Establishing
Community Based
Early Warning System

PRACTITIONER'S HANDBOOK

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Mercy Corps Nepal
P.O.Box 24374
Sanepa Chowk, Lalitpur, Nepal
Tel: +977 1 555 5532
Fax: + 977 1 555 4370
Website: www.mercycorps.org

Practical Action Nepal Office

Pandole Marg, Lazimpat
PO Box 15135
Kathmandu, Nepal
Tel: + 977 1 4446015/4434482
Fax: + 977 1 4445995
Website:www.practicalaction.org

Content and Materials Developed by:

Anup Phaiju - Practical Action
Debnarayan Bej - Practical Action
Sagar Pokharel - Mercy Corps Nepal
Ulla Dons - Mercy Corps Nepal

Special Contributors:

Dr. Dilip Gautam - Department of Hydrology and Meteorology
Hritika Rana - Practical Action
Sagar Gautam - Mercy Corps Nepal

Consultant for Compilation:

Kapil Neupane

Editorial Board:

Malene Friis, Debnarayan Bej, Ulla Dons

Photo Contribution:

Mercy Corps and Practical Action

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Acronyms

CBDRR	Community Based Disaster Risk Reduction
CBEWS	Community Based Early Warning Systems
DM	Disaster Management
DP	Disaster Preparedness
DRM	Disaster Risk Management
EWS	Early Warning System
EWS MC	Early Warning System Management Committee
HFA	Hyogo Framework for Action
ISDR	International Strategy for Disaster Reduction
NSDRM	National Strategy for Disaster Risk Management

Foreword

Natural hazards do not affect everyone uniformly. It has been established that in event of hazard the poorest suffer most. Because they live in fragile topography, structurally poor houses and have limited resources, their capacity for resilience is extremely low. Owing of their weak resilience capacity, every hazard interrupts their livelihoods, pushing them back to the vicious cycle of poverty. Indeed, for the poor, even small hazards occurring in their surrounding weaken their livelihood strategies, savings and assets.

Disaster risk reduction involves activities aiming at reducing such losses by addressing hazards related risks and people's vulnerability. Early warning is a major element of disaster risk reduction. It saves life and reduces economic and material losses from disasters. To be effective, community based early warning systems need the active involvement of the community people, a strong public education on and awareness of risks, an effective communication system ensuring a constant state of preparedness.

In January 2005, the World Conference on Disaster Reduction adopted the "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters". This included clear references to the importance of early warning, and encouraged the development of "early warning systems that are people centered, in particular systems whose warnings are timely and understandable to those at risk (…) including guidance on how to act upon warnings (…)". Nepal has further spelled out its commitment to Early Warning Systems in the National Strategy for Disaster Risk Management adopted by Government of Nepal in October 2009.

European Commission Humanitarian Aid and Civil Protection department (DG ECHO) as one of the largest providers of funds for humanitarian aid operations consider likewise Early Warning Systems an essential disaster risk reduction measure. Thus DG ECHO has financed several DIPECHO Programmes (Disaster Preparedness – ECHO) supported partner organisations in developing community based early warning systems.

This manual highlights the achievements and progress made by Mercy Corps and Practical Action, their local partners and the Department of Hydrology and Meteorology to establish a functional community based early warning system in Nepal. ECHO is proud to present this training manual as one of the latest outcomes of the community based early warning system implemented in Nepal.

Appreciation and thanks are extended to all the contributors to this manual who openly shared their practical experiences, views, and concerns, helping to establish an effective and efficient early warning system placing the people at the core. We sincerely hope that the manual will be used for the benefit of those communities living at risk of flooding in rural Nepal.

Claudia Amaral
Disaster Risk Reduction/DIPECHO Coordinator
Regional Support Office South Asia
DG ECHO

Luc Verna
Technical Assistant
DG ECHO Nepal

Message

Floods and landslides are the causes of about 300 deaths each year in Nepal with property damage exceeding USD 10 Million in average. Compared to other disasters in Nepal, floods and landslides are the number one natural disaster regarding economic damage and number two in loss of lives (epidemics being number one). In recent years, the frequency and intensity of extreme flood events is increasing with the impact of climate change and economic damage related to floods is also likely to increase with increasing development activities in the region. Hence, a reliable flood forecasting and early warning system is necessary to reduce the possibility of personal injury, loss of life, damage to property, and loss of livelihood.

In recent years, Department of Hydrology and Meteorology has modernised its hydrological and meteorological stations network with telemetric system to obtain river water level and rainfall data in real time. Flood warning level and danger level have been assessed in major flood prone rivers. Community based flood warning has been initiated in Narayani, West Rapti, Babai and Karnali river basins in collaboration with Practical Action, Mercy Corps and District Disaster Relief Committees. The gauge readers of flood forecasting stations have been brought into the network of various organisations involved in disaster preparedness and management. The community based flood early warning systems proved to be very effective to reduce the loss of life and properties.

As the systems will be expanded in other river basins, there is an urgent need of a manual or practitioner's handbook which will provide a recipe for establishing, operating and maintaining community based early warning systems. Mercy Corps and Practical Action have taken initiative to develop and publish this handbook. I would like to thank them for their timely endeavor. I firmly believe that this handbook will be very much useful for the Department of Hydrology and Meteorology and other organisations involved in promoting community based early warning system for disaster preparedness. The Department of Hydrology and Meteorology would fully utilise this handbook for the establishment, expansion and scaling up community based flood early warning systems in Nepal.

Nirmal Hari Rajbhandari
Director General
Department of Hydrology and Meteorology, Nepal

Acknowledgement

This Practitioner's Handbook on Community Based Early Warning System is an effort to put together the early warning learning experiences from the field and communities in Nepal for wider uses for establishment of community based early warning Systems in flood prone areas of Nepal. Mercy Corps and Practical Action would like to acknowledge the support of the European Commission's Humanitarian Aid and Civil Protection department, which both helped produce this training material and the funded projects implemented by Mercy Corps and Practical Action, respectively under several action plans. Without this committed and long term support for disaster risk reduction projects and hereunder early warning none of this would have been possible.

The commitment of communities in Banke, Bardia, Chitwan, Kailali and Nawalparasi made the early warning systems the success they have been. Without their enthusiasm, motivation, and willingness to consider new knowledge and new approaches very little would have been achieved in terms of early warning in Nepal. They have willingly shared their knowledge with communities and organisations from other regions of Nepal and beyond. We sincerely hope that the community based early warning systems will bring not only these communities, but many more communities in Nepal, in the region and in other places similar vulnerable greater security in the future.

Mercy Corps and Practical Action's local partners in the field and their role and importance for establishing community based early warning systems, sharing their knowledge and providing feedback for this training material cannot be overstated.

This manual and the community based early warning systems established with the support from Mercy Corps and Practical Action would not have been possible without the openness, support and enthusiasm of the Government of Nepal staff in all five districts and those of Department of Hydrology and Meteorology based in the field as well as at the Department in Kathmandu. Special thanks goes to Dr. Dilip Gautam, Head of Flood Forecasting Section at Department of Hydrology and Meteorology in Kathmandu for his commitment to expand and scale up early warning systems in Nepal. We are as well grateful for the time and support colleagues from DIPECHO Partner organisations, namely ActionAid Nepal, CARE Nepal, Danish Red Cross, Handicap International, Mission East and Oxfam GB and their local partners for their contribution in making this practitioner's handbook possible.

Ulla Dons
DIPECHO Project Manager
Mercy Corps Nepal

Debnarayan Bej
DIPECHO Project Manager
Practical Action

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Introduction

Approximately 70% of the recent disasters are weather-related and this proportion is likely to grow as climate change processes increase unpredictability and intensity of weather events. While natural hazards cannot be prevented, they only get turned into disasters when affected communities are vulnerable and unprepared. Community Based Early Warning Systems (CBEWS) have proved beyond doubt to save lives and reduce economic losses; however they have not yet been an integral part of the disaster management and risk reduction initiatives. Nor is early action – the culture of prevention - as the Hyogo Framework for Action called it – an effective and timely response to early warning, across different timescales. As early warning and early action are the two intertwined actions, this manual emphasizes that early warning without early action is not enough and early action can do more to reduce losses of lives and protect livelihoods if coupled with early warning instead of devising emergency response alone.

This handbook is significant in providing the first comprehensive attempt in Nepal to provide a guide for the establishment of community based early warning Systems in flood prone communities. The book has brought together the materials drawn from Practical Action and Mercy Corps experiences in dealing with establishment of Community Based Early Warning Systems in a number of communities in the terai areas of Nepal, as well as the reference and experience of other organisations and agencies to this effect. This handbook with a facilitator's guide and resource material will provide community trainers the tools to assist flood prone communities in establishing early warning systems.

The community based approaches for establishment of the early warning systems recognise the fact that the first response to a disaster always comes from the community itself. It also recognises the fact that in many cases, top down and highly technical approaches may fail to address the specific needs of vulnerable communities, ignoring the potentials of local resources and capacities. Community based early warning systems seek ways to help communities use local resources and capacities effectively to better prepare for and respond to disasters and adopt measures to reduce their vulnerability.

Community Based Early Warning Systems (CBEWS) suggest that people can be capable, resilient and able to protect themselves rather than getting into vulnerability. In this connection, there exist four basic requirements: individuals and institutions know the threat, they are able to monitor and communicate change in threat, they will disseminate information about the threat, and they are in a position to respond.

A key point on which many scholars and practitioners of disaster reduction agree upon is that "strategies must extend beyond information provision to engage community members in ways that facilitate their adoption of protective actions" (Paton, 2006).

Details of the course outline were presented for field practitioners and their managers at a sharing workshop held in Kathmandu in February 2010, subsequently further comments were solicited through consultations and e-mail exchange. The curriculum cum facilitators guide was then honed through a series of field tests and revised accordingly.

This Practitioner's Handbook is structured around the following topics:

Topic 1: Disaster Risk Reduction

The course starts with a review of the basic elements of disaster risk reduction. This topic explains the elements of disaster risk reduction, the disaster risk reduction cycle, the Hyogo Framework for Action and the National Strategy for Disaster Risk Management.

Topic 2: Early Warning Systems

This topic explains the key elements of an early warning system, discusses traditional early warning practices and the importance of having effective and efficient systems in place.

Topic 3: Establishment of Community Based Early Warning Systems

This topic discusses in detail the processes and steps for the establishment of a Community-Based Early Warning System that includes participatory situation analysis, observation and monitoring of hazards, establishment of communication and dissemination systems, as well as response systems. The topic also explains the roles of various stakeholders involved in the Early Warning System and their requirement of community trainings and simulations. This topic discusses strategies for strengthening groups and communities, management of the Early Warning Systems and community response to a flood event.

Furthermore, this topic contains presentation and sharing on issues, problems, solutions and capacity building related to the process in every step for the establishment of community based early warning Systems.

Topic 1 - Disaster Risk Reduction - DRR

The topic provides the foundation of understanding the most commonly used terminology within disaster management and early warning and helps the field practitioners discern between the different definitions. The topic also includes an introduction to Hyogo Framework for Action and the National Disaster Risk Management Strategy.

Session 1: Concept of Disaster Risk Reduction

The frequency and magnitude of weather related disasters hereunder flood in Nepal has increased over recent years and has demonstrated the need to reduce underlying risk factors and to develop and improve disaster risk reduction strategies, particularly taking the climate change into consideration. Disaster Risk Reduction aims to reduce disaster related risks, death, injury and adverse impact on livelihood. The goal is to transform vulnerable communities into safe and disaster resilient communities.

To promote a common understanding and application of disaster risk reduction concept and assist disaster risk reduction efforts of authorities, practitioners and the public, the United Nations International Strategy for Disaster Reduction (UNISDR) has developed the UNISDR Terminology on Disaster Risk Reduction. This Terminology has been developed at the request of the Hyogo Framework for Action 2005-2015 through a consultative process with a broad range of experts and practitioners in various international venues, regional discussions and national settings. The idea is to have an international standard terminology on disaster risk reduction so that there will be uniformity in the uses of terminologies whether that be in the development of programs, institutions, operations, research, training curricula or public information. This handbook will therefore make use of the UNISDR Terminology relevant for the establishment of early warning systems to ensure a common understanding prior to the establishment of the community based early warning systems.

The case presented in the box 1 will explain the overall concept and the importance of the DRR.

Box 1: DRR Case Story

Case Story

Altogether 200 households are residing in Banbarsha community of Pahalmanpur VDC-9 in Kailali district. The community is surrounded by the Kandra River to the east and the Basanta community forest to the west. The community is comprised of 150 indigenous households, 41 dalit households and 9 others. The 21 dalit households residing along the river bank are landless and have no other choice than settling along the river bank.

The Kandra River is an important resource for the community providing water for irrigation and fishing.

The community is annually affected by floods. During the rainy season upstream rainfall causes the river to swell and inundate the lower part of the village affecting 41 households and their land. The upsurge of flood water causes erosion of the river bank. The houses in the areas are generally made up of mud and straw thus at risk of being dismantled by the rain and flood water. Besides this, the strong current also sweeps away infrastructures such as wells, electric poles and roads.

The role of youths in this community is remarkable. They established the Gyan Jyoti Youth Club in 2005 when the internal conflict in Nepal was at its peak. The club focuses on "youth for peace and reconciliation" and they have accomplished various physical infrastructure works (construction of drainage, safety path and community building) and have initiated a public awareness campaign through street drama and door-to-door visits.

The club has managed to arrange timbers in coordination with community forests. It has also raised Rs. 100 (1 Euro) from each household and manufactured boats. Boats are very useful in evacuating the 41 households and individuals during flood. Likewise, the club initiated the plantation of bamboo, sugarcane and banana at the river bank to prevent land erosion. In coordination and collaboration with the VDC the club managed to construct a 230-meter graveled evacuation road.

During the period of flood 60 per cent of the inundated houses were partially damaged while 40 per cent was entirely crushed. The club members rescued people from waterlogged houses using banana trunks. They also managed shelter in safe areas for evacuated people and arranged food and clothes for them using community emergency fund. Families were compelled to consume contaminated water as all water points and toilets were submerged in flood water resulting in outbreak of diseases especially among children and women. The community people worked together to arrange timbers from community forest and reconstructed damaged houses and rehabilitated the road.

The community continues to take initiatives to control flood control using bamboo to protect the river banks and joining the efforts to secure clean drinking water internalizing the lesson from previous flood to prevent another outbreak of diseases due to flood water contaminating the water source.

Terminology used for Disaster Risk Reduction, Hyogo Framework for Action and Community Based Early Warning Systems

Hazard

A hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Comment: Hazards can include latent conditions that may represent future threats and can have different origins: natural origins (geological, hydro-meteorological and biological) or conditions induced by human processes (social-natural, social-political or technological hazards).

Photo 1: Flood Hazard

Examples of natural hazards are landslides, earthquake, floods, drought, and fires. Often disasters are caused by a combination of several hazards and factors. Hazards can cause ripple effect once it hits a vulnerable community; in most cases on hazard can result to several secondary hazards. For example, an earthquake causes landslides, which dams a river and then causes flooding. Design of an early warning system will depend on which kind of hazard a community experiences, thus the onset can be either fast or slow.

Risk

Risk is the combination of the probability of an event and its negative consequences.

Comment: This definition closely follows the definition of the ISO/IEC Guide 73[1]. The word "risk" has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in "the risk of an accident"; whereas in technical settings the emphasis is usually placed on the consequences, in terms of "potential losses" for some particular cause, place and period. It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.

Capacity

Capacity is the combination of all strengths, attributes and resources available within a community, society or organisation that can be used to achieve agreed goals.

[1]http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?ics1=01&ics2=120&ics3=&csnumber=44651

Comment: Capacity may include infrastructure and physical means, institutions, societal coping abilities, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management. Capacity may also be described as capability. Capacity assessment is a term for the process by which the capacity of a group is reviewed against desired goals, and the capacity gaps are identified for further action. Capacity can roughly be categorised in three main groups:

A) Physical/Economic Capacity

- Money/Cash
- Real properties
- Stable sources of income and livelihood
- Safe infrastructures
- Food security
- Balanced natural environment
- Absence of hazards

B) Social/Organizational Capacity

- Relationship with kin and family
- People centered government
- Strong civil society/empowered community
- Functional community based and civic organisations
- Optimum availability of basic social and health services
- Strong social networks and institutions

C) Motivational/Attitudinal Capacity

- Knowledgeable and skillful
- Confidence and self-esteem
- Proactive attitude
- Open to change and new ideas
- Continual learning
- Building on experiences
- Positive perception in life

Vulnerability

Vulnerability is the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Comment: There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability

Photo 2: Vulnerability

varies significantly within a community and over time. Vulnerability can roughly be categorized in three groups:

A. Physical/Material Vulnerability

- Hazard-prone location of community houses, farmlands, infrastructure and basic services
- Design and construction materials of houses and buildings
- Insecure and risky sources of livelihood
- Lack of basic services: education, health, safe drinking water, shelter, sanitation, roads, electricity and communication
- Exposure to violence (domestic, armed conflicts)
- Age and disability

B. Social/Organizational Vulnerability

- Weak family/kinship structures
- Lack of leadership and initiative to solve problems or conflicts
- Exclusion of certain groups from decision making about community life or unequal participation in community affairs
- Absence or weak community organisations (in formal, governmental, indigenous)
- Social status (caste, ethnicity, gender)
- Neglect from government and civil institutions

C. Motivational/Attitudinal Vulnerability

- Negative attitude towards change
- Passivity, fatalism, hopelessness
- Lack of initiative
- Dependence on external support
- Lack of knowledge and skills
- Extremism

Disaster

Disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts and which exceeds the ability of the affected community or society to cope by using its own resources.

Comment: Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

Disaster Risk (DR)

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Photo 3: Element at risk

Comment: The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.

Box 2: Disaster risk equation

Disaster Risk can be defined using the following relationship:

$$\text{Disaster Risk} = \frac{\text{Hazards X Vulnerability}}{\text{Capacity}}$$

This relationship can be used when we have the knowledge of the hazards and the degree of vulnerability and the capacity to respond to the hazards.

For example: if one community is situated on the bank of Mohana River and there is high chance of flood occurrence during the monsoon period.

Some households are situated in the up-land but most of the households are situated very close to the river bank.

Households on river bank are more vulnerable than the ones upland.
The Disaster Risk of the two clusters will be different and can be calculated by dividing the response capacity of the clusters.

Disaster Risk Reduction (DRR)

DRR is the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including lessened vulnerability of people and property by wise management of the land and the environment, and by improved preparedness for adverse events.

Comment: A comprehensive approach to reduce disaster risks is set out in the United Nations-endorsed Hyogo Framework for Action, adopted in 2005, whose expected outcome is "The substantial reduction of disaster losses, in lives and the social, economic and environmental assets of communities and countries."

Disaster Risk Reduction is the conceptual framework of elements considered with the possibility to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards.

Community Based Disaster Risk Reduction (CBDRR)

CBDRR is a process of disaster risk management in which at-risk communities are actively engaged in the identification, analysis, treatment, monitoring and evaluation

of disaster risks in order to reduce their vulnerabilities and enhance capacities. This means that people are at the heart of decision making and implementation of disaster risk reduction activities. CBDRR involves activities, measures and projects to reduce disaster risks which are designed and implemented by people living in at-risk communities with the goal of building safe, livable, disaster resilient and developed communities. The involvement of the most vulnerable is paramount and support from the less vulnerable is necessary.

Disaster Risk Reduction Plan

A document prepared by a community, authority, sector, organization or enterprise that sets out goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives.

Comment: Development of early warning systems should be an integral part of community disaster risk reduction plans in communities at risk of flooding. Disaster Risk Reduction Plans should be guided by the Hyogo Framework and considered and coordinated with relevant development plans, resource allocations and programme activities. The timeframe and responsibilities for implementation and sources of funding should be specified in the plan. Linkages with climate change adaption plan should be made where possible.

Risk Assessment

Risk assessment is a methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Comment: Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to possible risk scenarios. This series of activities is sometimes known as a risk analysis process.

Preparedness

The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Comment: Preparedness action is carried out within the context of disaster risk management and aims to build capacities needed to efficiently manage all types of emergencies and achieve orderly transitions through response to sustain recovery. Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes activities such as contingency planning,

stockpiling of equipment and supplies, development of arrangements for coordination, evacuation and public information, and associated training and field exercises. These must be supported by formal institutional, legal and budgetary capacities.

Response

The provision of emergency services and public assistance during or immediately after a disaster to save lives reduces health impacts, ensure public safety and meet basic subsistence needs of the people affected.

Comment: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called "disaster relief". The division between this response stage and the subsequent recovery stage is not clear-cut. Some action-oriented response such as supply of temporary housing and water supplies may extend well into the recovery stage.

Recovery

It is the restoration and improvement where appropriate facilities of livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Comment: The recovery task of rehabilitation and reconstruction begins soon after the emergency phase has ended, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. Recovery programs, coupled with the heightened public awareness and engagement after a disaster, afford a valuable opportunity to develop and implement disaster risk reduction measures and to apply the "build back better" principle.

Disaster Risk Management Cycle

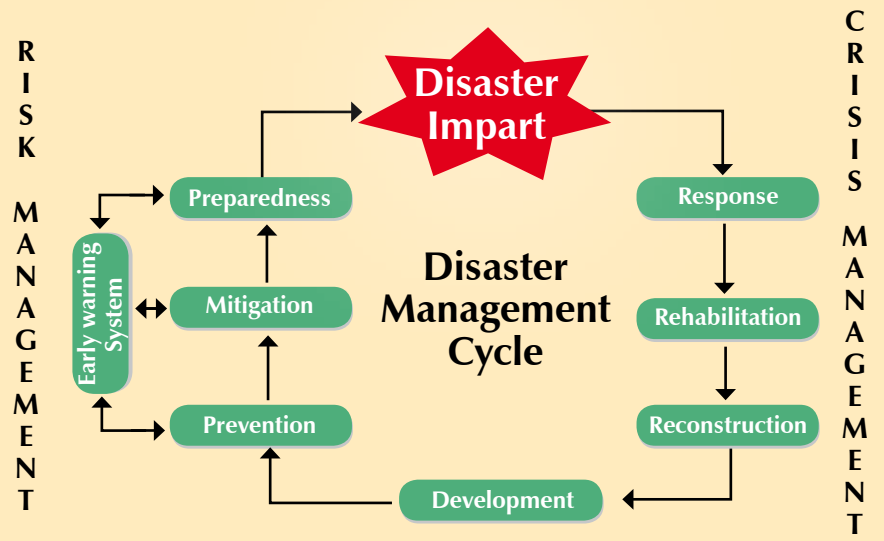
Disaster Risk Management (DRM)

It is the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

This term is an extension of the more general term "risk management" to address the specific issue of disaster risks. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness.[2]

In the Disaster Risk Management Cycle, there is clearly two phases i.e. before and after the disaster. Basically the Early Warning System (EWS) lays emphasis on the Prevention, Mitigation and Preparedness steps of the disaster management cycle. EWS also develops the capacity of the community for the Disaster Response during the disaster part (crisis management part) of the cycle.

Chart 1: Disaster Risk Management Cycle



[2]2009 UNISDR Terminology on Disaster Risk Reduction, ISDR

Session 2: Knowing Hyogo Framework for Action

The Hyogo Framework for Action (2005 – 2015) - HFA

The Hyogo Framework for Action (HFA) is a 10-year plan emerged from the World Conference on Disaster Risk Reduction in 2005 in Hyogo in Japan and is a global blueprint for disaster risk reduction efforts. The goal of HFA is to substantially reduce disaster losses, in lives and in the social, economic and environmental assets of communities and countries by 2015. The HFA has been already adopted by 168 governments including Nepal.

The HFA underscored the need for, and identified ways of, building the resilience of nations and communities to disasters. HFA provides a strong basis for priority actions by governments and governmental organizations as well as by local, regional and international non-governmental organization. It is designed to build the resilience of nations and communities to disasters.

The HFA is not a policy but a framework for commitment which provides a general guideline to achieve disaster risk reduction. The HFA emphasizes on the concept of Disaster Risk Reduction as a center for development plans and strategy. Disaster challenges the achievements of development and increases poverty.

The HFA has defined three strategic goals and five priority areas for action. In order to implement them effectively, guiding principles have been developed. HFA has also recommended practical measures to develop resilience among communities vulnerable to disaster on the backdrop of sustainable development.

The three strategic goals of HFA are:

Strategic Goal 1: Integration of disaster risk reduction into sustainable development policies and planning.

Strategic Goal 2: Development and strengthening of institutions, mechanisms and capacities to build resilience to hazards.

Strategic Goal 3: Incorporation of risk reduction approaches into the implementation of emergency preparedness, responses and recovery programmes.

Five Priority Actions:

Priority Action 1: Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.

Priority Action 2: Identify, assess and monitor disaster risks and enhance early warning.

Priority Action 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

Priority Action 4: Reduce the underlying risk factors.

Priority Action 5: Strengthen disaster preparedness for effective response.

Hyogo Framework for Action and Early Warning System

The framework marked the beginning of a new era for disaster risk management. Among its five priorities, priority number one calls for disaster risk reduction to be made a national and local priority with a strong institutional basis for implementation; priority two stresses the importance of identifying, assessing and monitoring risks and enhancing early warning and priority five focuses on strengthening preparedness measures at all levels.

The HFA articulated the need for governments, regional and international organizations and the development sector to integrate disaster risk reduction into their sustainable policy, planning and programming at all levels. It stressed that early warning systems contribute to the sustainability of development.

Session 3: National Strategy for Disaster Risk Management (NSDRM) 2009

The Nepal Natural Calamity (Relief) Act of 1982, amended twice in 1989 and 1992 is more orientated towards response rather than preparedness. The existing legislation has been found to be inadequate to address rights of disaster to affected or vulnerable people. There is a need for revision of the existing legal framework to ensure holistic risk management policies and systems giving adequate emphasis on all stages of disaster risk management cycle from preparedness to sustainable development in accordance with the Hyogo Framework for Action.

The National Strategy for Disaster Risk Management (NSDRM) was approved by the Government of Nepal in 2009 paving the way for addressing disaster risk reduction in a comprehensive manner within the overall development framework. Guided by the Hyogo Framework for Action (HFA), the NSDRM is a step towards meeting the goals and priorities set by Hyogo Framework for Action.

The overall objective of the NSDRM is to provide directions for integration of disaster risk reduction into national development plans and processes.

NSDRM analyses risks and vulnerabilities, taking note of historic events and seeking to learn from past events. It emphasizes on the relationship between disasters and poverty and suggests strong risk reduction approach to insure development investments by the government.

NSDRM is based on the spirit and principles of Disaster Risk Management approach.

Major guiding principles of disaster risk management strategy:

- Mainstreaming disaster risk reduction into development plans
- Ensuring safety to life and social security
- Gender and social inclusion
- Decentralized implementation processes
- Holistic risk management approach
- Safety and security to staff and stakeholders
- One window policy and cluster based approach to disaster management
- Spirit of participatory, interactive and coordinated efforts to DRR

Topic 2 - Early Warning Systems

Session 1: Understanding Early Warning System

The term 'early warning' is used in many fields to describe the provision of information on an emerging dangerous circumstance where that information can enable action in advance to reduce the risks involved. Early warning systems exist for natural geophysical and biological hazards, complex socio-political emergencies, industrial hazards, personal health risks and many other related hazards.

Box 3: EWS terminologies

Different terminologies and practice are used in EWS.

- **Community managed EWS:** a system managed by the community, but they may not be involved in the complete process of the establishment of the system. The establishment of the EWS might be done by an external organisation. In this process the community might not be fully empowered.
- **Community based EWS:** a system developed, managed and maintained by the community itself. In this process the empowering of the people/ community will be in the center. The role of supporting organizations will be to facilitate active and meaningful participation of all community members. Ultimately the EWS will be owned by the community.

Normally, the term "People-centered" and the "Community-based" are used as synonyms words.

Early warning systems contribute with other DRR interventions to protect and support sustainable economic development and early detection of undesirable situations. The society benefits from early warning systems in place. Many governments have failed to take early warning into account while formulating their development and disaster risk reduction policies. Subsequently it results in heavy losses to human lives and economic entities when disasters strike. Studies have demonstrated that disaster prevention can pay high dividends and found that for every Euro invested in comprehensive disaster risk management, broadly 2 to 4 Euro are returned in terms of avoided or reduced impacts on life, property, the economy and the environment[3].[4]

Early warning systems can be set up to avoid or reduce the impact of hazards as flood, flashfloods, landslides, storms, forest fires etc. The significance of an effective early warning system lies in the recognition of its benefits by the members of the general public.

Defining Early Warning System (EWS)

In the UN-ISDR terminology[5] the early warning system is the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by hazards to take necessary preparedness measures and act appropriately in sufficient time to reduce the possibility of harms or losses.

[3]Melcher, R (2005). Cost-Benefit Analysis of Natural Disaster Risk Management in Developing and Emerging Countries Manual. Working paper, GTZ, Eschborn

[4]White, B. and Rorick, M (2010) Cost-Benefit Analysis for Community-Based Disaster Risk Reduction in Kailali, Mercy Corps Nepal

[5]2009 ISDR Terminology on Disaster Risk Reduction

This definition encompasses the range of factors necessary to achieve timely warnings for effective response. A people-centered early warning system necessarily comprises four key elements: I) knowledge of the risks; II) monitoring, analysis and forecasting of the hazards; III) communication or dissemination of alerts and warnings; and IV) local capacities to respond to the warnings received. The expression "end-to-end warning system" emphasizes that early warning systems need to span all steps from hazard detection to community response. It is essential to link downstream communities and upstream communities or observers for effective operation of an early warning system. Heavy rainfall at upstream will have a direct impact on downstream communities. Downstream communities will only be able to get timely early warning information when this can be provided from upstream communities or observers.

Box 4: Impact of EWS

We are proud that no one has died in our communities

With the careful use of EWS devices and application of the skills and knowledge we gained through various trainings and exposures, we made sure that no human casualties were reported in our communities although 24 people died in adjoining communities where EWS was not in place. These figures show that if local communities are prepared sufficiently in advance, the impact of flood can be reduced dramatically.

Mr Chhallu Ram Chaudhari, Teacher, Hasulia, Kailali
Sources: CBDRR Good Practice Kailali Disaster Risk Reduction Initiatives, Mercy Crops, April 2009

The 'people-centered' elements require many systematic approaches and diverse activities spanning the four elements of early warning systems described above, such as: identifying target population, especially the vulnerable and disadvantaged and interacting with them to determine needs and capacities; conducting community meetings and involving communities in exploring and mapping their risks and planning their responses; fostering the development by communities of monitoring and warning systems for local hazards; generating public information tailored to target groups; developing formal mechanisms for community representatives to monitor and oversee warning system design; providing training for observers, authorities and communicators who operate the warning system; and providing exercises and simulations to enable people to experience and practice warning interpretation and responses. The early warning elements and activities will be further elaborated in the following chapters and topics.

Community Based Early Warning System

Community-Based Early Warning Systems (CBEWS) are anchored in the communities and managed by the communities. It is based on a "people-centered" approach that empowers individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner in a bid to reduce the possibility of personal injury, loss of life, damage to property, environment and loss of livelihood. It provides communities, practitioners and organizations involved in disaster risk management with advance information of risks that can be readily translated into prevention, preparedness and response actions. CBEWS helps to reduce economic losses by allowing people to better protect their assets and livelihood.

The true essence and significance of CBEWS is community empowerment. CBEWS suggests that people of a community can be capable and it empowers them to protect and prepare themselves and make them resilient against the disastrous effects. The communities are in the best position to undertake preparedness measures against disasters[6].

The basic requirements of CBEWS are that individuals and institutions have knowledge about what is threatening them, that people are able to communicate a change in threats, and that they are in a position to respond.

Essential features of Community-Based Early Warning Systems

- All community members especially the vulnerable groups should be involved at all stages of the CBEWS from designing to operating the systems, receiving the warning messages and responding to the warning.
- Measures taken should be based on the needs of everyone in the community including the most vulnerable segments of the community.
- The community members will own the process and system.
- CBEWS measures will enhance the capacity of the community members to deal with their situation.
- Meaningful participation in the decision-making process of EWS.

Flood Early Warning Systems

A flood early warning system is an integrated system of tools and plans that guide detection of and coordinates response to flood emergencies. A properly designed and implemented system can save lives and reduce property damage by increasing the time to prepare and respond to the threat of flood and time available to take protective measures prior to the occurrence of flood[7].

Importance of Flood Early Warning Systems

- Get advance notice of flood occurrence.
- Early Warning Systems can help to reduce casualties and damages.
- Vulnerable people in flood-prone areas are warned in time so that they can leave the danger zone and go to a safer place to avoid casualties.
- Can transfer moveable items to safer grounds.
- EWS contribute in protecting and supporting sustainable social and economic development.
- The society benefits from an early warning system.

However, these benefits only work under certain circumstances:

- The lead time (time between the warning and the actual arrival of the flood) must be sufficient to make the necessary arrangements.
- Safe places must be identified prior to the event and must be within reach of all people of the community.

[6]General Guidelines for Setting-Up A Community-Based Flood Forecasting & Warning System (CBFFWS) H. T. Hernando (PAGASA, Philippines)

[7]Estimating Forecast Lead Time, Nathan Pingel, Natural hazards Review.

- Evacuation routes must be identified prior to the event, marked and accessible for all segments of the community.
- The EWS must be fully operational and reliable, all procedures and equipment must be regularly tested and updated.
- All community members including the most vulnerable segments of the community must be aware of and agree on the EWS procedures and warning methods and must be willing to follow the information and advice given to them.

Box 5: Requirement for EWS systems

Early Warning Systems must be comprehensible and accessible for all users. They must deliver clear and concise messages tailored to the respective social and cultural context.

The ability to deliver vital information to the public at risk has not always been successful. In many cases, local mechanisms for communicating risk and interpreting warnings remain very week.

Sophistication of technical information may be of little use if it is not linked to the capacities, resources and traditions of the local situation.

Moreover, detailed information about the adverse impact of hazards on people and infrastructure, and their vulnerability - necessary for informed decision-making - is often missing. Even where procedures do exist, communities often do not respond appropriately to warning because of lack of community engagement and lack of planning, training, resources or viable response options.

Source: Living with Risk: A Global Review of Disaster Reduction Initiatives

Early Warning Practices and Systems

Effective Early warning systems require appropriate and easy to use technical know-how and good knowledge of the risks. The systems must have efficient and effective dissemination, information and communication systems that will reach all those at risk including the most vulnerable segments of the communities. It must be practiced and have well understood response mechanisms and procedures. The general public, risk managers, community leaders, members of disaster risk reduction and early warning committees, and security personnel should be well familiar with the mechanisms and procedures. Public awareness and education are crucial for ensuring effective and efficient early warning system. Close collaboration among the many sectors involved in the systems is essential to produce synergic efforts and make the system more viable.

Box 6: Traditional flood monitoring

Traditional Knowledge

"Before we were introduced to the early warning systems by the project we used to rely on nature to provide us early warning. The river water got a different smell, the ants started to move their eggs and the crabs moved to higher ground. These were some of the signals that indicated that a flood might soon reach our village, but often we found that the information was not reliable and that it was false alarm".

Mr. Ramwati Yadav, Aalinagar-9, Binauna VDC, Banke

The traditional framework of early warning systems is composed of three phases:

i) Monitoring of Risk (Measurement of Precursors)
ii) Forecast indicates sudden disaster event (catastrophic)
iii) Notification of a warning or alert, should an event of probable disaster/event take place

For example the people in western part of Nepal used to observe the behavior of the chicken to get the early warning message.[8] An example of traditional the early warning messages is elaborated in box 6.

An improved four-step framework being promoted by the different agencies includes a fourth phase: preparedness and response for an emergency situation.

The purpose of this fourth element is to recognize the fact that there needs to be a response to the warning. The response will be the responsibility of the community.

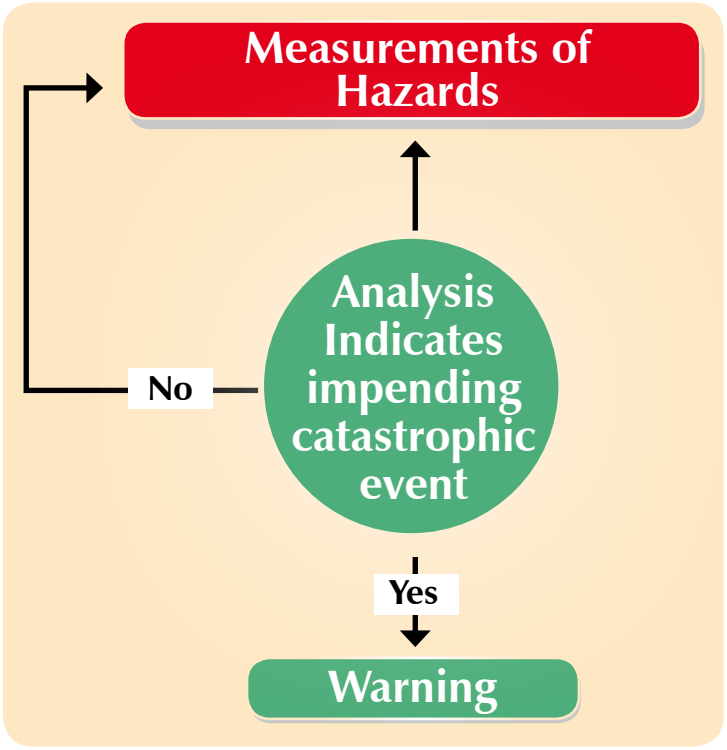
Box 7: Improved EWS

The need for a improved EWS was clearly demonstrated in September 19, 2008. Heavy late monsoon rains in several districts caused the worst flooding that Kailali district had witnessed for more than 20 years. Raj Kumari Chaudhary from Lalitpur in Phulbari VDC said that the water came so fast, it was chest high only four minutes after first entering her house. Raj Kumari member of the early warning committee with other members followed closely the early warning procedures with evacuation plans which they had designed and practiced. When the water started to rise and the sirens were sounded at 3am, Raj Kumari knew where to take her two children, and along with the rest of her community, has evacuated to safety.

[8] "When chickens scratch together there will be foul weather". http://ezinearticles.com/?Can-Animals-and-Animal-Behaviors-Predict-the-Weather&id=410815

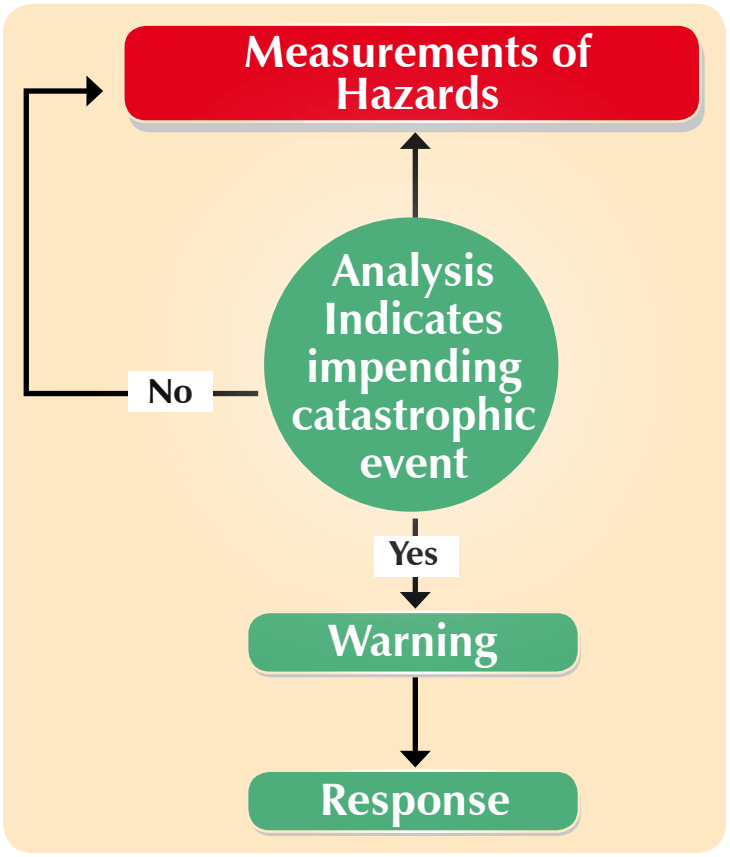
Traditional Early Warning System

Chart 2: Traditional EWS



Improved Four Phases Early Warning System

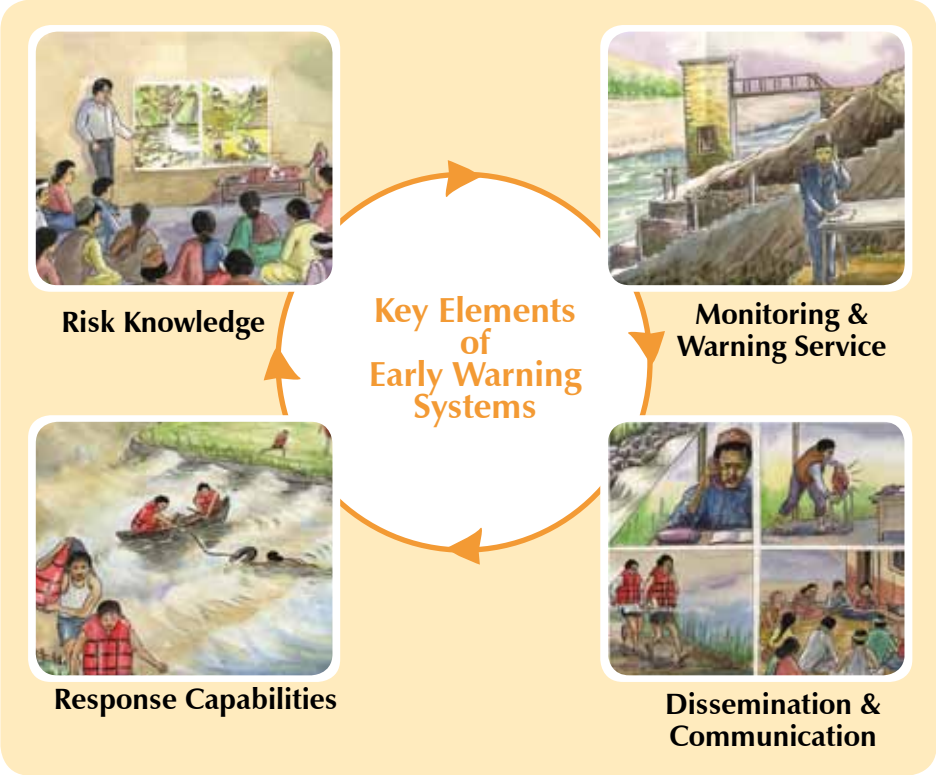
Chart 3: Improved EWS



Session 2: Key Elements of Early Warning Systems

A complete and effective community based early warning system comprises four inter-related elements: risk knowledge, monitoring and warning service, dissemination and communication and response capability (see figure X). A weakness or failure in any one part could result in failure of the whole system.

Chart 4: Key EWS elements



Risk Knowledge

Risks arise when a hazardous situation collide with vulnerable circumstances at a particular location. A detailed assessment of the risks will be required through systematic collection and analysis of data and should consider the dynamic nature of hazards and vulnerabilities arising from land-use change, environmental degradation, urbanisation and climate change. Risk assessments and maps help to understand the situation, motivate people, prioritize needs for developing early warning systems and guide preparations of disaster prevention and response measures.

Monitoring and Warning

Warning services lie at the core of the system. There must be a sound basis for predicting and forecasting hazards as well as reliable forecasting and warning system operating 24/7. Continuous monitoring of hazard parameters and contributing factors is essential to generate accurate and timely warnings. Warning services should be coordinated with stakeholders and relevant agencies to gain benefits of shared institutional, procedural and communication networks.

Dissemination and Communication

Warnings must reach all those at risk including all vulnerable members of a community. Clear messages containing simple, useful and understandable information are crucial to enable proper understanding of warnings and responses in order to safeguard lives and livelihoods. It should be taken into account that some community members might not be able to hear or see the information or to follow the instructions by themselves and appropriate measures and actions should be taken accordingly. Community and district level communication systems must be pre-identified and appropriate authoritative mandates be established. The use of multiple communication channels can be necessary to ensure that as many people as possible are warned and to reinforce the warning message.

Response Capabilities

It is essential that communities understand their risks, respect and follow the warning and know how to react. Education and preparedness interventions play a key role in increasing knowledge. It is also essential that contingency and disaster management plans be in place, that roles and responsibilities are clearly stated among community members, that resources including human resources are allocated and that standard procedures are well practiced and tested. All community members should be well informed regarding warning messages, when and how to react to the messages, steps to take to prepare themselves and their family, options for safe behavior, available escape/evacuation routes, and best ways to avoid damage and loss of properties.

Session 3: Essentials of EWS[9]

Community based early warning systems must be built on four essential aspects:

- Effectiveness
- Efficiency
- Equity and
- Legitimacy

The system must function effectively and reach the entire population. Furthermore, the system must address the needs of all members of the community and should be reliable.

Effectiveness

While designing an early warning system, following questions should carefully be considered as to ensure effectiveness of the system:

- Does the system ensure that the early warning messages reach the last and most vulnerable person of the community?
- Does the early warning message help reduce disaster risks?
- Is early warning message beneficial for saving human, physical and financial capital of the community?
- Is the system well managed and are the resources used in the most appropriate way?

Efficiency

Any established Community Based Early Warning Systems (CBEWS) should function properly which means it should be managed efficiently and be effective in protecting life and property during the time of the flood.

Efficiency of any CBEWS can be assessed by following:

- Are there prompt and effective decision making policies and systems in place to achieve its objectives?
- Will people have a positive perception on the immediate danger and is the level of understanding about hazard type appropriate?
- Can the EW messages be issued on time?
- Are the early warning facilities appropriate and are decisions taken by those at risk timely?

Equity

The CBEWS must address the need of all community members. Special needs of the most vulnerable groups of the community (women, people with disabilities, elderly people, and children) should be considered.

The Equity of any CBEWS can be assessed by following:

- Does the system address human justice?
- Are the voices of the most vulnerable people in the community heard?
- Are the special needs of the women, elderly people, people with disabilities and children considered and addressed?

[9]When Heaven (hardly) Meets the Earth: Towards Convergence in Tsunami Early Warning Systems, Jonatan A. Lassa

Legitimacy

The community people take the early warning message authentic and interpret properly to cope with the situation and make responses. The early warning message should not be considered like a Nepali Folk Story mentioned in box 8 below. EWS could be adopted and developed as common practice and culture of the community.

Legitimacy of any CBEWS can be assessed by following:

- Are the early warning messages accepted by the community or end users?
- Are there any possibilities of issuing the wrong early warning messages?
- Does the community respond to the early warnings?
- Are the local knowledge/traditional early warning practice accepted by the systems?

Box 8: Example of legitimate message

Example of Legitimate Messages (Nepali Folk Tale)

A farmer with 15 goats went to the Jungle for grazing. There is always a possibility of attack by tigers. Hence, before leaving the village he informed some of his friends that in case of being attacked by a tiger, he might shout "HELP!

Suddenly the villagers heard the sound "HELP!" They ran to the jungle, but the farmer was taking a nap on a tree. They became very angry and scolded him, but with a grin he told them that he was testing whether they would come or not and he promised never to repeat this in the future.

Few days later, the villagers heard the same "HELP!" again and they rushed to the jungle. The same happened. They warned the farmer that they might not come to help him again.

A month later the farmer went to the jungle again with his goats and as usual he climbed the tree; from there he watched the goats. Suddenly he saw a big tiger approaching the grazing goats. He became nervous and started to scream "HELP!" As no one arrived to help him, he continued screaming. Still no one came for the support. He was unable to take any action against the tiger and from the tree; he watched the tiger grabbing two of his goats. Then the tiger left. After assembling the remaining goats the farmer went back home and with anger he spoke to the villagers about the incident and asked them why they did not come to help him? The villagers replied that the previous two times when they had gone to help him, there was no incident and this time they simply thought that he was joking again.

Session 4 : Cross Cutting Issues[10]

According to the International Strategy for Disaster Reduction (ISDR) checklist, the following cross cutting issues should be taken into account while designing, operating and maintaining an effective early warning system to make it sustainable and people-centered.

Table 1: Cross cutting issues

Effective Governance and Institutional Arrangements • Operational policy developed • Commitment of all stakeholders • Functional institutional arrangement	**Cultural Diversity and Gender Perspectives** • Special needs of women, elderly people and persons with disabilities considered • Diverse culture practice considered
A Multi-Hazard Approach • Same EWS for different hazards • Better understanding on range of risks • Reinforces desired preparedness for different hazards	**Involvement of Local Communities** • Participatory approaches applied by active and meaningful participation of all local communities at all steps of EWS • Participation of those most likely to be exposed to hazards in decision-making process • Systems tailored to meet the needs of most vulnerable groups (women, elderly people, children and persons with disability) and special attention should be given to the most vulnerable community members

Effective Governance and Institutional Arrangements

Well-developed governance and institutional arrangements (counts both for CBEWSs and for bigger national systems) will support successful development and operation of a sound early warning system and will ensure that the systems will be sustainable.

Good governance is encouraged by robust legal and regulatory frameworks and supported by long-term political commitment and effective institutional arrangements. Effective governance arrangements should encourage local decision-making and participation which are supported by broader administrative and resource capabilities at the national or regional level.

Vertical and horizontal communication and coordination between early warning stakeholders should also be established.

A Multi Hazard Approach

Where possible, early warning systems should link all hazard-based systems. Economies of scale, sustainability and efficiency can be enhanced if systems and operational activities are established and maintained within a multipurpose framework that considers all hazards and end user's needs.

[10]Developing Early Warning Systems: A Checklist, ISDR 2006

Multi-hazard early warning systems will be activated more often than a single-hazard warning system and, therefore, would provide better functionality and reliability for dangerous high intensity events such as fire, earthquake and wildlife infrequently. Multi-hazard systems also help the public to a better understanding of the range of risks they face and to reinforce desired preparedness actions and warning response behaviors.

In the communities exposed to multi-hazards, it can be an advantage to introduce a system which will be activated for any of the disasters faced by the community. Proper guidelines should be developed by the community for all relevant disasters and it should clearly be disseminated to the community and the response from the community should be well exercised and reviewed.

Cultural Diversity and Gender Perspectives

In developing early warning systems, it is essential to recognize that different groups have different vulnerabilities based on their culture, gender, caste, ethnicity or other characteristics that influence their capacities to prepare, prevent and respond effectively to disasters. Women and men often play different roles in society and have different access to information in disaster situations. In addition, the elderly, disabled and socio-economically disadvantaged are often more vulnerable. It will therefore be essential to collect detailed information on all vulnerable persons in a community to ensure an effective EWS.

Involvement of Local Communities

Community based early warning systems rely on the active participation of those most likely to be exposed to hazards. Without involvement of local authorities and communities at risk, the government and institutional interventions and responses to hazard events are likely to be inadequate. It has further to be kept in mind that the communities themselves will always be the first responders for any disasters, which means that no system will be fully functional without community participation.

A "bottom-up" approach to early warning enables a multi-dimensional response to problems and needs of the communities. In this way, local communities, civic groups, and traditional social structures can contribute reducing vulnerability and strengthening local capacities.

Information, institutional arrangements and warning communication systems should be tailored to meet the needs of every group and special attention should be given to the most vulnerable members in the community. It is therefore essential to involve representatives from vulnerable groups in assessments, design as well as planning to meet their special needs and to make use of everyone's contribution and capacity. The most vulnerable groups include:

- **Women:** there are some special issues concerning women which need to be considered while designing and preparing a CBEWS. In patriarchal societies, women are often in a more vulnerable position than men as they have less access to resources and information. Pregnant women, lactating mothers, mothers with infants or young children do have special needs especially when it comes to response. The way many women are dressed (saris and long dresses) will as well impact their capability to respond quickly to the warning messages.

- **Elderly People/Children:** Elderly and Children in the community might need special attention during the flooding period and for evacuation. For this purpose, the special need of each elderly person and child will be collected during the situational analysis steps and recorded in a HH data base.

- **Persons with Disability[11]:** Person with disabilities may have one or more impairments such as physical, visual, hearing/speaking, mental/intellectual impairments. These impairments might hinder the person in reacting adequate to the warnings unless the early warning systems are adapted to the impairments or the persons will be informed and assisted by family or community members. Not all impairments will hinder the person to actively participate and contribute in developing, operating and responding to the EWS. While collecting community data it should be clear who will need special attention for early warning and evacuation, where they are living, what kind of attention they will need whether and from whom (family members or others).

Physical Difficulty in moving around or doing some activities	**Visual** Difficulty in seeing and moving around
Hearing & Speech Difficult in hearing and speaking	**Intellectual/Mental** Difficult in understanding & behaving appropriately

[11] Mainstreaming Disability in community Based Disaster Risk Reduction, Handicap International India 2008

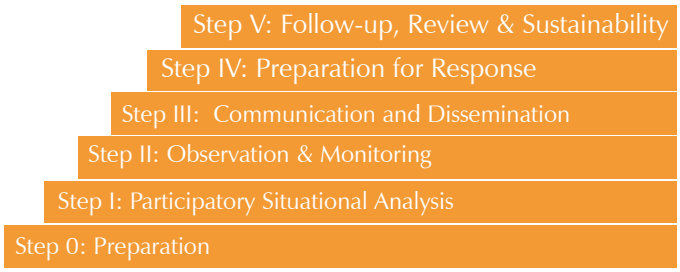
Topic 3 - Establishment of Community Based Early Warning Systems

This topic will guide the process of establishing a community based early warning system through five steps which all include a part on capacity building and the challenges faced by Mercy Corps and Practical Action while establishing CBEWS systems with their local partner organizations.

Community Based Early Warning System: It is a system designed, operated and maintained by the communities themselves. While establishing the system the community will explore external support from different individuals, communities, organizations and institutions. It is essential that the community develops and maintains close coordination and links with these stakeholders.

The community will lead all steps of establishment of the early warning system. It helps to develop ownership and contributes to the sustainability of the systems.

Following steps should be considered while establishing a community based early warning System:

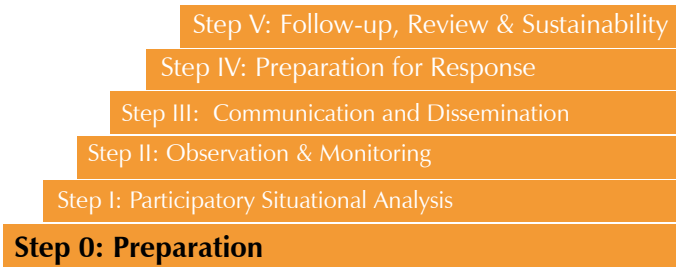


A detailed process for each step will be elaborated in subsequent sections. The suggested tools can be found in the reference material. (Refer list of Reference Materials Section on page 68 and 69 Of this document and in the enclosed CD)

Step 0 : Preparation

This step includes activities to identify whether the establishment of an early warning system will be the right intervention to mitigate the problems that the community is facing. The basic information should be collected in consultation with key persons in the community. The following information can be collected but other may be relevant.

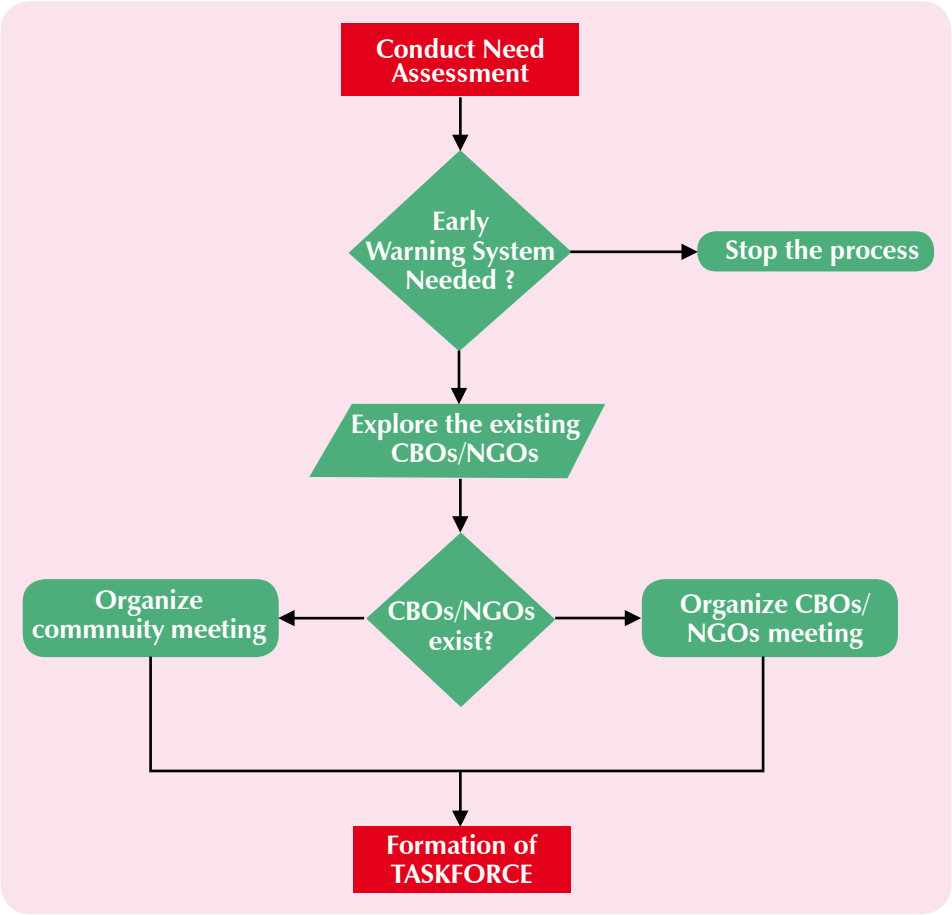
- Frequency and severity of past hazards
- Vulnerable households and groups.
- Spatial characteristics
- Existing social groups
- Indigenous early warning practices
- Capacity of the community



The information will be analyzed with community representatives and the outcomes will advice whether establishment of an early warning system will be effective in reducing the vulnerabilities of the community. The major criteria for identification of the relevancy of establishing early warning systems are:

- frequency of hazard
- severity of hazards
- availability of sufficient lead time

Chart 5: Illustrates the preparation process

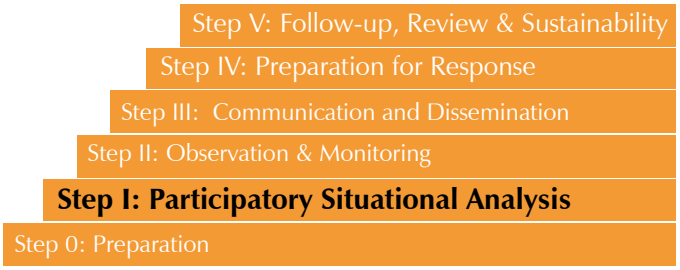


If the need assessment suggests an establishment of an early warning system, the remaining procedures of the flow chart should be followed and lead to Step 1 (See page 39 Participatory Situational Analysis). The local CBOs/NGOs can be representative in the taskforce. Formation of a taskforce for early warning system should involve all sections of the community. The major role of the taskforce is to facilitate the participatory situational assessment process and the formation of early warning management committee. The taskforce members should be familiar with participatory mapping principles and tools.

Rapport Building:

A good rapport will enhance building confidence among the stakeholders. It is necessary to understand the local context of the communities for the rapport building. A community orientation program can be organized as part of the rapport building. Orientation can include a presentation of the early warning process, its concept, scope, limitations, roles of the community and stakeholders. Information, Education and Communication (IEC) materials like posters and flyers can be used for the orientation. The IEC material should be inclusive and focus on the needs and roles of all sectors of the community. In case inclusive IEC is not available in the organization, material from other organizations can be explored or technical assistance from relevant organizations (gender, disability) can contribute for the development of inclusive IEC material. Having contact with individual households while collecting information can be another way of building the rapport.

Step I : Participatory Situational Analysis



The community will be the key actors and decision makers in the participatory situational analysis to ensure successful outcome of the mapping, analysis and effectiveness of the early warning system. This participatory process assumes the people as experts and the ones to know the reality of their community.[12]

Mapping and Gap Analysis

The community will be able to enhance knowledge of their hazards, vulnerability, risks and capacity through a mapping and gap analysis process. All concerned community members, groups and organizations will be actively involved in this process.

The taskforce will facilitate and collect information through:

- Hazard, vulnerability, and risk assessment
- Capacity assessment

Hazard, Vulnerability, Risk and Capacity Assessment

The assessment is a process involving all parties concerned for collection and analysis of information. The representation of all vulnerable groups will ensure in identification of their specific problems and special needs. The hazard assessment will identify existing hazards and related risks. The vulnerability assessment will identify the vulnerability of the community. The capacity assessment will identify existing capacities in the community on which the early warning system and existing coping (warning) mechanism can be built[13].

Different participatory mapping tools can be used as per the need of the community and the objectives of the assessment. Please refer the reference list and resource material along with an enclosed CD for detailed materials and information on tools.

Mapping (social and resource map, accessibility maps and hazards and vulnerable maps), seasonal calendar, transect walk, Venn diagrams, direct observation, semi-structured interviews and ranking tools can be used. The following table 2 shows different tools that can be used:

[12]Participatory Program Planning for Community-Based Change, A Guidebook for Field Workers, Mr. Eric Amit, Coady International Institute, Canada, 1997.

[13]Community Based Disaster Risk reduction for Field Practitioners, February 2009, p84.

Table 2: Mapping Tools

Tools	Purposes
Mapping	
• Social	• Houses, roads, temples, stores
• Hazards	• Elements at risk, safe areas etc.
• Resource	• Local capacities (schools, health centers, religious facilities, open fields, market, forest, safe areas)
• Vulnerability	• Location of the vulnerable community • Most vulnerable groups (people with disability, children, women, elderly people) • Routes and accessibility to evacuation shelter
Seasonal Calendar	• Duration and timing of hazards and vulnerability • Busy and leisure time of the community members
Transect Walk	• Visualizes interactions between physical environment and human activities over space and time • Danger area, evacuation routes and sites • Available local resources • Problems and opportunities
Venn diagrams	• Organizations, their roles and relationship with the community
Direct Observation	• Verify secondary information
Semi-structured interview	• Collects general/specific information of problems vulnerabilities, capacities and perceptions
Ranking	• Identifies criteria and determines preferences • Identifies differences in perceptions

Hazard Assessment

Hazard Assessment is a methodology of studying the nature of hazards determining its essential features and impact. The key features of the hazard assessment are:

- Type of hazard : natural or man-made
- Warning signs: scientific or indigenous indicators (cloudy skies, movement of animals, temperature, weather pattern, etc.)
- Force : intensity or magnitude
- Speed: on-set and impact (very fast, very slow, etc.)
- Frequency: how often does the hazard strike (once a year, every month, once in 10 years, etc)
- Duration: how long does the hazard event last (1 day, 2 hours, 60 seconds, etc)

In general, it is sufficient to describe the hazard in qualitative terms before establishing the EWS; however, quantitative data will ensure better foundation of early warning system.

Essential information for the hazards assessment is:

- Nature of the hazard (flash flood or flood)
- Frequency of the hazard
  - Location and spatial area of the flood
  - Depth of the flood
  - Duration of the flood
  - Velocity of the flood

Types of flood

Flash Flood

Flash flood is defined as flooding of short duration with a relatively high peak discharge. Flashfloods are distinguished from regular floods by a timescale of less than six hours from rising to going back to normal.[14] Its major characteristics are:[15]

- Occurs within six hours after heavy rainfall
- Normally a result of the runoff from a torrential downpour
- Or from the failure or sudden break-up of ice jams or other river obstructions

River Flood

River flood is a temporary covering of land by an overflow of water from the river. The river covers the land which is normally dry. The river excess water flows from its usual boundaries particularly at bends. Its major characteristics are:

- Rainfall over large catchment areas
- Melting of the winter's accumulation of snow
- Sometimes both of above
- Takes place in river systems with tributaries that may drain large geographic areas and encompass many independent river basins
- Normally has a slow build-up,
- Is often seasonal
- May continue for days or weeks

The Nature of flood hazard

The following information can be collected for the hazard assessment:

Frequency

Collect historic information on flood interviewing local people and estimate frequency and

Location and spatial areas of flood

An overview of the potential flooded areas can be identified using maps (topographic maps the area, maps held by the local authorities or maps produced by or with assistance of the community at risk). The official maps will complement the maps produced by the community.

Photo 4: Flood marks on trees

Depth of the flood

Interview local people about their experiences and take note of stains on buildings, trees and infrastructure or from rubbish (e.g. plastic bags) in tree branches.

[14]Manual Local Flood Early Warning Systems Experiences from the Philippines, October 2009
[15]Manual Local Flood Early Warning Systems Experiences from the Philippines, October 2009

Duration of the flood

The number of casualties and amount of damages depend on the duration of flood. The risk of water-borne diseases will increase during the time that the area is covered by water.

Velocity of the flood

Floating debris and materials are the indicators of strong currents. Ask people about their experience of currents of the floods. Strong currents might be dangerous and people should not endure floods in their houses because these might collapse.

Vulnerability Assessment

Vulnerability assessment is the methodology of identifying who and what will be affected, and who will need assistance.

Social, geographic, economic and political processes influence how hazards affect different people. Some groups are more vulnerable and at risk. Class, occupation, caste, ethnicity, gender, disability, health status, age, immigration status and the nature of social networks are the key factors for degree of vulnerability.

The assessment should include detailed information of people with disabilities (speaking & hearing, vision, physical and mental and intellectual) and other vulnerable groups such as elderly people, children, pregnant women, women with new born babies and lactating women.

Capacity Assessment

Capacity assessment is the methodology to determine how people can cope, prepare, respond and recover from a disaster. Particularly useful tools for capacity assessment are resource mapping, institutional and social network analysis coping strategy analysis and resource mapping. Key elements of capacity assessments are:

- Coping mechanism: how people cope with existing hazards, what are the mechanisms?
- Resources: what are the resources and how are they used?
- Capacities: what are the physical, social and attitudinal capacities?

Capacity assessment can include following activities:

Institutions and Stakeholders Analysis

Establishment and operation involves many stakeholders with the flood prone community at the core. Contribution from and coordination with a wide range of stakeholders is required to ensure the effectiveness of an early warning system. These can be identified through an institution and stakeholder analysis.

Photo 5: Participatory hazard mapping

The community will identify the organizations and institutions which can support for and be a part of early warning systems. The Venn diagram will be useful for this purpose. For more details of tools for institution and stakeholder analysis please refer to the list of reference material. (Tools for Development, A handbook for those engaged in development activities, DFID, March 2003)

The following list provides a brief explanation of the types of organisations and groups which can be involved in early warning systems.

Communities: The residents of flood-prone areas are often referred to as "communities". These communities may consist of different social, religious or ethnic groups with varying attitudes and coping mechanisms in disaster situations. Essential is that they actively take part in mitigating and will not see themselves as victims.

Local Governments: District Development Committees, Municipalities, Village Development Committees and District Disaster Relief Committees are responsible to take the lead role in disaster reduction initiatives.

Early warning is not a priority in all VDCs/municipalities affected by floods. In many cases, the VDCs/municipalities do not experience severe flooding and therefore are less enthusiastic for establishing early warning system. However, their cooperation in gathering information is essential for establishing an early warning system.

National Government Institutions: National government institutions for instance line ministries and departments are responsible for formulating high-level policies and frameworks for early warning and for providing technical support.

The government institution (Department of hydrology and meteorology) has rainfall recording and river level data collection system, which will be instrumental for the early warning systems. The department can provide historical and current data of the flood and rainfall pattern, location of rainfall and river level stations.

Box 9: Roles of government bodies

In Nepal the Department of Hydrology and Meteorology is responsible for the operation and management of the countrywide hydro-meteorological stations, weather monitoring, analysis, forecast, and dissemination of information. The Department of Water-Induced Disaster Prevention is involved in research and river/hydraulic modeling, field research stations for landslide/ erosion studies, flood control researches, developing hazard maps and implementation of mitigation measures for floods and landslide/ erosion.

Non-Governmental Organizations (NGOs): Several NGOs and civil societies are active in emergency situations. They provide humanitarian assistance to the affected people with relief distribution, establishing shelters and ware houses, rehabilitation and reconstruction.

Some NGOs pursue a more development oriented approach and are actively involved in preparedness, prevention and mitigation. Some NGOs have supported establishment of early warning systems through participatory approaches and acted as advocates.

NGOs can play a role in raising awareness among individuals, communities and organizations involved in early warning, particularly at a community level. They can also assist with the implementation of early warning systems and in preparing communities for natural disasters.

Formation of Early Warning Management Committee

After completion of the Participatory Situational Analysis, the taskforce will have in-depth information and knowledge of the community and will facilitate in the formation of early warning management committee. In the establishment of an early warning system, this committee will develop links with different stakeholders for technical, managerial and financial support. The members of the management committee will be oriented about their rights, roles, responsibilities and tasks.

Make sure that vulnerable groups are well represented in the management committee!

Capacity Building

A needs assessment will identify the areas of capacity building for participatory situational analysis. The following approaches can be taken to build the capacity of communities and stakeholders:

- Training
- Awareness raising (IEC material - posters, flayers, pamphlets, videos, street drama, door-to-door)

Main target audience for the capacity building should be the community leaders, task force and stakeholders. Suggested content for capacity building using the above approaches:

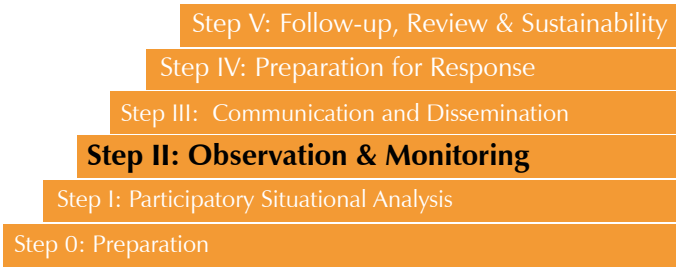
- Participatory assessment tools
- Facilitation skills
- Community mobilization

Challenges

The challenges related to participatory situational analysis might differ from community to community. Following are some challenges faced during the establishment of community based early warning system in Nepal:

- Inadequate emphasis on social, economic and environmental vulnerability
  - Due to various factors such as poverty, fatalism, insufficient traditional practices, and individualistic/selfish nature of the community and society.
- Inclusiveness and participation in assessments:
  - Due to lack of pro-activeness, poverty, caste systems and social structure, most vulnerable communities/individuals (women, elderly people, and people with disabilities) may not be involved or may be reluctant to participate in the assessment process.
- Data gaps
  - Specially in the small rivers where historic data of rainfall and river level might not be available.
  - Data for newly settled communities and gauging stations might not be available.
  - Danger of loss of historic memory
- Difficulty in accessing information
  - Secondary data not available

Step II: Observation and Monitoring of Hazard for Early Warning



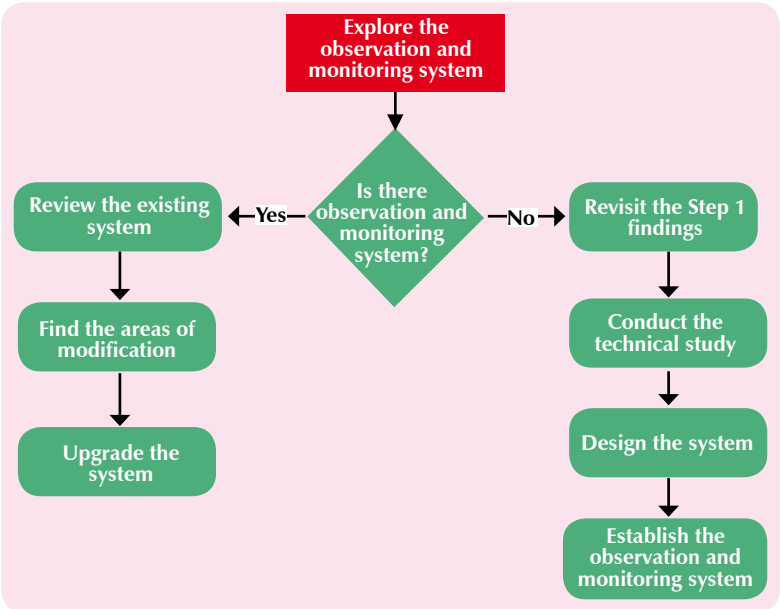
After analyzing the collected data an observation-and monitoring system should be developed with the active participation of the community.

The hydrology and meteorology services have established daily observation and recording of rainfall and water level stations in many places. A joint assessment team with representatives from the community, EWS taskforce, project staff and government staff will assess the stations to determine whether they can provide relevant information for an early warning system.

The assessment team will identify the relationship between the observer stations and downstream communities. The team will look into quantity and quality of the monitoring devices, human resources available, need for capacity building, and possibilities for communication, additional equipments and necessary maintenance.

Exploring the existing Observation and Monitoring Systems:

First of all, existing observation and monitoring systems should be explored (indigenous, traditional or more modern). The following chart 6 suggests a procedure to follow:



Upgrading of Existing Systems

If systems exist, the community will review it and find out the areas of modification. Once the areas are identified, the community will develop their system for observation and monitoring of flood hazards.

The following checklist can be used to review the existing systems:

- How effectively are they functioning?
- Do they provide timely and reliable information?
- How are they managed?
- How are resources for the systems mobilized?
- Does the community have capacity and resources (Human and financial resources, tools and equipments) to operate the system?
- What are the lessons learned from the existing system?
- Are there any needs for modification of the system?

The review will identify whether the system can effectively serve the community's needs for a EWS. It will be relevant to explore available external technical support from the government and non-governmental organizations.

Developing New Systems

In the communities where a system does not exist the EWS management committee will explore options for new systems with technical support from the government and non-governmental organizations.

The EWS management committee should revisit Step 1 findings and conduct a detailed technical study of the upstream catchments area. With the help of the information collected during Step 1 and the technical study, the management committee will develop their observation and monitoring system. Once the system is developed, the community will test the system organizing a mock drill.

The following factors can be considered for the development of hazard monitoring and warning systems:

Hazard Monitoring and Warning Decision

An essential part of the EWS is continuous upstream observation of hazards throughout rainy seasons. In principle, the observation must be round-the-clock every day of the week during rainy seasons. However, if the weather forecast predicts no rain within the next few days, it may be sufficient for the monitoring stations to remain on standby until the next rainfall.

For example, in Nepal there is very little risk of flooding during other seasons than the monsoon season. Therefore, the 24-hour-observation should be standby during other seasons.

In case of flash flood, only upstream water level observation is not sufficient. Hence, the rainfall intensity and quantity must also be observed.

Tools and Equipment for Hazard Monitoring

Characteristics of hazard will decide which tools and equipments to be used. Following devices and tools can be used for the flood hazard monitoring:

Monitoring Devices

Different types of devices exist for river level and rainfall monitoring. While assessing the devices to be used, cost, technology, and maintenance and possibilities for replacement should be considered. Priorities should be given to low cost and simple technology for easy maintenance and replacement.

The EWS management committee will select the most feasible location for the monitoring water level and rainfall devices with external technical advice.

Water Level Devices

In big river systems, the most reliable way of predicting flood is to observe the water level at the upstream. A minimum setup consists of one upstream gauge and one downstream gauge. The lead time (the time flood takes to travel from upstream to downstream) can be identified by correlating the data from these two gauges. More precise and reliable information can be obtained to increase the warning time by establishing more than one gauge station upstream.

Photo 6: Upstream gauge

Photo 7: Gauge painted on bridge pillar

If there is a bridge pillar in a relevant distance from the community it can be an advantage to paint the gauges on bridge pillar. From experience these gauges will last longer, require less maintenance and are accessible. In case of no bridge pillar strong foundation should be constructed in the river bank for the installation of the gauge station please see.

The scales should be painted with water resistant colors. The numbers should be big and readable from the river bank even at night. The observers might need a flashlight for night time observations.

For downstream monitoring in the community three colored poles can be established. The risk assessment will identify the location for installation of pole.

Identifying Threshold and Lead Time

Threshold and lead time can be calculated using the available historical information obtained from the communities' memory and from Department of Hydrology and Meteorology.

a. Interview with the community to identify the date, time, and level of previous high flood
b. Check upstream Department of Hydrology and Meteorology data on the same date to identify the upstream water level and time.
c. Correlate the information obtained from point a and b.

If there are no upstream gauge stations and a new gauge station is established during setting up of CBEWS, EWS committee members have to be alert to take real time information to find out the threshold and lead time.

Technical support can be taken from concerned authorities to identify threshold in this case. However, finding threshold value by communities themselves during real time is crucial to the response by communities at the onset of any flood.

Photo 8: Three colored pole (Level 1, green: Alert/Standby/Ready-Level 2, yellow: Preparation "Get Set"-Level 3: Evacuation-Red).

Photo 9: Water level gauges.

Adjustment of Thresholds

The threshold values need to be adjusted over time. The initial value might be too high or too low. Especially in the Tarai region, the levels of the river beds have a tendency to change due to deposition or scoring. Based on real time experience, communities themselves can fine tune the threshold values for forth coming years.

Pre-conditions for Warning/Alert Levels

Warning levels will be based on the identified lead time and threshold. Three different warning levels are normally used. Refer to the following table 3

Table 3: Warning Alert Levels

Warning/ Alert Level	**Level 1** Alert, Standby "Ready"	**Level 2** Preparation "Get set"	**Level 3** Evacuation "Go"
Precondition	Heavy up-stream rainfall (threshold value may vary as per location and watershed) warning level 1,	Water level in river increased by X (according to calculated threshold) meter	Water level in river increased by XX (according to calculated threshold) meter
Warning Messages	High possibility of flood	Flood is inevitable within X hours (according to calculated lead time)	Flood coming any time
TO DO LIST	• Upstream observer will inform the EWS management committee and then they will inform the community. • Upstream observer will inform concerned organizations/ persons in accordance with agreed communication channel. (refer to communication channel on page 54)	• Upstream observer will inform the EWS management committee and then they will inform the community. • Upstream observer will inform concerned organizations/ persons in accordance with agreed communication channel. (refer to communication channel on page 54)	• Upstream observer will inform the EWS management committee and then they will inform the community. • Search and rescue and first aid teams will be activated for immediate evacuation as per the contingency plan. (refer to Pg XX) • Inform nearest police station, Red Cross Chapter and others for external assistance.

Specific warning signals (sirens, flags, light) should be agreed by the community.

Rainfall Devices

Simple as well as sophisticated rainfall devices are available. The gauges used for the CBEWS should again be low cost and simple technology.

Photo 10: SEWIN_DHM_training-Automatic tipping bucket.

Photo 11: Measuring water by ruler.

Capacity Building

A need assessment will identify the areas of capacity building for observation and monitoring. The following approaches can be taken to build the capacity of communities and stakeholders:

- Training
- Awareness raising (IEC material - posters, flayers, pamphlets, videos, street drama, door-to-door)
- Learning/ exposure visits
- Equipping with relevant facilities

While installing monitoring devices, it will be important to ensure that people operating the system have relevant knowledge and skills required for monitoring and maintenance of the system. Main target audience for the capacity building should be gauge observers, community leaders and early warning management committee members. Suggested content for capacity building is:

- Identifying and analyzing the existing practices and systems of the rainfall and water level observation and monitoring
- Lead time and threshold calculations
- Use of monitoring devices
  - Data reading
  - Data recording
  - Data transmission as per the communication system designed for the EWS
- Maintenance of the monitoring devices
- Team building (up/down stream community, flood prone communities, other community members, media)
- Effective communication skills
- Roles and Responsibilities of different actors

Challenges

The challenges related to observation and monitoring might differ from community to community, with the nature of flood. Following are some challenges faced during the establishment of CBEWS in Nepal:

- Lack of resources (Human and financial) for 24/7 observation and monitoring
- Problems in calculation of threshold and lead time– especially for short rivers and many tributaries
- Limited number of water level and rainfall gauge station which might not provide the required information
- Inadequate level of technical capabilities
  - Unavailability of technical support to operate the EWS
- Inadequate access to information
  - Not able to get weather forecasts and interpreted data
  - Too costly to access the information
- Inadequate institutional arrangements
  - Lack of capable and prompt institutional arrangements
  - Limited coordination among the stakeholders
  - Lack of institutionalized support system
  - Ineffective integration of lessons learned from previous warnings
- Inadequate governmental and non-governmental support
  - Low priority and lack of political will

Step III: Communication and Dissemination Plan

Step V: Follow-up, Review & Sustainability
Step IV: Preparation for Response
Step III: Communication and Dissemination
Step II: Observation & Monitoring
Step I: Participatory Situational Analysis
Step 0: Preparation

This step will focus on transferring the information gathered during observation and monitoring of hazard to the residents of the flood prone areas and disaster risk reduction stakeholders. A reliable and well-organized dissemination system should be in place for on time information dissemination. It is therefore essential to develop and agree on a flow of information which needs to be well understood by all stakeholders. The system should be effective and efficient to reach all end users. The communication and dissemination system should offer alternative methods in case of failures of one or more communication channels.

Communication from the right place, on the right time, to the right people

Different communication and dissemination systems can be applied to communicate information from gauge station to EWS management committee members, and stakeholders; and to disseminate the information to all the members of the community.

Information can be communicated via telephone network in the areas with good phone coverage. Wireless radios of the security forces can be used in areas with no or limited phone coverage.

Photo 12: Traditional dissemination system

Local traditional dissemination systems should be assessed for their relevance, effectiveness and feasibility. Hand operated sirens has been introduced in CBEWSs set-up in Nepal over the past few years. Community people decided to use hand operated sirens to distinguish the warning messages from their cultural musical instruments which are used for other community events.

An example of dissemination system is to develop a "Community Communication Network". In this network each household will be responsible for informing one or two other households. The last household will report to the EWS management committee, to ensure that all households are informed.

Local FM radio networks are also effective mediums to reach the wider population.

The following steps can be followed to develop a communication and dissemination system:

a. Identify existing communication and dissemination systems
b. Identify the mechanism and medium for communication and dissemination based on the information and level of risk
c. Develop communication and dissemination plan with technical support from the concerned organizations. Identify roles and responsibilities of each stakeholder. Take into account the special need of all community members (including hearing, visual and mentally impaired persons).
d. Supply and install the communication and dissemination tools and equipments. Prepare operation and management plan for these tools and equipments.
e. Share agreed communication and dissemination plan to all community members and stakeholders. Develop inclusive IEC materials as per local need for awareness.

Tools and Equipment

The following tools and equipments can be used for communication and dissemination of early warning information:

- Telephones
- Wireless radios
- Sirens (hand operated)
- Colored flags/light
- Hand mikes
- FM radio and television stations

Telephones: Contact details of gauge observers, stakeholders (i.e. VDC and district authorities, police and army posts, media) and communities should be collected, compiled and distributed. The contact details include names and telephone numbers of the contact persons (alternative phone numbers if available).

Telephones requiring electrical power (or charging) should be supplied with additional batteries and/or solar systems.

Wireless Radios: Wireless radios of security personnel (police, armed police and army) will be used to communicate the information where telephone network is out of order and not available. Security personnel should be trained to communicate for the early warning purpose.

Siren: The EWS management committee will decide for the number of sirens required and location to be placed. Large and scattered communities might need more than one siren to ensure that all households can hear the siren.

Photo 13: Use of hand operated siren

The EWS management committee will assign the person(s) to operate the siren(s). He/she will receive orientation and instructions for his/her role and responsibilities including maintenance of the siren. The Siren operator should keep contact details of the siren supplier as to know where to get spare parts.

Colored Flags/Lights: The EWS management committee should introduce colored flags/lights to disseminate the warning to people with hearing impairment. The flags/lights should be of the same colors as the three colored poles. . The EWS management committee will assign the person(s) to operate the flags/lights. He/she will receive orientation and instructions for his/her role and responsibilities including maintenance of the flags/lights.

Hand Mikes: The EWS management committee will identify the number of hand mike. The EWS management committee will assign the person(s) to operate the hand mike(s). He/she will receive orientation and instructions for his/her role and responsibilities including maintenance of the hand mike. Hand mike operator should keep contact details of the hand mike supplier as to know where to get spare parts and batteries.

Photo 14: Use of hand mike

Hand mikes requiring electrical power (or charging) should be supplied with additional batteries and/or solar systems.

The EWS management committee will regularly check sirens, hand mikes, flags/lights, telephones to ensure that they are functioning properly. They should also review their dissemination plan, assigned roles and responsibilities especially before the advent of the monsoon season.

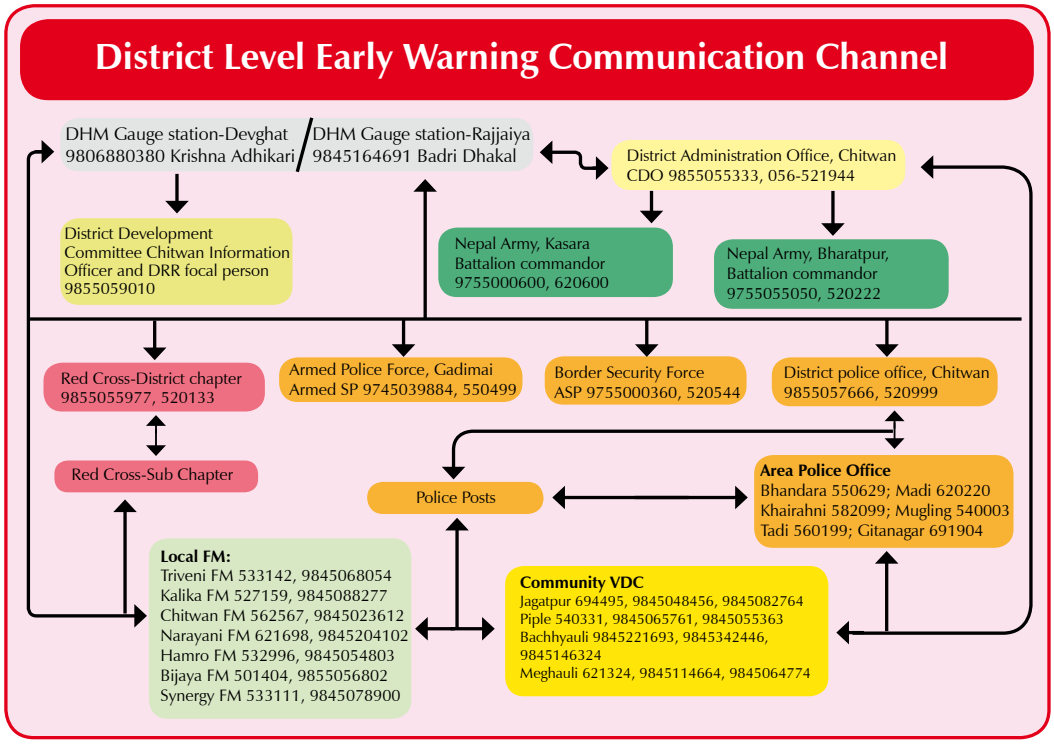
FM Radio and Television Stations: As mentioned above FM radio and television stations can communicate to the larger community. The EWS management committee will identify radio and television stations with the best coverage and agree on the terms for collaboration.

For the effective communication system the principle of "Live and let them Live" should be followed and oriented to the members and leaders of up-stream, down-steam and flood prone community.

The FM radio and television stations should be included in the communication and dissemination system. The staff of the FM radio and television stations should be trained for communication and dissemination systems. The staff might further be trained on how and from where to obtain flood forecasting information.

One communication channel chart can be posted at the FM radio and the TV station transmission room.

Chart 6: Communication Channel



Communication and Dissemination Levels

An effective communication and dissemination system in principle consists of three levels:

1. Upstream (or gauging station) to Community

The primary and very important communication is made from the upstream gauging station to the flood prone communities and other entry points in accordance with the agreed communication channels.

The upstream observer will provide the downstream community's real time information about the rainfall and river level and to what extent the rain and flood is likely to continue.

2. Within Communities

The community will agree on and set up a system for disseminating early warning information. Each community member will be responsible for disseminating information to ensure that everyone has heard or seen the information. Once the flood prone community receives information, they will immediately impart information to other member of the community.

The community members will use sirens, hand mikes, colored flags, traditional horns, drums, and telephones by following "Community Communication Network" as agreed in their plan for dissemination of information.

3. Community to Community

It is equally important to disseminate early warning information to other communities in the same river system especially the downstream communities. Downstream communities can benefit from the information in order to prepare and respond on time.

Recognizing and Understanding Warning Messages

Emergency situations do not allow for lengthy conversations. The information therefore should be short, clear and easily understandable. Common understanding of the EWS system, warning level and communication channels will ensure effective communication.

Table 4: Below shows an example of signals

Warning Level	**Level 1** Alert, Standby "Ready"	**Level 2** Preparation "Get set"	**Level 3** Evacuation "Go"
Precondition	One sound of the siren, long pause (repeated)	Two consecutive sounds of the siren, long pause (repeated)	Continuous sounds of the siren
For the person with the hearing impairment*	Green flags/lights	Yellow flags/lights	Red flags/lights

** make sure in advance that the person with hearing impairment will understand the signals. The colored flags/lights can either be placed with the family of the hearing impaired person or with the EWS management committee.*

It will be a good idea that the one who receives the information writes down the message to ensure that he/she does not forget anything. It is further a good practice to ask the one who provide the information to repeat the message or to verify that the message was correctly understood.

Capacity Building

A need assessment will identify the areas of capacity building for communication and dissemination. The following approaches can be taken to build the capacity of communities and stakeholders:

- Training
- Awareness raising (IEC material - posters, flayers, pamphlets, videos, street drama, door-to-door)
- Learning/ exposure visits
- Equipping with relevant facilities

While installing communication and dissemination equipments, it will be important to ensure that people operating the systems have relevant knowledge and skills required for communication and dissemination, and maintenance of the equipments. Main target audience for the capacity building should be gauge

observers, community leaders, early warning management committee members, media, and other stakeholders. Suggested content for capacity building is:

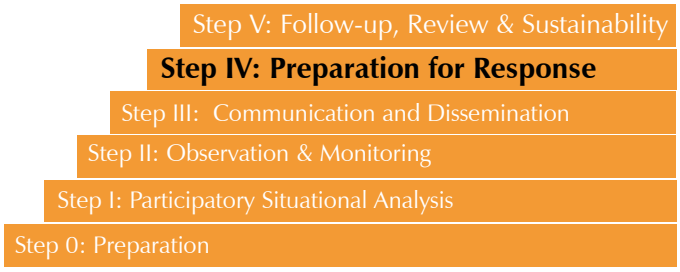
- Identifying and analyzing the communication and dissemination channels
- Define roles and responsibilities of stakeholders
- Use of communication and dissemination medium
  - Telephones
  - Wireless radios
  - Sirens (hand operated)
  - Colored flags/light
  - Hand mikes
  - FM radio and television stations
- Maintenance of the tools and equipments
- Team building (up/down stream community, flood prone communities, other community members, media)
- Effective communication skills
  - Develop common understanding on warning messages
  - Develop understanding on need of most vulnerable groups (people with disabilities, women, children, senior citizens)

Challenges

The challenges related to communication and dissemination might differ from community to community. Following are some challenges faced during the establishment of CBEWS in Nepal:

- Inadequate communication systems to provide timely, accurate and meaningful information.
- Lack of alternative channels to ensure outreach of information
- Poor quality of telecommunication systems and technology
- Lack of clarity in warnings issued
- Inadequate understanding of vulnerable groups and their needs
- Ineffective engagement of the media and the private sector
- Failure of equipments
- Lack of community's trust in the information disseminated
- Obstruction in dissemination of information due to social structure
- Complicated and not user friendly tools and equipments
- Lack of awareness of alternative communication channels

Step IV: Preparation for Response



Preparation for response is the fourth step in establishment of community based early warning system. This step totally relies on the previous steps and will only be effective when they are fully functional. This step will empower the community to be well prepared and respond effectively to disasters. Hence, response is the most crucial component of early warning system.

Early warning systems will only make sense if all involved stakeholders have the relevant knowledge, capability and are ready to respond when a flood occurs. The previous steps will ensure that the communities have relevant knowledge of hazards, their vulnerability, and capacities, observation, monitoring of hazards and how to communicate and disseminate warning. However, the community will still need a concrete plan to be prepared and to respond to disasters.

The effectiveness of response depends on the following critical components:

- Availability of lead time
- Clear understanding of the warning information and the actual risk of flooding
- Trust in warning information
- Knowledge on how to prepare and respond
- Past experience of hazards, disasters and warnings
- Well structured contingency action plans
- Trainings, awareness campaigns and simulation/drills

Contingency Plan

A contingency plan is a plan devised for taking specific actions to reduce the impact of disaster. The plan should be discussed, developed and shared within the communities and with stakeholders.

A contingency plan or response plan (different organisations might use different labels) is an important part of early warning system and disaster risk reduction initiatives. This is the ultimate indicator of the effectiveness of successful community based early warning system.

The plan will provide the community a guide in establishing the roles and responsibilities of various community groups and stakeholders. This plan should be developed, tested and disseminated before the on-set of disaster.

An effective and efficient contingency plan will include and should address the following sectors:

- Communication and dissemination
- Evacuation
- Search and rescue
- First Aid
- Health
- Transportation
- Shelter and shelter management
- Water and sanitation
- Provision of relief (food and non-food)
- Data collection

The key points to be considered while preparing the contingency plan are:

- It must be simple and user-friendly
- Avoid long narrative text
- It should be easy to understand by everyone

For the effectiveness of such a contingency plan, clear roles and responsibilities must be spelt out and arrangements for equipment must be organized in advance. For example:

Table 5: Roles and Responsibilities for Preparedness and Response

Sector	Necessary Arrangement
Communication & Dissemination	• Equipments and systems are in place and tested addressing the needs of everyone
Evacuation	• Evacuation routes are identified and marked • Special equipments for the different types of impairments are arranged • Proper locations are identified to evacuate for different community groups • Volunteers are trained to manage evacuation
First aid	• First aid teams are formed and trained • First aid kits are in place and replenished if needed
Search & Rescue	• Search and rescue teams are formed and trained • Equipments like lights, ropes, boats, life jackets, tubes etc are arranged • Special equipments for different types of impairments are arranged
Health	• Necessary medicines and health equipments are arranged • Proper linkage and coordination with nearest health service centers are developed for referral
Water and Sanitation	• Procedures for management of drinking water are arranged
Transportation	• Different types of transportation modes (stretcher, boat, bus, trucks, jeeps etc) are identified
Shelter	• Shelter and/or safe areas are identified • Procedures for management of shelter are prepared
Relief Material	• Food and non-food relief materials are stock-piled
Data Collection	• Procedures for data collection and reporting are developed (number of affected households, injured, deaths, evacuated persons and to which location)

Contingency Plan Development Process

The points mentioned below are sequential and should be followed ensuring active participation:

- Community (including women, elderly, disabled, cast and ethnic groups), CBOs, local government authorities, media, police and army will participate in developing the plan
- Review and analyze the results of participatory situational analysis
- Identify actions/activities
- Identify resources needed to implement the plan (i.e. human and financial resources, tools and equipments)
- Identify committees/teams needed to facilitate the actions and their roles and responsibilities
- Ensure consensus and validate the plan
- Distribute copies of the plan to every household, local government, CBOs and other stakeholders.
- Test and revise the plan

Following are the roles of the committee while facilitating the process:

- Ensure active participation and inclusion
- Facilitate the use of tools for analyzing the situation and identifying the actions
- Ensure that the plan is based on the actual needs
- Ensure that the plan will address the specific needs and benefit the entire community
- Act as resource person for technical inputs
- Settle differences in opinion among community members by consensus

Responsibilities of Key Actors

The major roles and responsibilities of different stakeholders for the contingency plan can be as follows:

Table 6: Roles and Responsibilities of EWS Stakeholders

Key Actors	Major Task	Major responsibility
• Observer	• Communication and Dissemination	• Provide up-dated upstream data as per agreed communication channel
• EWS Management Committee		• Disseminate information to the community, search and rescue teams, evacuation teams, volunteers, nearest police station, health post etc. as per agreed communication channel
• Individuals		
• Search and Rescue team	• Search and Rescue • Evacuation	• Gather up-dated information of the community people (casualties, missing) and report to DMC • Mobilize the team members and volunteers for search and rescue • Pay special attention to most vulnerable groups

Key Actors	Major Task	Major responsibility
• First Aid team	• First Aid	• Establish First Aid Post and provide service • Refer seriously injured persons to nearest health posts or hospitals • Counseling the depressed and shocked persons • Pay special attention to most vulnerable groups
• Volunteer	• Search and Rescue, First Aid, Evacuation	• Support search and rescue and first aid teams • Support in managing the shelter
• EWS Management Committee	• Search and Rescue, First Aid, Evacuation	• Coordinate and mobilize search and rescue and first aid teams • Identify safe evacuation route and mark the route with special attention to people with disabilities • Mobilize necessary materials/items such as phone, hand mike, siren, traditional equipments, boat, inner tube, rope, life jacket • Manage the shelter i.e. arrange for food, water and sanitation

Testing, Maintaining and Updating Plans

The contingency plan should be shared with all the communities, volunteers, committees and stakeholder for effective response. A concentrated effort must be made to create awareness and train everyone for the emergency.

A contingency plan must be considered a living document. Thus the risk assessment periodically reviewed and updated. Most importantly, the contingency plan must be updated as nature of hazards, vulnerability and capacities change overtime. The contact details (names, addresses, and phone numbers) should be regularly updated because members in committees and volunteers might change. Only an up-to-date contingency plan will help the community effectively in dealing with disasters.

Regular simulations/mock drills will help testing and updating the plan. Copies of the updated plan should be shared and distributed to all.

Capacity Development

A need assessment will identify the areas of capacity building for preparation and response. The following approaches can be taken to build the capacity of communities and stakeholders:

- Training
- Awareness raising (IEC material - posters, flayers, pamphlets, videos, street drama, door-to-door)
- Simulations/mock drills
- Learning/ exposure visits
- Equipping with relevant facilities

Main target audience for the capacity building should be communities, members of committees, and other stakeholders. Suggested content for capacity building using the above approaches:

- Procedures to follow in developing contingency plan
- Roles and responsibilities of community's committees, stakeholders and institutions in planning as well as response procedures
- Standard procedure for data collection and report during disaster
- Accessible alternative evacuation routes, marking them with the signs
- Location of the accessible shelters and safe areas
- Shelter management
- Linkages and coordination with other organizations
- Support mechanism for relief materials distribution
- Simulations/mock drills

Mock Drills: Mock drills are simulation exercises which help testing the plan and to check the effectiveness and efficiency of response. This also helps to identify the gaps and areas of improvements in the plan.

Photo 15: Mock drill evacuation to higher area

A well prepare mock drill must be organized at least once in a year as part of the pre-monsoon preparedness initiatives. Mock Drills shall be executed with the objective spontaneous reaction and response from the communities. The participants should not be on standby for the drill and wait for the go signal. They should pursue their normal daily activities. However, the key person of the organizing committees will know about the mock drill and communities can be informed in advance that sometime in future a mock exercise will be organized.

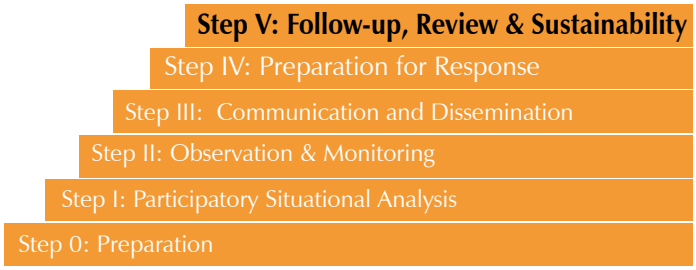
A meeting with representation of all sectors of the community immediately after the mock drills should review the whole exercise including early warning communication, dissemination and response. The meeting will identify areas for improvements. The community will incorporate the feed-back and suggestions, update the plan and disseminate the changes.

Challenges

The challenges related to preparation for response might differ from community to community. Following are some challenges faced during the establishment of CBEWS in Nepal:

- Lack of collaborative efforts among stakeholders
- Unclear roles and responsibilities of stakeholders
- Low level of awareness and capacity
- Lack of simulation exercises/mock drills
- Limited understanding of special needs of vulnerable groups and their representation
- Limited understanding of the traditional knowledge and practices
- Lack of long-term disaster risk reduction strategies
- Non-appropriate reaction due to stress
- Not following the agreed procedures
- Improper management of shelter and safe areas
- Improper management of relief
- Underestimate the significance of the disaster

Step V: Follow-up, Review and Sustainability



This final and fifth step will focus on initiatives for follow-up, review and sustainability of the systems. It will be necessary with a fine tuning of the system combined with real time experience and changes of the situation and environment.

It might seems easy to establish an EWS, but sustaining and carrying the systems forward can be challenging and will require specific initiatives. Follow-up and review is important for the sustainability of the systems.

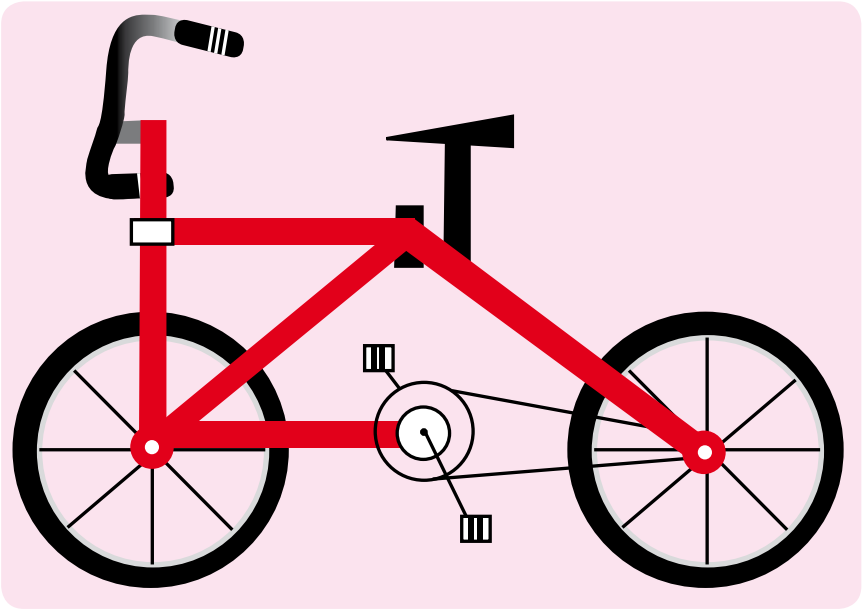
Sustainability is defined as the ability to maintain an activity, a process and a system over a longer period of time. In simple words it means that the community itself will be able to continue and maintain the EWS either by own means or means generated from other sources. The community will take the full operational and financial ownership of the system.

Early warning should be seen as an integral part of DRR interventions and development initiatives and of the daily life of the communities to ensure the sustainability. The system should further be built on existing structures and with sound technical support.The success of the early warning systems and their sustainability will require the community to develop a culture of preparedness and resilience.

Sustainability of the EWS can be divided into organizational and technical sustainability. Organisational sustainability implies that the community is the owner of the system after its establishment. It further requires plans and responsibilities to be reviewed, (please see below for further details) tested and updated. Human resources should be available and trained.

Technical sustainability refers to the community's ability to maintain and update the technical component of the systems. These two parts are equally important to sustain the EWS and the failure of anyone of these will reduce the effectiveness of the system. The two parts can be compared with the two wheels of a bicycle (see following illustration); the bicycle cannot run with only one wheel.

Figure 1: Components of Sustainability



Organizational Sustainability Technical Sustainability

Pre and Post Monsoon Reviews

The appropriate season for reviewing the early warning system and the contingency plan with active participation of communities, observers and other stakeholders will be just before and after monsoon.

Pre Monsoon Review Meeting: The overall objective of the pre-monsoon meeting is for the major actors of the EWS to revisit the plan in order to ensure that the EWS system and the contingency plan will function optimally for the forthcoming monsoon. The agenda of the review meeting can be:

- Revisit overall plan, assessing whether the plan is sufficient for response
- Review learning from mock drills
- Agree upon the roles and responsibilities of the actors of the EWS
- Update important data focusing on the most vulnerable groups such as women, pregnant and lactating mothers, elderly, children and people with disabilities
- Clarify the communication and dissemination systems
- Repair and maintain the equipments
- Aware the community about evacuation plans and routes and signs and location of the shelters/evacuation areas

Post Monsoon Review Meeting: The overall objective of the post monsoon meeting is to assess the effectiveness of the systems and the performance of the stakeholders in time of flood. The agenda of the review meeting can be:

- Review what worked well
- Document the learning
- Refine the roles and the responsibilities of the various stakeholders.
- Update important data
- Analyze the areas for improvement of the early warning system
- Visit the flood affected areas and observation stations and check the condition of the equipments
- Update the EWS system and share it with communities and stakeholders

Challenges on Follow up and Review Meetings

- Lack of interest in participating meetings immediately after the flood trauma
- Lack of active participation of the most vulnerable segments of the community (minorities, dalits, children, people with disability)
- Low priority for the meetings due to other responsibilities
- Lack of cooperation among the stakeholders
- Lack of budget for maintenance and/or replacement of the equipments
- Lack of budget for modification and human resources development
- Inadequate identification of good practices and lack of sharing

Organisational Sustainability

Institutionalization of the system is necessary for the sustainable operation of the EWS. The community and the organizations will need to develop systems and procedures to ensure operation, management, capacity development and fund raising. The following areas can be considered for organizational sustainability:

Table 6: Skills and Capacities for Organizational Development

Areas	Skills and capacity development
Risk knowledge	• Hazard mapping • Vulnerability and capacity assessment • Stakeholder analysis
Observation and monitoring	• Hazard monitoring • Operation and maintenance of the equipments and tools for observation and monitoring
Communication and dissemination	• Effective communication • Operation and maintenance of the equipments and tools for communication and dissemination • Effective use of IEC materials
Preparation for response	• Conducting effective mock drills • Roles and responsibilities of stakeholders (i.e. first aid, search and rescue teams) • Meeting facilitations • Preparation of contingency plan
Organizations/ Governance	• Establishing systems and procedures for review of the EWS and plans • Management of committees and election of committee members • Longer term planning • Fundraising and resource mobilization • Community/social mobilization • Coordination and developing linkages and networks

Maintaining Linkages, Coordination and Networking

Close links, coordination and networking with individuals and institutions is a crucial part of the organizational sustainability of the systems.

A well functioning and sustainable early warning system is a result of collective effort involving individuals, community groups, organizations and institutions. It is therefore very important to maintain effective links and close coordination between stakeholders. At this stage it can be a good idea to revisit the data collected for the stakeholder analysis (see Step I: Participatory situational analysis, (page 39) to ensure that relevant links and mechnisms for coordination are in place and the roles and responsibilities are well defined.

Figure 2: Individual contract versus collective strength

Source: Network Management Source Book, POWER II/CARE Nepal

Below chart 7 is an example of stakeholders identified in a stakeholder analysis:

Chart 7: Stake holder analysis

The following activities can be organized to maintain the links and the coordination mechanisms:

- Stay in regular contact
- Share plan and challenges for the early warning system
- Invite stakeholders for review meetings (pre- and post monsoon), field visits and mock drills
- Participate in stakeholder meetings

Positive relationships with stakeholders can pave the way for learning and shared resources (human as well as financial) which are essential for the longer term sustainability of the early warning system. Strong networks can be mobilized to advocate for early warning to be integrated in disaster risk management and development plans at all levels of the local and national governments.

Technical Sustainability

Operation, maintenance and management of early warning system

An early warning system will be technically sustainable when technical skills for maintenance and upgrading of equipments are ensured. This will be the responsibility of early warning management committee with stakeholders (i.e. Department of Hydrology and Meteorology, district technical officer, NGOs, VDC, DMC or District Disaster Relief Committee).

Following activities can be organized for technical sustainability:

- Regular up-date of tools and equipment
- Review of roles and responsibilities of individuals and stakeholders in terms of maintenance of equipments and tools
- Establish a system for regular maintenance of equipments and tools
- Coordinate with stakeholders for technical support
- Establish maintenance funds
- Regular mock drills

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Asian Disaster Preparedness Center

- www.adpc.net

DPNET - Disaster Preparedness Network Nepal

- www.dpnet.org.np

International Federation of Red Cross and Red Crescent Societies

- www.ifrc.org /what/disasters/preparing/index.asp

Mercy Corps

- www.mercycorps.org

Practical Action

- www. practicalaction.org

UNSIDER

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- www.unisdr-earlywarning.org

World Bank

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