter of policy; preparedness to respond has to be engrained in society.

Examples of Ways to Build People-Centered Early Warning Systems

- Develop maps of flood risk showing flood heights, safe havens, and routes to safety.
- Undertake surveys of the vulnerability of people living on landslide-prone hillsides.
- Assist national weather services to access international weather data and satellite images.
- Support remote communities by installing simple electronic river gauges and alerting systems to give warning of flash floods.
- Stimulate research and training in modern early warning science and technology.
- Undertake studies of how people access and interpret early warnings and then apply the lessons to dissemination processes.
- Develop, test, and refine evacuation scenarios for different types of emergencies in highly populated areas.
- Promote community-based systems to check on elderly and disabled people when storms or heat waves are forecasted.
- Develop performance standards and guidelines for different types of early warning systems.

Examples of Existing Early Warning Systems

Tsunami

When undersea earthquakes occur in the Pacific Ocean, their locations and strength are immediately pinpointed by monitoring centers, and warnings of possible tsunamis are issued. The lack of a comparable early warning system in the Indian Ocean was a factor in the huge loss of life there from the December 2004 tsunami.

Wildfire

Each year wildland fires around the world burn an area equivalent to the size of India, with large environmental and economic costs. Fire authorities now are cooperating globally to monitor and better manage fire risks, including providing community-based fire management training, awareness campaigns, and education programs.

El Niño phenomenon

The 1997 –1998 El Niño event was blamed for the deaths of 24,000 people and damage in excess of US$34 billion worldwide. However, using seasonal climate forecasts, California undertook preventative activities that reduced its losses to half the US$2.2 billion losses that occurred in the previous 1982 –1983 El Niño.

Desert locust plague

The early warning system for desert locusts coordinated by the Food and Agriculture Organization of the UN (FAO) warned in early 2004 that a plague was imminent. Unfortunately, donors did not respond to the request for US$9 million for aerial spraying, so that by August 2004 the appeal had to be raised to US$100 million – a costly lesson that early warning systems cannot be effective if the communication and response elements fail.

Landslides

An early warning system for the Yangtze River valley monitors landslides using 70 stations employing over 300 professionals. The network protects a population of 300,000 people and so far has forecasted 217 landslides avoiding estimated economic losses of US$27 million.

Urban flash floods

Flash flooding in urban areas can cause enormous damage and loss of life. In Japan, the Public Works Research Institute prepares detailed flood hazard maps for towns and has shown that people familiar with the maps respond to early warnings much more quickly and effectively.

Drought and famine

Early warning systems coupled with humanitarian food aid have hugely cut the number of people dying from famine, possibly saving two million lives over the last 20 years. International and regional cooperation also has strengthened the abilities of African countries in early warning and food security management.

Volcanic eruption

Warnings of a catastrophic eruption of Mt. Nyiragongo in 2002 were not well communicated or understood and the nearby town of Goma, Democratic Republic of Congo, suffered great losses. An improved early warning system with strengthened community understanding and mitigation responses is now being developed.

Typhoons and hurricanes

In many countries, sophisticated observing and forecasting systems of national weather services provide good warnings of typhoons and hurricanes. In 2004, millions of people in the Americas and in Asia were evacuated, undoubtedly saving thousands of lives. But nearly 2,000 people in Haiti died because of lack of warnings.

Floods in Mekong basin

In the populous and frequently flooded Mekong River basin in Southeast Asia the early warning system of the Mekong River Commission (MRC) is a vitally important service. Reaching the villages is difficult, however, but can be achieved with the assistance of NGOs such as the Cambodian Red Cross.

Global Perspective

The UN General Assembly has repeatedly drawn attention to the disasters issue (e.g. General Assembly resolution A/RES/59/231 about International Strategy for Disaster Reduction). It has established the International Strategy for Disaster Reduction (ISDR) as the centrepiece of UN efforts to cut the disaster toll. Many organizations cooperate within the ISDR framework to promote policies and practices to make societies more resilient: UN bodies, including the World Meteorological Organization (WMO), UNESCO, and other key players like the UN Development Program (UNDP), the UN Environmental Program (UNEP), and the Office for Coordination of Humanitarian Affairs (OCHA); regional disaster reduction organizations; civil society partners such as the Red Cross movement; and Munich Re. Early warning has been a long-term concern of the ISDR partners.

Governments and the public have been slow to take action on disasters in the past. Huge resources go into relief and recovery, but very little is spent on addressing the underlying causes. Humanitarian action is usually totally disconnected from development investments.

The December 26, 2004 Indian Ocean Tsunami has been a wake-up call for many. It has raised awareness of disasters, the factors causing them, and what should be done. The event has thrown a lot of weight behind the Hyogo Framework for

Action 2005-2015, the blueprint agreed by governments at the World Conference on Disaster Reduction, which was organized under the ISDR in Kobe, Japan in January this year.

At the UN Conference on Small Islands Developing States hold in Mauritius in January 2005, the UN-Secretary General said: "This tsunami tragedy has taught us once again the need for prevention and early warning. Last week's meeting in Jakarta called for the establishment of a regional early warning system for the Indian Ocean and Southeast Asia. But we should do even more. We need a global warning system – and one that covers not just tsunamis but all other threats, such as storm surges and cyclones. In such an endeavour, no part of the world should be ignored. We must think globally, and consider measures equal to the task."

The International Early Warning Program

As a step forward to an internationally-organized approach to early warning, the International Early Warning Program was proposed at the Second International Conference on Early Warning (EWC-II), held in Bonn, Germany, in October 2003. The conference also called for an organizational platform to support the program. The Platform for the Promotion of Early Warning (PPEW) already has been established with support from the German Federal Foreign Office.

The International Early Warning Program is a vehicle for all organizations to join and help implement and improve early warning systems. The program is sponsored by leading United Nations organizations.

The program is a vehicle by which partner organizations cooperate and develop shared and systematic approaches to advance early warning systems worldwide. IEWP aims to:

- Develop international dialogue and a common framework for action, and promote early warning in policy debates and as a development priority.
- Collate and disseminate good practices and other information on early warning systems.
- Define and support capacity building projects in priority areas of need, involving humanitarian and development communities.
- Develop improved tools and techniques, including guidelines and performance standards for early warning systems, and formulate priorities for further research and development.

Benefits will include better coordination, wider information flow, a stronger focus on integrated people-centered early warning systems, wider recognition of early warning's role in meeting development goals, and ultimately the reduction of impacts and disasters on vulnerable communities.

In January 2005, the IEWP was officially launched by a partnership of United Nations organizations at the World Conference on Disaster Reduction, Kobe, Japan. It is open to all organizations that have a stake in effective early warning systems and want to collaborate to improve them, such as humanitarian agencies, food aid organizations, emergency management organizations, hydro-meteorological services,

environmental agencies, academic institutes, community organizations, NGO relief agencies, development assistance donors, and United Nations organizations.

For more information, please visit www.unisdr.org/ppew, or email isdr-ppew@un.org.

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About the Symposium

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