

First Draft, For Comments



Government of Nepal

Ministry of Home Affairs

National Early Warning Strategic Action Plan, 2013

May, 2013

Foreword

Due to steep terrains and weak geological structures, natural hazards such as floods and landslides recur every year in Nepal. The country is also prone to other natural disasters like earthquakes and glacial lake outburst floods. A total of 400 persons are killed every year by disasters on average with an annual loss of property worth one billion. In this context, the early warning system can contribute to protection of human lives as well as to reduction of other effects of natural hazards in the country.

In 2005, World Conference on Disaster Risk Reduction adopted the Hyogo Framework for Action 2005-2015 : **Building the Resilience of Nations and Communities to Disasters**. In the Hyogo Framework for Action, early warning has been incorporated as the second most important activity. The Framework encourages to develop people-centred early warning systems. Such systems disseminate early warning messages in such a way that they are clearly understood by the people to be exposed to risks. Early warning also includes guidance on ways to cope with other effects of hazards.

The Government of Nepal has already adopted the National Strategy for Disaster Risk Management (NSDRM) in 2009 in which early warning has been recognized as one of its priority actions. This National Early Warning Strategic Action Plan (NEWSAP) has been developed by the Government of Nepal as a complementary document to the NSDRM.

If early warning on disaster risks is disseminated, communities, disaster management workers and committees concerned will be able to work for timely prevention of, preparedness for and response to disasters. The early warning system contributes to the reduction of economic loss as it helps communities minimize the loss of people's belongings, properties and their livelihoods as well.

National Disaster Response Framework (NDRF) provides guidance for development of early warning system under the preparedness plan of action in order to make the disaster risk reduction and disaster response effective. As a result of this guidance, the Ministry of Home Affairs (MOHA) acting under the Central Natural Calamity Relief Committee (CNCRC), in co-ordination with all agencies concerned, has developed this NEWSAP. The main responsibility for implementing it lies with the Ministry of Science, Technology and Environment. In the NEWSAP, a number of activities and practical mechanisms have been identified in order to make the preparedness activities more effective by strengthening the important networks engaged in early warning.

The NEWSAP will contribute to the efforts being made by governmental agencies, UN humanitarian assistance networks, I/NGOs, CBOs and voluntary organizations as well. It is expected that this will go a long in reducing loss of life and property in Nepal.

Executive Summary

In Nepal, a number of people are killed and property worth several millions is lost every year due to the disasters such as floods, landslides, fires, lightning and storms. Taking into consideration the five priority areas as stipulated in the Hyogo Framework for Action 2005-2015 adopted by the World Conference on Disaster Risk Reduction, Government of Nepal has developed the National Disaster Risk Management Strategy (NSDRM), 2009. The second priority action identified in the NSDRM focusses on enhancing the system for identification, assessments and monitoring of early warning systems. The 10th action included in the NSDRM developed for disaster risk reduction and management stresses the need for establishment of the system to monitor hazards and risks as well as national early warning systems. Based on it, this National Early Warning Strategic Action Plan (NEWSAP) has been developed in order to enable people and communities to be affected by hazards to take actions to cope with likely effects of disasters. It will help reduce the loss of life and property and the possibility of damage to be caused to environment as well as to social and economic structures and provided guidance to cope with the effects of disasters. The Ministry of Home Affairs (MOHA) acting under the guidance of the Central Natural Calamity Relief Committee (CNCRC), in co-ordination with all agencies concerned, has developed this NEWSAP.

The main responsibility for implementing the NEWSAP lies with the Ministry of Science, Technology and Environment. In this Strategic Plan, a number of activities and practical mechanisms have been identified in order to make preparedness activities more effective at local and national levels by developing important networks engaged in early warning. The NEWSAP will be a complementary document to the NSDRM. The objective of the NEWSAP is to determine the short-, mid- and long term actions in order to protect people from natural hazards and provide support to all developmental activities. The NEWSAP will provide early warning to communities, persons and organizations engaged in disaster risk management activities.

A number of strategic actions have been identified on the basis of feedback and suggestions received during interactions with consultants and stakeholders. Such interaction programmes were held in course of developing the NEWSAP. National and international documents were studied and relevant issues have been incorporated in the NEWSAP. As development and expansion of early warning systems are closely linked with the development of information technology at global level, the NEWSAP will be subject to review every five years.

1. Situation Analysis

Nepal is vulnerable to disasters for a number of factors such as fragile topography, high and steep hills and mountains, weak geological structures, monsoon rains, impact of climate change, active seismic zone, unplanned urbanization and settlements, inadequate infrastructures, poverty

etc. On the basis of classification by the International Decade for Natural Disaster Reduction (IDNDR, 1995), disasters that occur in Nepal can be categorized as follows:

1. **Hydrological and Climatic Disasters** (such as floods, inundations, glacial lake outburst floods, avalanches, droughts etc.);
2. **Geological Disasters** (such as earthquakes and landslides); and
3. **Environmental Disasters** (such as fires in forests).

Capacity to cope with the effects of natural hazards is low because of the status of social and economic development in Nepal. It has been a challenge to ensure timely flow of information and early warning on risks due to the low level of education and awareness among the general population in Nepal.

A number of communities living in remote and rural areas are not aware of the fact that they have been living in vulnerable locations as they may be affected by imminent landslides or debris flow. The data collected on the past disasters indicate that floods and landslides are the recurring hazards in Nepal. The floods and landslides in the hills and floods, erosion of agricultural land by rivers and inundation are the most severe problems faced by Nepal.

The territory of Nepal from east to west lies in the seismically active zone. It has faced a number of devastating earthquakes in the past. Similarly, climate change has been contributing to the increase of floods and its other adverse effects. The level of knowledge and the ability of people in the community to reduce risks and vulnerability have been very low. In view of the need for enhancing the coping capacity through capacity building and developing strategies for proper management of disasters and determining procedures and processes required for production, decision, communication and verification of early warning on risks, the NEWSAP is developed.

The early warning system helps communities and other stakeholders, both persons and organizations involved in disaster risk management undertake activities for prevention of, preparedness for and response to disasters by disseminating early warning messages in time.

Existing Policies, Legal and Institutional Provisions Concerning Early Warning in Nepal

Existing Policies and Legal Provisions

Taking into consideration the five priority actions mentioned in the Hyogo Framework for Action, 2005-2015, the Government of Nepal has developed the National Strategy for Disaster Risk Management (NSDRM), 2009 in order to make the disaster management effective. In the priority actions of the NSDRM, monitoring of hazards/risks and establishment of national early warning system in order to issue early warning messages in cases of disasters likely to occur have been incorporated as one of the priority actions. Natural Calamity (Relief) Act, 1982 was promulgated with the objectives of protecting life and property of the population in general and

managing disasters effectively by conducting rescue and relief operations. This Act provides for formation of Natural Calamity Relief Committees at central, regional, district and local levels as mechanisms for developing policies, formulating plans and implementing them for preparedness for and response to disasters for management of all types of disasters. National Disaster Response Framework (NDRF) provides guidance for development and implementation of early warning system in order to make the disaster risk reduction and disaster response effective. It is envisaged that the new institutional provisions will be made in the days to come after adoption of the Draft Disaster Management Act with the objectives of addressing all components of the disaster cycle.

The Ministry of Home Affairs as a central coordinating agency has been playing a role in disaster management. The role to be played by the Ministry of Federal Affairs and Local Development in disaster risk reduction and preparedness activities has been quite important. The role played by the Ministry of Science, Technology and Environment in policy development and providing guidelines for conservation of natural environment has been important whereas the Department of Hydrology and Meteorology has been designated as the responsible department for making forecasts on all kinds of events that are connected with water, weather and floods and other activities related with early warning. The Department of Water Induced Disaster Prevention under the Ministry of Irrigation has been working for raising public awareness, developing the risk maps and protecting infrastructures and other structures for agricultural land development. The Department of Soil Conservation and Watershed Management has been entrusted with the authority to ensure appropriate land use by developing plans for it whereas the Department of Irrigation, Department of Forest and local bodies have been making important contributions towards disaster risk reduction. Donor community, I/NGOs and other stakeholder organizations also have contributed to disaster risk management.as well in Nepal.

While analyzing the efforts and achievements made for establishment and development of early warning systems for natural hazard, there are a number of problems and challenges being faced. As the disaster management is a multi-dimensional and multi-sectoral issue, it is not possible to face the existing problems and challenges prevailing in this area with the efforts of the government alone. Cooperation and collaboration from all agencies concerned including national, international and regional stakeholder agencies, NGOs, private sector and communities are expected for it.

2. Overall Approach:

The NEWSAP is aligned with the vision, mission, goal, objectives and underlying principles of the NSDRM. The NSDRM provides guidance for formulation of the strategy for early warning as well as for development of overall framework and working procedures. The vision of the NEWSAP is to build disaster resilient communities through early warning system. Its mission is

to establish community-centred early warning systems by applying appropriate technology in order to reduce the loss to be caused by natural disasters. The goal of the NEWSAP is to ensure access of all concerned to early warning system in order to support sustainable development by reducing the loss of life and property to be caused by natural hazards.

2.1 Objectives of the NEWSAP

The overall objective of this NEWSAP is to reduce risks of disasters and manage them by providing early warning on imminent hazards through early warning systems.

Its other objectives include to monitor and provide early warning services, establish and operate information dissemination and broadcast systems in order to reach the population likely to be affected by imminent disasters, develop community-centred and sustainable early warning systems equipped with modern technology, integrate early warning system into the Climate Change Adaptation Policy and Programmes, establish and develop institutional mechanisms of early warning system at national and regional levels and establish and develop early warning systems in collaboration and cooperation with NGOs at national, regional and international levels.

2.2 Underlying Principles:

The NEWSAP is based on the following underlying principles:

- Early warning system will remain as one of the pillars for disaster reduction and as well as one of the main elements of disaster reduction strategy and action plan.
- Communities will be able to enhance, through early warning system, their capacities to reduce disaster risks, monitor disasters, access to early warning of likely disasters and respond to them.
- Communities vulnerable to natural hazards will reduce risks by developing several strategies and action plans based on indigenous technology and knowledge.
- Sustainability of early warning systems will be ensured by ensuring that all systems are operated in full participation of national and local level stakeholders.
- Early warning systems will draw on indigenous and traditional knowledge and information and be equipped with modern technology also.
- Early warning will be based on collaboration among multilateral agencies and cross-cutting sectors.
- Early warning messages will have to be disseminated by the agency legally authorized by the government to do so. While producing, verifying and broadcasting early warning messages, a series of steps will be followed by the authorized agency.

3. Strategies and Activities mentioned in the NEWSAP:

In order to achieve the objectives of the NEWSAP, six strategies and working policies under each strategy have been determined. These strategies include establishment and development of early warning system equipped with modern technology, reduction of disaster risks, development of early warning systems and their networking at national and local levels, identification of areas vulnerable to various natural hazards and raising public awareness on early warning system, control hazards by ensuring the access of communities to early warning systems, increase effectiveness of early warning systems by conducting studies and research and carrying tests in collaboration and coordination of stakeholder agencies and experts.

The strategies mentioned above will be implemented by adopting the following working policies:

Make institutional provisions by enacting necessary legislations and formulating policies, strengthen institutional capacities of ministries, departments, offices and local bodies for early warning, identify the areas vulnerable to natural hazards, establish and operate early warning systems in vulnerable areas, establish linkages of early warning system with the National Emergency Operation Centre, establish and operate early warning systems with participation and engagement of local communities, raise awareness about it, hand over the system to the community concerned in order to ensure sustainability and promote participation of government agencies, donor community, INGOs, experts and private sector in establishment and operation of such systems.

National Strategic Action Plan for Early Warning System (NEWSAP)

The main expected output of the early warning system is to provide assistance in building communities resilient to disasters by implementing the activities as stipulated in the NEWSAP in the short term (five years), mid-term (ten years) and long term (15 years). The short term objectives are to establish appropriate institutional structures, enact required laws and develop policies and formulate action plans. Selection of early warning systems, dissemination and interactions with communities will be undertaken during the midterm whereas installation of systems, its dissemination, handing over to the community, adoption of measures for sustainability of systems and development of effective system for efficient disaster risk management will be carried out to achieve its long term objectives.

Proposed Institutional Structure for Early Warning System

Taking into account the Natural Calamity (Relief) Act, 1982, National Strategy for Disaster Risk Management, 2009 and directives issued by the Ministry of Home Affairs and the Ministry of Federal Affairs and Local Development, establishment of units have been proposed for early

warning on likely natural hazards supported by their networking with Emergency Operational Centres functioning at national, regional, district and local levels for development of early warning system in Nepal and its effective implementation. It will function as a government institution to carry out the tasks for establishment, operation, maintenance and repair of disaster monitoring units and forecasting and dissemination of early warning messages.

Major Stakeholders

For effective development and early warning systems and its subsequent implementation requires contributions and coordination among a number of persons, groups and organizations. The major stakeholders of early warning include individuals, communities, cooperatives, local government, central government, regional organizations, international agencies, NGOs, private sector, mass media and communications sector, scientists and educational institutions.

Implementation and Monitoring

For implementation of the NEWSAP, it is imperative to make effective institutional provisions. There is an urgent need to establish institutions as envisaged in the NEWSAP and NSDRM. There will also be a need for having enough financial resources to implement each and every strategy in an effective manner. In order to implement the NEWSAP, provisions for required resources and budget will be made. Early warning programmes should be included in annual development plans. The agencies concerned will have to ensure that financial resources are available at all levels in their respective areas. Efficient human resource is one of the components required for smooth implementation of disaster management strategies. Therefore, emphasis will be given to the development of efficient human resource for disaster management and early warning system.

National Early Warning Strategic Action Plan

1. Background

Nepal is at risk of disasters since it is affected by recurring hazards like floods, landslides, epidemics and fires every year. Approximately 400 persons are killed and property worth one billion is lost every year due to disasters in Nepal. In order to reduce the loss of life, property, agricultural land, development infrastructures and other structures, the early warning system will be very useful. Early warning about natural hazards at an appropriate time will help reduce the loss of life and property and can contribute to reduction, prevention and control of natural disasters. Thus, it is imperative to establish early warning systems in Nepal.

Early warning is one of the five priority actions mentioned in the **Hyogo Framework for Action: Building the Resilience of Nations and Communities to Disasters** adopted by the World Conference on Disaster Risk Reduction in 2005. The Hyogo Framework has encouraged establishment and development of community-centered early warning systems. People at risk and other stakeholders will receive early warning in time through such systems. This will also provide guidance on ways of coping with risks of natural hazards.

The Government of Nepal has adopted the National Strategy for Disaster Risk Management (NSDRM), 2009 with the objective of building disaster resilient communities. In the NSDRM, early warning has been recognized as one of the primary actions for hazard reduction. Likewise, National Disaster Response Framework (NDRF) approved by the Government of Nepal also considers establishment and development of early warning system as one of primary activities. In the context of effective implementation of these policy provisions, this **National Early Warning Strategic Action Plan (NEWSAP)** has been developed, with assistance of concerned ministries, departments and stakeholders, by the Ministry of Home Affairs as a complementary document to the NSDRM.

Early warning systems will enable individuals and communities affected by disasters to take appropriate actions on time. It will also reduce loss of life, property and livelihoods. If early warning is available, people, communities and organizations engaged in the field of disaster risk management will carry out activities for prevention of, preparedness for and response to disasters.

2. Disaster Risk Situation

Nepal is vulnerable to various types of disasters for a number of factors such as steep terrains and weak geological structures, high and steep hills and mountains, weak geological location,

monsoon rains, impact of climate change, active seismic zone, unplanned urbanization and settlements, increasing population, poverty, illiteracy and low level of awareness. On the basis of classification by the International Decade for Natural Disaster Reduction (IDNDR, 1995), disasters that occur in Nepal can be categorized as follows:

- 1. Hydrological and Climatic Disasters** (such as floods, inundations, glacial lake outburst floods, avalanches, droughts etc.);
- 2. Geological Disasters** (such as earthquakes and landslides); and
- 3. Environmental Disasters** (such as fires in forests).

Knowledge about risks and capacity to respond to natural disasters vary from one location to another and from one community to another because of the different status of social and economic development among different regions and communities in Nepal. Seen from this perspective, capacity of the Nepalese society to respond to natural hazards is very low. So, it has been a challenge to disseminate information on risks and early warning due to the lack of knowledge on issues and low level of awareness among the population in general.

A number of communities in rural and remote areas live even in areas inundated by debris flow for reasons of poverty, low access to information and lack of adequate knowledge about vulnerability. People living in these areas are not aware of the fact that the areas where they have been living may be affected by landslides or debris flow. This situation is the result of lack of knowledge among people living in the areas.

The data on disasters covering the period from 1971-2009, reveal that the primary recurring hazards experienced in Nepal are floods and landslides. The floods, landslides and debris flow in the hills and floods, erosion of agricultural land by rivers, inundation and changes in the course of rivers in Terai area are the most complex problems being encountered in Nepal.

The territory of Nepal from east to west lies in the seismically active zone. It has faced a number of devastating earthquakes in the past. Similarly, climate change has been contributing to the increase of floods and protracted period of droughts with their other adverse effects. Several studies have shown that this situation is likely to get worse in the days to come. It is expected that early warning system will provide considerable assistance to persons, communities and organizations involved in disaster risk management in dissemination of information on time and it will go a long way in prevention of, preparedness for and response to disasters.

Existing Policies, Legal and Institutional Provisions Concerning Early Warning in Nepal

Taking into consideration the importance of disaster management for overall development of the country, the Government of Nepal, as directed by the Hyogo Framework for Action, has developed and adopted the National Strategy for Disaster Risk Management (NSDRM), 2009.

The NSDRM primarily aims at reducing the effects of disasters by mainstreaming the concept of disaster risk reduction into the national development process. In the priority actions of the NSDRM, monitoring of hazards/risks and establishment of national early warning system in order to issue early warning messages in cases of disasters likely to occur have been incorporated as one of the priority actions. Natural Calamity (Relief) Act, 1982 was promulgated with the objectives of protecting life and property of the population in general and managing disasters effectively by conducting rescue and relief operations. This Act provides for formation of Natural Calamity Relief Committees at central, regional, district and local levels as mechanisms for developing policies, formulating plans and implementing them for preparedness for and response to disasters of all types. The National Disaster Response Framework (NDRF) provides guidance for development and implementation of early warning systems in order to make the disaster risk reduction and disaster response effective. As the prevailing act cannot address all components of disaster cycle, it is envisaged that the new institutional provisions will be made in the days to come through adoption of the Draft Disaster Management Act with the objective of addressing all components of the disaster cycle.

The Ministry of Home Affairs as a central coordinating agency has been playing a role in all activities of disaster management. The primary role of the Ministry of Home Affairs is to coordinate the disaster management activities at national level. The role to be played by the Ministry of Federal Affairs and Local Development in disaster preparedness activities has been quite important. The role played by the Ministry of Science, Technology and Environment in developing policies and providing guidelines for conservation of natural environment has been important. The Department of Hydrology and Meteorology has been designated as the responsible department for forecasting weather and carrying out early warning activities. There is a section under the Department of Hydrology and Meteorology for forecasting floods by developing and implementing plans and conducting repair and maintenance activities for forecasting floods and early warning. The Department of Water Induced Disaster Prevention under the Ministry of Irrigation has been working for raising public awareness, developing the risk maps and protecting infrastructures and other structures for agricultural land and development. The Department of Soil Conservation and Watershed Management has been entrusted with the authority to ensure appropriate land use by developing the plans for it whereas the Departments of Irrigation, Department of Forest and local bodies have been making important contributions towards disaster risk reduction. Several national and international non-governmental organizations also have contributed to strengthening of efforts made by the government and communities in effective and coordinated manner and establish, expand and upgrade early warning systems in the country.

Efforts made in Establishment of Early Warning Systems

The Department of Hydrology and Meteorology had established an early warning system in connection with imminent Tso Rolpa Glacial Lake Outburst Floods (GLOF) in 1998. However, this system is no longer in operation. In collaboration with the Department of Hydrology and Meteorology, local bodies and communities concerned, Practical Action has established and promoted early warning systems in the districts of Chitwan, Nawalparasi, Banke and Bardiya. Similarly, Mercy Corps has established and promoted community-centred early warning system in the district of Kailai. In these districts, local disaster management committees have been already established. Linkages of Flood Warning Centres have been established with the District Natural Calamity Relief Committees, communication media, Nepal Red Cross Society, Nepal Police, and Nepal Army. Since 2007, community-based flood early warning systems are in operation in Narayani, East Rapti, and West Rapti and Babai rivers. Likewise, Action Aid, Nepal has established and promoted community-based early warning system in Sunsari district in collaboration with the Department of Hydrology and Meteorology. Early warning system has also been established in Upper Bhotekoshi Hydro Project. Similarly, the Department of Water Induced Disaster Prevention has established a community-based early warning system for landslides and excessive rains along the Mugling-Narayanghat Highway at Kabilas VDC of Chitwan district.

Existing Problems and Challenges in Early Warning for Natural Hazards

While analyzing the efforts and achievements made for establishment and development of early warning systems for natural hazards, there are a number of problems and challenges being faced in Nepal. The major problems and challenges being encountered include inadequate investment, lack of effective monitoring and evaluation, lack of responsible national early warning centre, inadequate publicity at the community level, inability to develop appropriate mechanisms for communications, weak capacity for response, lack of coordination among various bodies, lack of legal, policy and institutional provisions and inability to conduct adequate training courses, research and study activities on regular basis.

2.1 Vision

Build disaster resilient communities through early warning system.

2.2 Mission

To establish community-centred early warning systems by applying financially viable and appropriate technology in order to reduce the loss to be caused by natural disasters.

2.3 Goal

To ensure appropriate access of all concerned to early warning system in order to support sustainable development of the country by reducing the loss of life and property to be caused by natural hazards.

2.4 Objectives

The overall objective of this NEWSAP is to reduce risks of hazards and manage them by providing early warning on imminent disasters through early warning systems.

Other objectives are:

- (a) Provide services for monitoring hazards and early warning by establishing and developing early warning systems.
- (b) Establish and operate effective information dissemination and broadcast systems in order to reach out stakeholders active in disaster management and population likely to be affected by imminent disasters.
- (c) Making legal, policy and institutional arrangements to provide support in development and implementation of community-centered and sustainable disaster early warning system equipped with modern technology.
- (d) To integrate early warning system into the Climate Change Adaptation Policy and Programmes,
- (e) To establish and develop institutional mechanisms equipped with modern technology in order to exchange early warning at national and regional levels.
- (f) To collaborate with national, regional and international level NGOs for the establishment and development of early warning systems.

2.5 Underlying Principles

The NEWSAP is based on the following underlying principles:

- Early warning system will remain as one of the pillars for disaster reduction and as well as one of the main elements of disaster reduction strategy and action plan.
- Communities will be able to enhance, through early warning system, their capacities to reduce disaster risks, monitor disasters, access to early warning of likely disasters and respond to them.
- Communities vulnerable to natural hazards will reduce risks by developing several strategies and action plans based on indigenous technology and knowledge.
- Sustainability of early warning systems will be ensured by ensuring that all systems are operated in full participation of national and local level stakeholders.

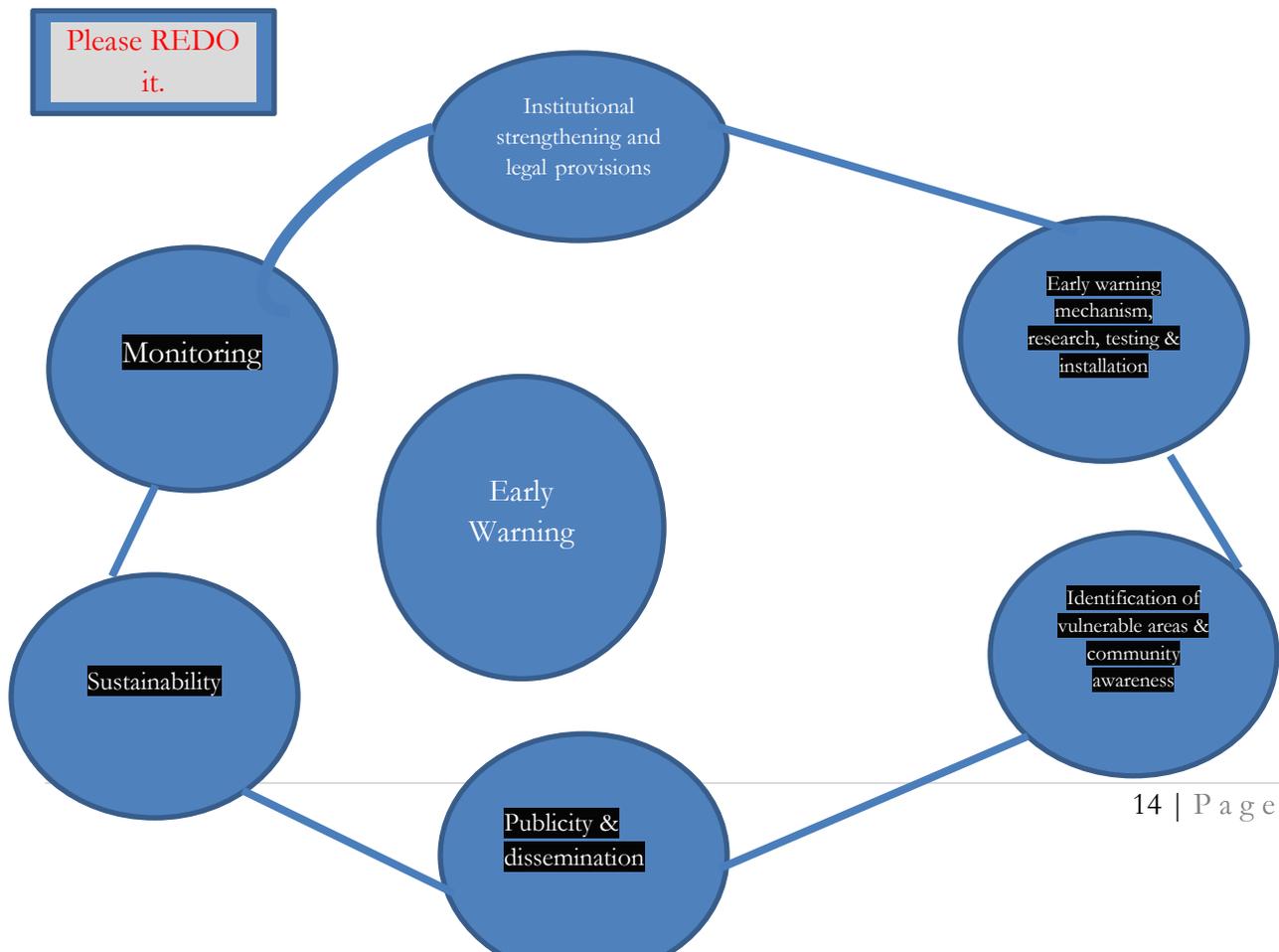
- Early warning systems will draw on indigenous and traditional knowledge and information and be equipped with modern technology also.
- Early warning will be based on collaboration among multilateral agencies and cross-cutting sectors.
- Early warning messages will have to be disseminated by the agency legally authorized by the government to do so. While producing, verifying and broadcasting early warning messages, a series of steps will be followed by the authorized agency.

2.6 Approaches to Early Warning Processes

The integral components of the approach to early warning processes are:

- 1) Institutional strengthening and legal provisions,
- 2) Study, research and installation of early warning systems,
- 3) Identification of vulnerable areas and raising public community awareness,
- 4) Effective system for dissemination and broadcasting of information,
- 5) Sustainability of the system and reliable arrangements for updating and upgrading the system,
- 6) Effective provision of participatory monitoring, evaluation and review.

All components mentioned in formulation of the NEWSAP are depicted as follows:



3. Strategies

In order to achieve the long term goal of building disaster resilient communities by reducing the effects of hazards and events of disasters and undertaking the measures for mitigation, preparedness and public awareness through effective implementation of National Strategy for Disaster Risk Management (NSDRM), the following strategies, working policies and action plan have been adopted:

1. Reduce disaster risks by establishing and developing early warning system equipped with modern technology
2. Develop early warning systems for all kinds of likely natural hazards and establish their networking at national and local levels.
3. Identify areas vulnerable to various natural hazards and raise public awareness on the need and importance of early warning systems through educational materials and communication media.
4. Control hazards by ensuring access to and participation of communities in early warning systems.
5. Sustain early warning systems.
6. Increase effectiveness of early warning systems by conducting studies and research and carrying tests in collaboration and coordination of stakeholder agencies and experts.

Utilize early warning system for coordinated responses.

The strategies mentioned above will be gradually implemented through the following working policies.

3.1 Working Policies

- 3.1 Institutional provisions will be made by enacting necessary legislations and formulating polices for relevant development of early warning system.
- 3.2 Procedures for early warning systems will be developed and brought into operation.
- 3.3 Institutional capacity of the ministries, departments and local bodies implementing early warning systems will be strengthened and early warning sections and units will be established.
- 2.1 Areas vulnerable to various hazards will be identified.
- 2.2 All feasible early warning systems will be established and brought into operation as per the needs in vulnerable areas as identified by ministries and departments.
- 2.3 Networking of early warning systems will be established with National Emergency Operation Centre as well as such Centres established at regional and district levels.

- 3.4 Early warning systems located in areas prone to disasters will be established and operated with participation and engagement of local communities.
- 3.5 Areas vulnerable to disaster risks will be identified by analyzing information collected from different sources, reports, documents and studies.
- 3.6 Information for raising awareness on the status of vulnerability to disaster risks will be provided immediately.
- 3.7 Early warning systems established at national and local levels will be operational for 24 hours a day in order to disseminate information on disaster risks through appropriate mechanisms.
- 4.1 Awareness on early warning systems will be gradually raised through training courses, seminars, publicity activities, practical demonstrations and other educational activities.
- 4.2 Early warning systems will be made functional at all times and regular flow of information will be ensured at national and local levels.
- 5.1 Early warning systems established in all feasible locations will be handed over to the communities concerned and operated in a sustainable and reliable manner.
- 5.2 All installed early warning systems will be made relevant, environment-friendly and equipped with modern technology.
- 5.3 Sense of belonging and ownership among stakeholders and communities benefitting from such early warning systems will be developed.
- 5.4 Necessary means and resources for sustainable operation of early warning systems will be ensured.
- 5.6 Early warning units will be developed as centers for studies and research activities in future.
- 6.1 Participation of governmental agencies, I/NGOs, expert groups and private sector in developing and operating early warning system will be promoted.
- 6.2 Early warning systems will be developed for reduction of all types of disasters after studies, research and testing.
- 6.3 A booklet providing information on development of plans for early warning systems and their operation will be prepared and distributed.

3.2 Major working policies have been divided into the following three phases:

(1) Short Term:

The necessary legal, policy and institutional provisions will be made for the effective implementation of the NEWSAP, early warning systems will be established and operated in watershed areas as well as in areas likely to be affected by the GLOFs by identifying disaster sensitive areas. Participation of local bodies, I/NGOs, private sector and communities will be ensured in the establishment and operation of early warning systems. Preparedness activities will

be carried out for conducting activities in the mid-term. Activities proposed in the short term will be completed in three years.

(2) Mid Term:

Operational early warning systems will be established for natural hazards such as landslides, droughts, epidemics and cold waves, sense of ownership among the communities concerned will be developed by mainstreaming such systems into overall development processes. Additional activities for study and research will be conducted for modernization of early warning systems, particularly in relation to frequently recurring and high risk hazards. Preparedness activities will be carried out for conducting activities in the long term. Activities proposed in the mid-term will be completed in five years.

(3) Long Term:

Establishment of appropriate early warning systems and their operation in a sustainable and effective manner as well as activities for their capacity building will be undertaken for risk management of all imminent disasters including torrential rains, storms, forest fires, earthquakes and lightning. Activities proposed in the term will be completed in ten years.

For implementation of above working policies, strategic activities as required under each strategy will be carried out by incorporating major components including legal, physical, managerial and financial and other institutional aspects of the NEWSAP.

4. Implementation Mechanisms and Responsible Agencies

Existing structures and the status of manpower in ministries, departments and offices implementing early warning systems will be reviewed and, then, provisions will be made for establishment of necessary sections and units with skilled manpower.

There will be necessary provisions for equipment and machineries in order to make the information disseminated by hazard early warning systems more systematic and reliable. Consultations will be held with groups of experts and coordination maintained with donor agencies on issues pertaining to policies, planning, studies and research activities for modernizing the early warning systems and making them relevant. The development and expansion of the system will be gradually an integral part of the organizational structure. Likewise, appropriate arrangements will be made for training of human resources working in the organization. The implementation process of warning systems will be made more effective in coordination and collaboration with stakeholders and local communities involved in disaster risk reduction activities.

The intended objectives of the NEWSAP can be achieved through effective implementation of activities as specified in the action plan and agreed upon by agencies responsible for their implementation. It has to be ensured that all specified activities have been carried out. Agencies responsible for implementation of activities have been specified in the NEWSAP. These agencies will have to carry out the activities mentioned in the NEWSAP in coordination with stakeholder agencies and in cooperation with other supporting agencies as required. The Government of Nepal will create institutional structures for National Strategy for Disaster Risk Management (NSDRM) and Early Warning Systems as well. As per the existing provisions, the coordinating agency for implementation of the NEWSAP will be the Central Natural Calamity Relief Committee (CNCRC) which is the apex body for disaster management. The secretariat of the CNCRC is the Ministry of Home Affairs which supervises the operation of activities and acts as the coordinating agency. Similarly, the Natural Calamity Relief Committees at regional, district and local levels and bodies/organizations concerned are the authorized committees/agencies at their respective levels for implementing early warning systems. Community based organizations will be responsible for coordination of early warning systems at the community level. In accordance with the NSDRM, early warning systems are one of the preparedness measures to be taken by the district and local level disaster management committees. Similarly, training courses on early warning system is one of the preparedness measures to be taken by the community based organizations. In case existing laws are revised and amended, the early warning systems will be operated in line with the institutional structures as provided for in the revised and amended legislations.

For effective implementation of early warning systems, the proposed institutional structures and their working procedures will be as mentioned in Annex A.

4.1 Duties, functions and powers of responsible agencies /stakeholders

- To take the lead responsibility for implementation of the action plans related with them.
- To develop or revise necessary legislation for implementation of the action plans.
- To manage human and other necessary resources for implementation of action plans.
- To maintain co-ordination with and enlist support as required for implementation of action plans from national and international donor agencies, I/NGOs, private sector, local bodies, local communities, media and educational and scientific research agencies.
- It will be the duty of responsible organization to ensure that early warning information on imminent disasters has been disseminated at the local and national levels easily in collaboration with beneficiaries of communities concerned.

- In course of effective implementation of laws, policies and regulations concerning disasters, other responsible bodies will exercise the rights as prescribed in other prevailing laws.

4.2 Responsible Agencies

1. Central Natural Disaster Relief Committee (CNDRC)

The Central Natural Disaster Relief Committee (CNDRC) is headed by the Home Minister. This Committee issues directives for development of necessary policies and formulation of plans and their implementation to address disasters, natural or otherwise. The main responsibility of the CNDRC is to conduct relief operations during such disasters by mobilizing national and international assistance.

2. Ministry of Home Affairs (MoHA)

The Ministry of Home Affairs is the central body that coordinates the efforts made by all other agencies working for disaster management and risk reduction. The Ministry is responsible for developing policies regarding disaster management and implementing them. This Ministry has been playing an important role to materialize the vision of Government of Nepal to build disaster resilient communities in future. The coordinating role of the MoHA will be very crucial in developing strategies and actions on early warning systems as pointed out in the National Disaster Response Framework in order to inform communities concerned through early warning systems and make them alert.

3. Ministry of Science, Technology and Environment (MoSTE)

This Ministry aims at achieving sustainable development through environment conservation and plays an important role in formulating policies and conducting study and research activities. The MoSTE has been carrying out significant activities in order to reduce effects of changes in environment and minimize environmental risks and integrate disaster risk reduction activities in the country. The MoSTE will have a vital role in developing early warning system as to make people alert and safe from disasters. Through weather forecast, it warns people of droughts, torrential rains, avalanches and so on. Similarly, it will conduct studies on glaciers and glacial lakes and provide information on possibilities of floods likely to be caused by glacial lake outbursts. It will also provide early warning on avalanches, storms, lightning and incessant rains and will have an important role in reducing the loss to be caused by hazards.

4. Ministry of Finance (MoF)

The Ministry of Finance will take the lead role in allocating annual budget for implementation of early action plans on early warning systems. The MoF will make necessary arrangements for making financial resources for it.

5. Ministry of Federal Affairs and Local Development (MoFALD)

The Ministry of Federal Affairs and Local Development as a central agency has a role to play, in accordance with the Self Governance Act, 1999 in coordination, support and facilitation of activities to be carried out by local bodies as well as in monitoring and evaluation of such activities. It is the responsibility of this MoFALD to raise public awareness on disasters and carry out disaster preparedness and mitigation activities for disaster risk reduction through local bodies. It is the obligation of the MoFALD to mainstream disaster reduction in development activities at local level by raising awareness and enlisting people's participation and provide assistance in development of early warning system in order to dissemination information on likely hazards.

6. National Planning Commission (NPC)

The National Planning Commission has an important role to play in developing disaster risk reduction and management plans and mainstreaming disaster risk reduction into national development process.

The NPC will have a vital role to play in integrating community based disaster reduction programmes while carrying out developmental activities in order to reduce the disaster risk in the days to come.

7. Ministry of Irrigation (MoI)

The main objective of the Ministry of Irrigation is to develop irrigation policies and plans to increase agricultural productivity by developing irrigation facilities in the country. The MoI has a role to play in developing policies on water-induced disasters and implementing them and as well as in undertaking flood control measures by providing early warning on floods and reducing their risks effectively.

8. Ministry of Forest and Soil Conservation (MoFSC)

The Ministry of Forest and Soil Conservation is responsible for formulating plans and policies regarding forest and soil conservation. Its responsibilities include conservation of forests, control of rivers and landslides. This MoFSC undertakes activities for identification of areas affected or to be affected by natural hazards and takes measures for controlling them. The MoFSC has a role to make the communities aware of landslides and fires in forests and thus reduce such losses by developing early warning systems.

9. Ministry of Agriculture Development (MoAD)

The main objective of the Ministry of Agriculture Development is to uplift the living standards of people by promoting sustainable agricultural development in the country. The MoAD has been constantly working to improve agricultural productivity by introducing various modern and competitive farming techniques and encouraging farmers to engage in farming by applying modern farming techniques. Similarly, the Ministry has been formulating and implementing various plans and policies at local level to prevent decrease in production of agricultural crops due to droughts, heavy rainfall followed by floods that destroy crops. Developing early warning system to forecast disasters like droughts, landslides or flooding and disseminating information to farmers in advance of hazards like droughts and landslides are also the major responsibilities of the MoAD as it can be instrumental in minimizing the impacts of the disasters.

10. Ministry of Industry (MoI)

One of the major responsibilities of the Ministry of Industry is conduct studies on the topography of the county and prepare maps of the areas vulnerable to disasters. The MoI will also prepare maps of seismically active areas and develop early warning systems to prevent hazards to be caused by industrial accidents.

11. Ministry of Urban Development (MoUD)

The primary objectives of the Ministry of Urban Development are to develop and implement policies and plans for construction of earthquake resistant buildings, raise awareness on them, formulate plans for planned development of urban areas and develop well managed and safe urban areas in the country. The MoUD has an important role to play for regulating safe housing construction by implementing building codes. This MoUD is also entrusted with the responsibility for making arrangements for temporary shelter and rehabilitation for the people displaced by disasters.

12. Secretariat of Water and Energy Commission

The Secretariat of the Water and Energy Commission is mainly responsible for identification of rivers causing risks of floods and erosion in view of hazards likely to be created by water-induced disasters as well as for providing assistance for development of early warning systems in vulnerable areas for reduction of risks.

13. Ministry of Health and Population (MoHP)

The main responsibility of the Ministry of Health and Population is to make necessary arrangements for medical personnel, equipment and other materials to provide health services during the emergency phase of disasters. Similarly, it is also the responsibility of the MoHP to take preventive and curative measures for early identification and control of epidemics. This MoHP has a role to play in disseminating information among people in the communities on such epidemics by developing early warning system.

14. Department of Hydrology and Meteorology

The main functions of the Department of Hydrology and Meteorology are to carry out studies and analyze information related to weather conditions in the country, collect such information and make weather forecasts. This Department has a role to play in developing national early warning systems in coordination with other various agencies concerned in order to provide hydrological and metrological information to the people in general.

15. Department of Soil Conservation and Watershed Management

The prime activity of the Department of Soil Conservation and Watershed Management is to reduce the risk of natural disasters like floods and landslides, conserve ecosystem and take measures for prevention of loss of life and property by natural disasters. The major role of the Department will be to disseminate information on hazards landslides to the community through early warning system, reduce loss of life and property and conserve watershed areas for reducing losses to be caused by soil erosion. The Department will also work for mapping of hazards such as floods and landslides in the catchment areas of the district concerned.

16. Department of Mines and Geology

The Department of Mines and Geology has been focusing on conducting studies and research of geological structures, mapping of earthquake risks, collection and dissemination of information on earthquakes through its seismic centres. It is expected that this Department will be acting prominently to conduct studies, research and testing earthquake information system in the days to come, study and utilize earthquake early warning systems existing in several countries and assist in development of national early warning system.

(The role of the Department of Housing and Urban Area Development to be discussed with this Department and added in it).

17. Department of Water Induced Disaster Prevention

Early warning system is quite significant for reduction and mitigation of water-induced disasters and for protection of vulnerable communities from landslides and soil erosion. The Department of Water Induced Disaster Prevention will play a key role in development of early warning systems in order to disseminate information in time on water-induced disasters.

18. Department of Health Services

The major functions of the Department of Health Services include making necessary arrangements for public health services and adopt a number of measures to control diseases including epidemics during the emergency phase after disasters. Similarly, this Department can play an important role in the development of early warning systems in order to provide information on the outbreak of epidemics to the vulnerable persons and communities and prevent loss of life.

19. Department of Forest

The Department of Forest has been working for conservation of forests, control of forest fires and undertake afforestation programmes in areas likely to be affected by hazards in order to prevent disasters. This Department will have an important role in development of early warning system on controlling forest fires and conserving forests in the country. This Department will make assessment on forest fires and prepare mapping of hazards related with forest fires.

20. Regional Natural Calamity Relief Committees and bodies associated with it

The Regional Natural Calamity Relief Committees headed by the Regional Administrators are required to coordinate with various regional bodies and submit reports to the Central Natural Calamity Relief Committee on disaster management activities carried out at the regional level. The Regional Committees and other associated bodies will have an important role to play in networking of early warning systems established by several organizations with the Regional Emergency Operation Centres.

21. District Natural Calamity Relief Committees and bodies associated with it

The Natural Calamity Relief Committees headed by the Chief District Officers are formed at the district level. These Committees formulate disaster preparedness and response plans at the district level and carry out search and rescue and relief activities in the districts. These Committees are also responsible for coordination in order to reduce the loss by disasters and will have an important role to play in establishment and development of early warning systems in vulnerable areas.

22. Local bodies

Local bodies like Village Development Committees (VDCs), municipalities and District Development Committees (DDCs) have been carrying out various activities for disaster risk reduction and management in their respective areas. In accordance with the Local Self Governance Act, 1999., the responsibility for mainstreaming disaster management activities into the district level periodic plans lies with the local bodies. It is also one of their responsibilities to carry out activities to reduce disasters by raising public awareness through early warning systems.

4.3 Participating agencies and their roles

Effective development of early warning systems and their subsequent implementation requires contributions from and coordination among a number of persons, groups and organizations. Significant assistance from the donor community, UN specialized agencies (UNDP, UNICEF, WHO, WFP, FAO, UNFPA, UNOCHA, IOM, UMHABITAT, UNHCR), multinational organizations, International Centre for Integrated Mountain Development (ICIMOD), South Asian Association for Regional Cooperation (SAARC), international non-governmental organizations, International Red Cross Movement including Nepal Red Cross Society, various international and regional organizations, stakeholder communities, non-governmental sectors and media houses is expected in establishment and development of early warning systems in Nepal. Similarly, universities, institute of engineering, academic institutions, National Academy for Science and Technology, various study centres and research institutions, community organizations as well as volunteers and stakeholders in the community will have supportive roles to play in early warning systems.

Major responsible organizations to carry out activities as prescribed in this NEWSAP as well as the agencies with their supportive roles in implementing activities successfully have also been identified. It will be the duty of supporting agencies to provide assistance to and maintain coordination with other organizations as per the needs as expected by the responsible agencies for implementation of activities as mentioned in the NEWSAP. The functions and duties of supporting organizations in connection with the present NEWSAP will be as follows:

1. To supporting the responsible agencies concerned to carry out activities;
2. To provide necessary resources, means and expertise for implementation of activities;
3. To be affiliated with, provide assistance and give feedback on activities being carried out,
4. Provide various kinds of support as required for sustainability of early warning systems;
5. To raise public awareness for developing the sense of ownership among community people in operation of early warning system, utilize its services and promote 'alert management'.

5. Strategy and Action Plan

Major activities and responsible agencies in order to carry out activities are specified under each strategy and working policy. Summary of the Strategy and Action Plan has been given in The Table-1. Likewise, main responsible agencies, supporting bodies, expected achievements and also indicators have been mentioned in the same Table. The National Early Warning Centre, its

branches and units will have the primary role to play in implementation, facilitation and coordination of activities mentioned in the Table. The National Early Warning Centre, in collaboration with the Emergency Operation Center established under the Ministry of Home Affairs, will be responsible for carrying specific activities for establishment, operation, management, dissemination, monitoring and other tasks assigned to it.

Strategic Plan of Action for Operation of Early Warning System, 2013

Strategy	Activities	Responsible Body/Agencies	Time Duration	Partner Organizations/ Body(Agencies)	Indicators
1. Reduce disaster risks by establishing and developing early warning systems equipped with modern technology	1.1 Develop required policies and legislation for establishment and development of early warning system.	Ministry of Home Affairs	Short term/ On-going	Ministry of Law and Justice Constituent Assembly and Parliamentary Affairs Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Health and Population Ministry of Irrigation Ministry of Industry	Necessary policies concerning early warning systems will have been developed and legislation enacted.
	1.2 Strengthen institutional capacities by establishing separate section or unit for operation of early warning system in responsible ministries, departments and local units.	Ministry of Home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Irrigation Ministry of Industry	Short term	Department of Hydrology and Meteorology Department of Mining and Geology Department of Water Induced Disaster Prevention Department of Health Services Department of Forest Department of Soil Conservation and Watershed Management National Emergency Operation Centre Local bodies	Early warning sections and units will have been established in concerned ministries and departments.
	1.3 Establish and operate early warning systems in concerned ministries, departments and local bodies for monitoring of hazards and risks.	Ministry of Home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation	Mid term	Department of Hydrology and Meteorology Department of Mining and Geology Department of Water Induced Disaster Prevention	Early warning systems will have been developed and operational in concerned ministries and departments.

		Ministry of Irrigation Ministry of Industry		Department of Health Services Department of Forest Department of Soil Conservation and Watershed Management National Emergency Operation Centre Local bodies	
1.	1.4 Develop Standard Operating Procedures (SPOs) for operation of early warning systems.	Ministry of Home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Irrigation Ministry of Industry	Mid term	Department of Hydrology and Meteorology Department of Mines and Geology Department of Water Induced Disaster Prevention Department of Health Services Department of Forest Department of Soil Conservation and Watershed Management National Emergency Operation Centre Local bodies	Standard Operating Procedures (SPOs) will have been developed and implemented.
2. Develop early warning systems for all kinds of likely natural hazards and establish their networking at national and local levels.	2.1 Identify stakeholders at national and local levels for early warning systems for different hazards.	Department of Hydrology and Meteorology Department of Mining and Geology Department of Water Induced Disaster Prevention Department of Health Services Forest Department Department of Soil Conservation and Watershed Management		Ministry of Home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Irrigation Ministry of Industry National/Regional/District Emergency Operation Centres Communication Media	Stakeholders for the early warning systems will have been identified and networks at national and local levels established.
	2.2 Establish linkage of already established and presently operational early warning	National/Regional/District Emergency Operation Centres		Concerned ministries and departments Telecommunication service	Networking of early warning mechanisms established at central,

	systems with each other as well as with national early warning systems.			provider agencies Communication Media	district and community levels will have been established with each other as well as with national networks and operated effectively.
	2.3 Early warning systems should be operational for 24 hours a day and flow of information on early warning should be ensured on regular basis.	National/Regional/District Emergency Operation Centres		Concerned ministries and departments Telecommunication service provider agencies Communication Media	Early warning messages will have been reached to the community in time.
	2.4 Early warning systems should be mainstreamed in periodic and annual plans of vulnerable DDCs, VDCs, and municipalities.	Concerned Local Bodies	Mid-term / On-going	National Planning Commission Ministry of Federal Affairs and Local Development Ministry of Home Affairs	Early warning system will have been mainstreamed in development projects and other activities of local bodies.
3. Identify areas vulnerable to various natural hazards and raise public awareness on the need and importance of early warning system.	3.1 Develop awareness materials based on local and traditional knowledge, skills and technology for vulnerable communities.	District Disaster Management Committees Local bodies	Mid term	Ministry of Home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Industry, Concerned Departments National/International /Local NGOs Local communities	Materials for raising awareness based on local technology and indigenous knowledge and skills will have been developed and distributed in the community.
	3.2 Launch public awareness campaigns in partnership with various communication media for raising awareness on early warning systems.	District Disaster Management Committees Local bodies	Short term	National and local media, Telecommunication service provider agencies F.M.s, television channels and newspapers	Vulnerable communities will benefit from awareness raising programs on early warning systems.
	3.3 Develop human resources of agencies concerned and	All concerned ministries, departments and Local bodies	Mid term	Educational Institutions, Training centers,	Knowledge and skills on early warning system

	capacities of communities on early warning system training courses, seminars, practical demonstrations, knowledge and educational activities.			National/International /Local NGOs	will have been developed.
4 Control risks by ensuring access to and participation of communities in early warning systems.	4.1 Establish and operate early warning systems with participation and involvement of local communities.	District Disaster Management Committees Local bodies	Mid term	Concerned ministries and departments, National/International /Local NGOs	Early warning systems will have been developed and operated with participation of local communities.
	4.2 Establish coordination and contacts between stakeholders and communities of the areas in which initial testing of early warning system is to be carried out.	District Disaster Management Committees Local bodies	Mid term	Concerned ministries, Departments, National/International /Local NGOs	Coordination and contact among vulnerable communities and stakeholders will have been established.
	4.3 Form committees/ task forces with participation of communities operating early warning systems in vulnerable DDCs, VDCs and municipality areas.	District Disaster Management Committees Local bodies		Concerned ministries, Departments, National/International /Local NGOs	Early warning/task forces will have been formed in local bodies.
	4.4 Local bodies and communities should be tested on the basis of needs and appropriateness and training should be conducted to impart knowledge and skills for operation of early warning systems.				
5. Sustain early warning systems and	5.1 Make local bodies and communities responsible for operation, maintenance, repair and upgrading of early warning	Concerned ministries and departments	Long term	District Disaster Management Committees Local bodies National/International/Local	Early warning systems will have been operated by local bodies and communities.

follow this system in all vulnerable areas.	systems established in all feasible places.			NGOs	
	5.2 Enhance capacity of local communities to operate, maintain, repair and upgrade warning systems established.	District Disaster Management Committees Local bodies, National/International /Local NGOs		Concerned ministries and departments	Capacities of local communities will have been enhanced and early warning systems made effective.
	5.3 Make early warning mechanisms relevant, equipped with modern technology and environment-friendly.	Concerned ministries and departments/ offices	Long term	Local bodies and communities	Early warning system will have been environment-friendly and equipped with modern technology.
	5.4 Develop the sense of belongingness to and ownership of early warning systems among beneficiary stakeholders and communities.	Local bodies and communities	Long term	Concerned ministries, departments/offices District Disaster Management Committees	Early warning systems will have been operated by local communities themselves.
	5.5 Ensure adequate means and resources are available for sustenance of early warning systems.	Government of Nepal	Long term	Ministry of Finance Local bodies Donor Agencies, National/International /Local NGOs	Adequate resource will have been allocated for operation of early warning systems.
	5.6 Develop early warning units as study and research centres in future.	Local bodies and stakeholder communities	Long term	Concerned ministries and departments/agencies Universities Educational institutions Scientific and Academic institutions Donor Agencies Communications Centre	Early warning unites will have been developed as study and research centres in future.
	5.7 Replicate effective warning systems of early warning by enhancing the capacity of stakeholders.	Department of Hydrology and Meteorology Department of Water Induced Disaster Prevention	Long term	Ministry of Home Affairs Ministry of Federal Affairs and Local Development Ministry of Health and	Skilled trainers will have been developed in stakeholder agencies and early warning

		Department of Soil Conservation and Watershed Management Department of Mines and Geology National and Regional Emergency Operation Centres		Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Irrigation Ministry of Industry,	systems replicated.
6. Increase effectiveness of early warning system by conducting studies and research and carrying tests in collaboration and coordination of stakeholder agencies and experts.	6.1 Increase participation and involvement of governmental agencies, I/NGOs, donor community, mass media and private sector to increase effectiveness of early warning plans.	Concerned ministries/agencies, local bodies and stakeholder communities	Long term	Ministry of Finance National Planning Commission Donor communities	Effectiveness in development and operation of early warning systems will have been increased.
	6.2 Conduct additional studies, research and testing by the concerned ministries, departments and agencies and scientists and academic institutions for development and strengthening of existing and early warning mechanisms.	Ministry of home Affairs Ministry of Health and Population Ministry of Science, Technology and Environment Ministry of Forests and Soil Conservation Ministry of Irrigation Ministry of Industry	Mid term	Universities and educational institutions Study and research centres	Established and feasible early warning systems will have been studied, researched and tested as well as expanded and strengthened.
	6.3 Develop training materials	Concerned ministries/	Short term	Educational institutions,	Training courses on

	on early warning systems and conduct training courses for stakeholders in collaboration with private and government training centers.	departments and local bodies		Training centres, National/International /Local NGOs	early warning will have been conducted by private and public sector training courses.
	6.4 Share and publish knowledge gained and achievements made through studies and research for information of concerned agencies and stakeholders.	Central Natural Calamity Relief Committee National Emergency Operation Centre		Universities Academic Institutions, Departments and agencies involved in studies and research activities Study and research centres on early warning systems	Knowledge gained and achievements made from studies and research will have been, shared, published and disseminated.
7. Make preparations for mobilization of manpower and resources for likely disaster responses by receiving early warning for emergencies.	7.1 Give early warning information in advance to search and rescue teams and local volunteer teams to be deployed for response in areas at risks.	National/Regional/District Emergency Operation Centres	On-going	Security agencies Local Disaster Management Committee Community Volunteer Task Forces	Search and rescue teams and emergency task forces will be ready for deployment upon receiving information of early warning messages.
	7.2 Establish mechanisms to receive information through local disaster management committees/communities on manpower, means and resources for collection of information of areas likely to be affected by disasters and effective response to them.	District Emergency Operation Centre Security Agencies Local Disaster Management Committees Community Volunteer Task Forces	On-going	District Disaster Management Committee Local bodies	Mobilization of required manpower and means and resources for likely disaster response will have been ensured.
	7.3 Organise simulation exercises at central, regional and local levels in view of likely disasters.	National/Regional/District Emergency Operation Centres		Central Natural Calamity Relief Committee Ministry of Home Affairs and other concerned ministries Nepal Red Cross Society Regional/District Disaster Management Committees	Manpower required for disaster response will have been identified and their preparedness tested.

	7.4 Make available to Emergency Operation Centres the list of contact details of local manpower and updated details of means and resources required for disaster response.	District Emergency Operational Centres Security Agencies	Continuous	District Natural Calamity Relief Committees Local bodies Local Disaster Management Committees Community Volunteer Task Forces	Details of manpower and other resources required for disaster response will have been updated.
8. Monitoring/evaluation	8.1 Evaluate whether or not targeted communities are benefited by receiving information on early warning in time about disaster risks through early warning systems.	Central Monitoring and Evaluation Committee, Regional/District Disaster Management Committees	On-going	Concerned ministries, Secretariat of National Planning Commission Local bodies Local Disaster Management Committees	Whether or not the targeted communities have been benefitted from early warning system will have been determined.
	8.2 Assess implementation status of activities by various agencies, identify problems cropped in in course of implementation, give necessary directives to responsible agencies on ways to be adopted for resolving problems.	Central Monitoring and Evaluation Committee	Long-term	Concerned ministries, Secretariat of National Planning Commission Local bodies Civil Society/Independent agencies involved in monitoring and evaluation, Local Disaster Management Committees	Understanding as to the real status of implementation will have been developed and problems cropped in resolved.

6. Proposed Framework of New Organizational Structure:

Since disaster management is a multi-dimensional and multi-sectoral issue, all concerned will have to work in a coordinated manner for reduction of disaster risks and management of emergencies depending upon the nature of work of respective organizations and prevailing situation in a particular time. The provisions and organizational structures made in the prevailing Natural Calamity (Relief) Act, 1982 attempt to address the whole cycle of disaster management in an integrated way but they do so in a limited manner only. Due to the existing organizational structure, it has been a challenge to focus on relief and response and, at the same time, incorporate the whole process of disaster risk management including preparedness and mitigation and mainstream disaster management activities into development processes. In view of the gaps of existing legislation and the need to cover additional areas of activities, a new disaster management act has been proposed. In the act, new organizational structure has been proposed in order to achieve the objectives of the National Strategy for Disaster Risk Management, 2009. In accordance with the proposed organizational structure, there is a provision for formation of a high level National Disaster Management Council so that disaster risk reduction can be mainstreamed into national development process and disaster preparedness and mitigation activities can be made effective. The secretariat of the Council will be the National Disaster Management Authority. The proposed organizational structure will enable to carry out intensively and in a responsible manner the activities at all phases of disaster management cycle, i. e. pre-disaster activities, response to be undertaken during disasters and post-disaster activities as well.

6.1 The organizational structure of the National Early Warning System is aligned with that of the National Strategy for Disaster Risk Management, 2009

This NEWSAP envisages that coordination will be maintained with Emergency Operation Centres functioning under the Ministry of Home Affairs, operational units of early warning will be established as permanent government bodies under the concerned ministries, departments and agencies and procedures will be determined for development of early warning systems. The responsibilities of early warning units will be as follows:

1. To establish a Hazard Monitoring Centres, operate them and carry out their maintenance and repair activities for prediction and early warning of hazards. (Hazards: floods, flash floods, landslides, glacial lake outburst floods, avalanches, droughts, hailstorms, thunderstorms, heat wave, cold wave, mist, smoke etc.)
2. To collaborate with Department of Hydrology and Meteorology for collection of immediate weather data.
3. To collect data through *distant measurement system*, satellite imaging and RADAR.
4. To develop data base systems for immediate management of data for the following activities:

- 1) To promote mapping based the Geographical Information System (GIS) in such a way that maps indicate the status of disasters.
 - 2) To enter and process data.
 - 3) To share data for prediction models as well as for the data based on automation technology.
 - 4) To promote prediction.
 - 5) To produce automated prediction bulletins.
 - 6) To develop the status of various disasters at the local administrative level.
 - 7) To produce automated statistics.
5. To develop mathematical prediction models for various disasters.
 6. To disseminate early warning system in collaboration with the National Emergency Operation Center under the Ministry of Home Affairs.
 7. To act as the National Central Organization for early warning and promote regional and international cooperation for exchange of information, training, research and development of early warning systems.

Early warning units will work closely with the Department of Hydrology and Meteorology, district and local disaster management committees and community based organizations for immediate interactions on immediate data and other structural issues.

7. Monitoring and Evaluation

The regular monitoring of the activities mentioned in the NEWSAP will help to understand the status of implementation as well as to make them effective. Regular monitoring will provide guidance to evaluate the state of activities being carried out, identify problems encountered in course of implementation and find out solutions to them. Therefore, a responsible agency has been identified for monitoring and evaluation of activities stipulated in the NEWSAP. The agency responsible for monitoring and evaluation will assess the implementation status of activities, problems encountered, measures to be taken to resolve them, examine the level of progress and give necessary directives to the bodies responsible for implementation. The following activities will be included in monitoring and evaluation.

7.1. Monitoring and Assessment/Evaluation Activities

Evaluate whether or not the early warning systems already established are being operated effectively as per the prescribed frameworks and procedures and contributing to achievement of expected outcomes.

Evaluate whether or not early warning messages were disseminated among the agencies and communities concerned in time by early warning systems with the result that these agencies and communities benefit from the messages.

Assess the implementation status of activities, identify problems encountered as well as measures to be taken to resolve them and give necessary directives to the bodies responsible for implementation.

The Government of Nepal will monitor on regular basis the major activities proposed in the NEWSAP. Experts, academic institutions and stakeholders, political parties and local communities may make significant contributions to monitoring activities.

Effective institutional structures will be established for implementation of the NEWSAP. Implementation of the NEWSAP will be made effective by making structural arrangements as stipulated in the National Strategy for Disaster Risk Management.

Provisions for necessary financial resources and budget will be made for effective implementation of the NEWSAP. Programmes of early warning will be included in annual development budgets. Financial resources for early warning systems will be secured by the agencies concerned in their respective areas.

As efficient human resource is one of the components required for smooth implementation of disaster management strategies, emphasis will be given to the development of efficient human resource for disaster management and early warning systems.

8. Mobilization of Financial Resources

The government will make necessary investment on establishment of early warning systems and will also make available grants in aid from the donors. The Government of Nepal will provide the operational expenditures at its initial phase. Once the system is operational, the expenses will have to be borne by the local bodies and communities. Once the system is handed over to the communities, necessary procedures will be developed in order to mobilize major part of expenses from organizations, individuals and communities that benefit from the early warning systems.

It is estimated that annual loss in gross domestic production caused by natural disasters ranges from 0.1 to 4%. The events of natural disasters in the past reveal that maximum loss is caused every ten years. It is estimated that 0.7% of the GDP on average has to be expended in disaster risk reduction annually. It is generally recognized that expenditure for preparedness should be at the rate of seven per cent of the total loss. Of this amount, 10% has to be spent on early warning

systems. It means that 0.01% of the total GDP or Rs 150 million has, at present, to be invested on early warning systems.

9. Expected achievements

1. Early warning systems equipped with modern technology in all ministries, departments, local bodies and communities will have been established and developed and disaster risks reduced.
2. Study, research and testing of all types of feasible early warning systems will have been conducted and linkages established at national and local levels by networking them.
3. Effectiveness of early warning mechanisms established and operated at central, district and community levels will have been increased.
4. Additional vulnerable areas will have been identified and early warning systems extended and strengthened in these areas.
5. Information flow through early warning systems will have been ensured in such a way that awareness in the community is raised.
6. Trust and participation in and access of communities to early warning system will have been ensured and hazards controlled.
7. Early warning systems will have been handed over to the communities concerned and their sustainability ensured.
8. Additional studies and research on early warning systems in coordination and collaboration with stakeholder agencies and experts will have been conducted and such systems promoted, upgraded and developed.

GLOSSARY OF TERMS Related with Disaster Management

Alert: Advisory that hazard is approaching but is less imminent than implied by warning message.

Assessment: Survey of disasters, already occurred or imminent, conducted for finding out the actual or real loss and for making recommendations for control of, preparedness for and response to them.

Avalanche: A mass of loosened snow, ice, rock and mud suddenly and swiftly sliding down a mountain.

Debris flow: Flow of mud in high speed in which there are loose particles such as rocks and tree trunks in sufficient quantity.

Disaster: A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. Disasters are classified according to the factors causing them (natural or man-made disasters).

Disaster Legislation: The body of laws and regulations that govern and designate responsibility for disaster management concerning the various phases of disaster.

Disaster Management: Policies and administrative decisions concerning various phases of disasters by which responsibilities are assigned for disaster management.

Disaster Response: A sum of decisions and actions taken during and after disaster, including immediate relief, rehabilitation, and reconstruction.

Drought: A period with deficiency of water in soil so that there will not be enough water for plants, animals and human beings.

Earthquake: An abrupt rupture beneath earth's crust resulting in faults in the surface and, subsequent shaking of the earth. In cases of intense shaking, buildings and other structures tumble down with loss of life and property.

Emergency: A sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences.

Evacuation *: An act of transferring people and their property from disaster-affected areas to safer places.

Evaluation: Post-disaster assessment of all aspects including their effects.

Flood: Significant increase at the level of water in rivers, lakes, ponds or in coastal areas.

Flood alarm level: Dangerous level of water when early warning has to be issued and widely disseminated.

Flood forecasting: Procedures for predicting of water level, quantity of water flow, time of likely events and specially, peak time of maximum flow of flood water.

Floodplain: Downstream area along the banks of rivers created due to frequent inundation.

Floodplain zoning: The plan that prohibits construction of buildings for prevention of loss due to floods or makes other recommendations and defines main areas prone to floods.

Hazard: A dangerous phenomenon or possibility of events that may cause loss of life and property within certain period and in a particular area.

Heat Wave: Protracted duration of extremely high atmospheric temperature.

Indigenous Knowledge: Original knowledge and technology of a particular place or community.

Landslide: Usually all mass movements caused by gravity in a slope. In its true sense, rapid downward movement of rocks or earth from a slope is called landslide.

Lag Time: The time between the receipt of early warning by a community and actual approach of a hazard when people at risk get the opportunity to protect their life and property.

Lead time: The time between the receipt of early warning of a particular hazard and its actual approach, which is used for mobilization of resources for response activities.

Lifelines: The public facilities and systems that provide basic life support services such as water, energy, sanitation, communications and transportation.

Logistics: The range of operational activities concerned with supply, handling, transportation and distribution of materials. Also applicable to the transportation of people.

Maximum probable flood: The highest level of floods estimated taking into consideration of all appropriate factors of metrology, hydrology and topography.

Mean return period: Period of interval between two events of dangerous hazards.

Mitigation: Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and environment.

Monitoring (Surveillance): System that permits the continuous observation, measurement and a valuation of the progress of a process or phenomenon with a view to taking corrective measures.

Mudflow: The down-slope transfer of fine earth material mixed with water.

Non-structural elements: Elements of building which are not included in the load bearing system (such as partition walls, internal roof etc.) and other activities of disaster risk management such as training, awareness, skill development excluding physical construction works, machineries and equipment.

Non-structural flood mitigation: A system that aims at reducing the effects of floods through non-structural measures such as land use planning, advanced early warning system, insurance against floods.

Pollution: Contamination of a substance or more than one into environment due to toxic industrial, chemical or biological wastes, rubbles from artificial products and mismanagement of natural and environmental resources.

Population at Risk: A well-defined population whose lives, property, and livelihoods are threatened by given hazards.

Preparedness: Systematic activities carried out in order to reduce loss of life and property, make arrangements for evacuation of people and property from the area to be affected by disasters and facilitate rescue, relief and rehabilitation activities (See also: **Prevention**).

Prevention: Activities to provide outright avoidance of the adverse impacts of hazards by providing permanent protection from disasters. It includes engineering and other physical protective measures, and also legislative measures controlling land use and urban planning.

Public Awareness Raising: The processes of making communities alert, aware, conscious and able about necessary activities to be undertaken depending the nature of hazards as actions to be carried out for protection of life and property before, during and after disasters.

Reconstruction: Necessary activities aimed at rehabilitation of communities sometime after resettlement during post-disaster period. These actions include construction for permanent residence, complete rehabilitation of all services and full recovery of pre-disaster situation.

Rehabilitation: Actions and decisions taken after disasters in order to restore normal living conditions and encourage and facilitate necessary adjustment to the changes taken place after disasters.

Relief: Assistance and/or intervention during or after disaster to meet the life preservation and basic subsistence needs. It can be of emergency or protracted duration.

Rescue: Action, process or method to make free or take out people, communities or their property trapped in hazards.

Resettlement: Necessary activities carried out for permanent settlement of people displaced or affected by disasters in the area other than the place of their origin.

Risk: Estimated loss (deaths, injuries, loss of property and disrupted economic activities). The risk is expressed by the notation: $\text{Risk} = \text{Hazards} \times \text{Vulnerability}$.

Sanitation: The application of measures and techniques aimed at ensuring and improving general hygiene in the community, including the collection, evacuation and disposal of liquid and solid wastes, as well as measures for creating favourable environmental conditions for health and disease prevention.

Search (and Rescue): The process of locating and recovering disaster victims. Search and rescue go hand in hand and first aid and basic medical assistance are applied as may be required.

Secondary Hazards: Those hazards that occur as a result of another hazard or disaster, i.e., fires or landslides following earthquakes, epidemics following famines, food shortages following drought or floods.

Shelter: Temporary area for settlement provided or arranged for communities of disaster victims during emergencies or physical protection requirements of disaster victims who no longer have access to normal habitation facilities.

Simulation exercise: Process of taking decisions and disaster drills in communities who fear that they are likely to be affected by disasters in order to depict such situations.

Structural flood mitigation: Structural system adopted for reduction of effects of floods by applying physical constructions including ponds, embankments, methods of taking the silt out, change of river course and flood barriers.

Vulnerability: The extent of loss to be caused as a result of potentially damaging harmful events.

Warning: Dissemination of message signaling imminent hazard which may include advice on protective measures. See also "alert".

The terms mentioned above except those marked are taken from the Internationally Agreed Glossary or Basic Terms Associated to Disaster Management, Department of Humanitarian Affairs, United Nations, 1992.*