

Implementation of Tsunami Early Warning in Indonesian Local Communities

Checklist for assessment, planning and monitoring



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German-Indonesian Cooperation for
Tsunami Early Warning System (GITEWS)
Capacity Building in Local Communities

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Acknowledgement

This Checklist was designed by adapting the framework and guideline questions from the “Checklist for Developing Early Warning Systems”, which was developed during the EWC III Third International Conference on Early Warning “From concept to action “, 27 – 29 March 2006, Bonn, Germany.

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Foreword

Preparedness is the clue to cope with tsunamis, which are quite common natural phenomena along the Indonesian coastlines. Preparedness builds on knowledge about the natural hazard and our vulnerability towards it. Preparedness also includes the ability to recognize natural warning signs and / or receive warning messages from a tsunami early warning system on time. Prepared people and communities will know than how to react and have plans ready for evacuation and emergency response.

Early warning is essential to save lives and reduce damages when a tsunami strikes. Indonesia, in cooperation with Germany and other countries as well as international organizations, is setting up a Tsunami Early Warning System (INA-TEWS) for the whole country. This system will be an essential part of an integral Tsunami Early Warning System for the entire Indian Ocean Region.

Early warning systems can reduce the negative effects of disasters substantially, if they can rely on a functioning analysis and communication chain, at whose end the population and the institutions could convert the warning effectively into action.

Consequently, the success of early warning will express itself by the public reaction to the warning. Local actors play a very prominent role to achieve this target. Awareness and knowledge about the hazard and potential impacts, receiving advisories and warnings from national institutions, giving guidance and instructions to local population and preparing people for natural disaster are the genuine tasks of local governments and their communities.

“Local Communities” refers to communities at district level down to neighborhood level and includes Local Governments, Community Leaders, Private Sector, Local Academic Institutions, NGOs and the population in general.

Strengthening of local actors and institutions involved in disaster preparedness and the joint development of tools are important steps to set up an effective and people centered Tsunami Early Warning System in Indonesia. Hopefully the present checklist will contribute to that goal.

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Introduction

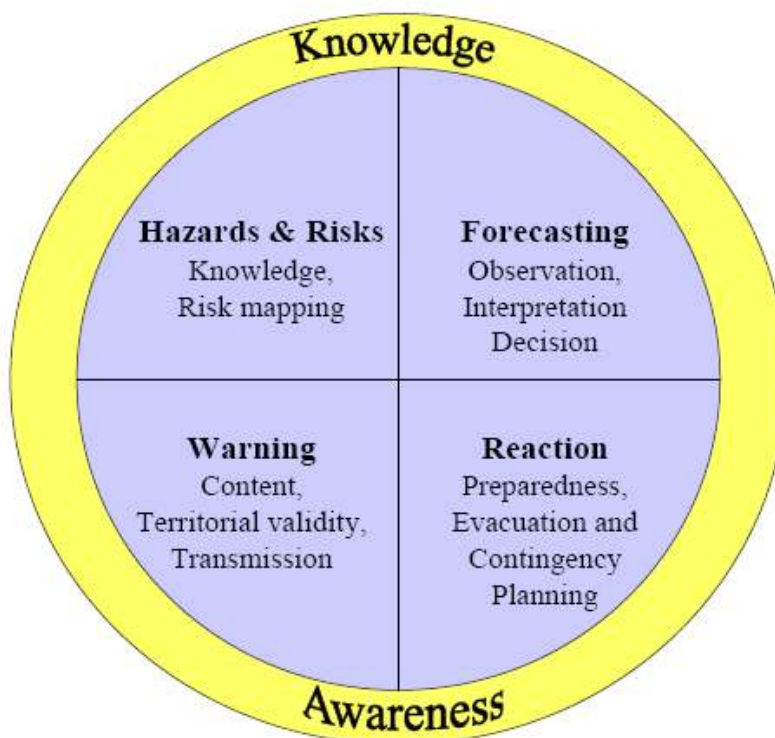
Introduction

1. Why and for whom has this Checklist been developed?

Implementation of Tsunami Early Warning in Local Communities is a process, which depends on many factors. Conducting this process requires to assess what is already in place, to plan the activities to implement all required elements of the Early Warning System and to monitor the progress achieved. The present checklist was developed to serve as a simple tool for local decision makers and stakeholder involved in the implementation of Tsunami Early Warning on community level in Indonesia. This tool was developed in a way that it can be used by local actors on their own, without requiring external expertise or resources. However, it has to be stated that self assessments are not effective without a self critical attitude and a open mind.

2. Contents of the Guide

Early Warning is the provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response (ISDR).



A complete and effective people centered early warning system comprises **four inter-related elements**: (1) risk knowledge; (2) technical monitoring and warning service; (3) communication and dissemination of warnings; and (4) community response capability. Best practice early warning systems also have strong inter-linkages and effective communication.

The checklists are structured around these **four key elements**. Additionally a number of **cross cutting issues** that are critical to the development of the Indonesian Tsunami Early Warning System have been outlined. These include effective governance and institutional arrangements, a multi-hazard approach to early warning, involvement of local communities and consideration of gender perspective and cultural diversity.

The document consists of two inter-related parts that should be read in order. For each key element the first part provides useful **background information** and overarching issues related to the Indonesian Tsunami Early Warning System. The second part is a series of **practical checklists** of actions and initiatives that should be considered when developing or evaluating the progress of the Tsunami Early Warning System. Each of the checklists is grouped under a series of major themes and includes a simple list of actions or steps that, if followed, will provide a solid basis upon which to build or assess an early warning system.

3. Using the Checklist

The checklists were developed to be used as a reference tool for different purposes to ensure that the major elements of the Tsunami Early Warning System are in place:

1. Assessment tool

- to identify the actual situation of the local community regarding Tsunami Early Warning
- to identify weaknesses and opportunities as well as potentials for improvement
- to identify stakeholders involved

2. Planning tool

- to identify the aspects where action is needed
- to prioritize the topics
- to define objectives for working groups
- to develop an action plan

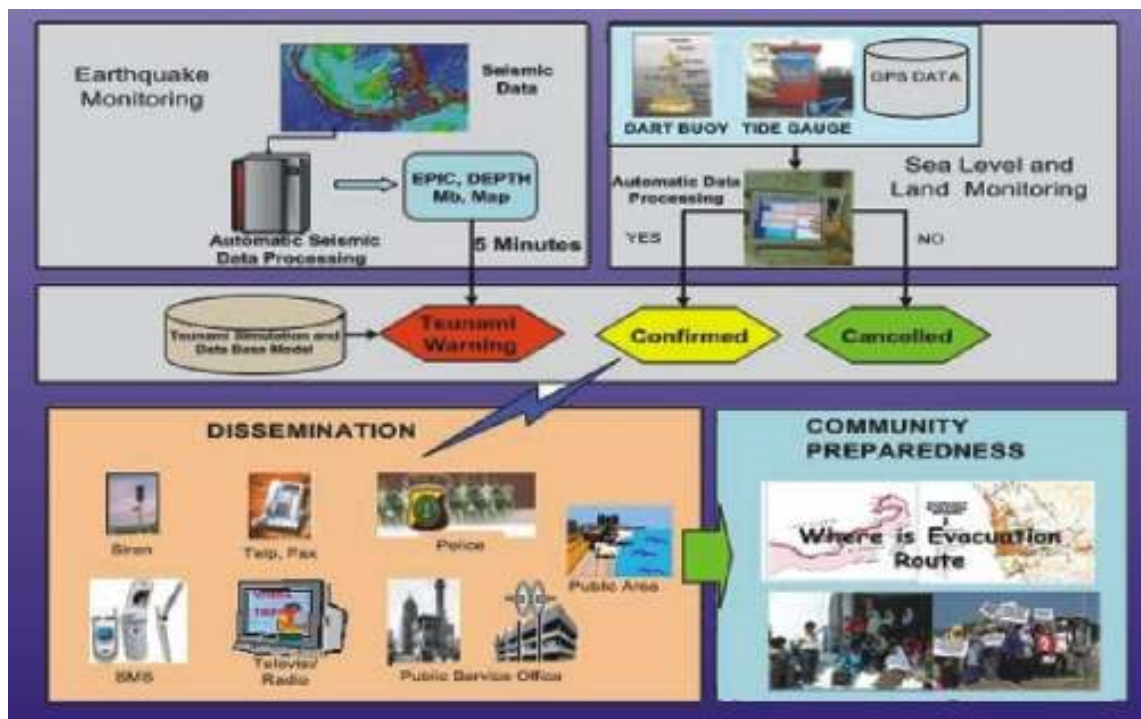
3. Evaluation tool

- to monitor and evaluate the progress and achievements during the implementation process
- to maintain and the system once established

As the implementation of Tsunami Early Warning is a multi-stakeholder task, an explanation of the main **actors** involved, and their roles and responsibilities is included. In each local community it will be necessary to identify the relevant actors to be involved in developing the different elements of the Early Warning System. Additionally a **Stakeholder Analysis Tool** is included to facilitate identifying roles and responsibilities of each local actor involved.

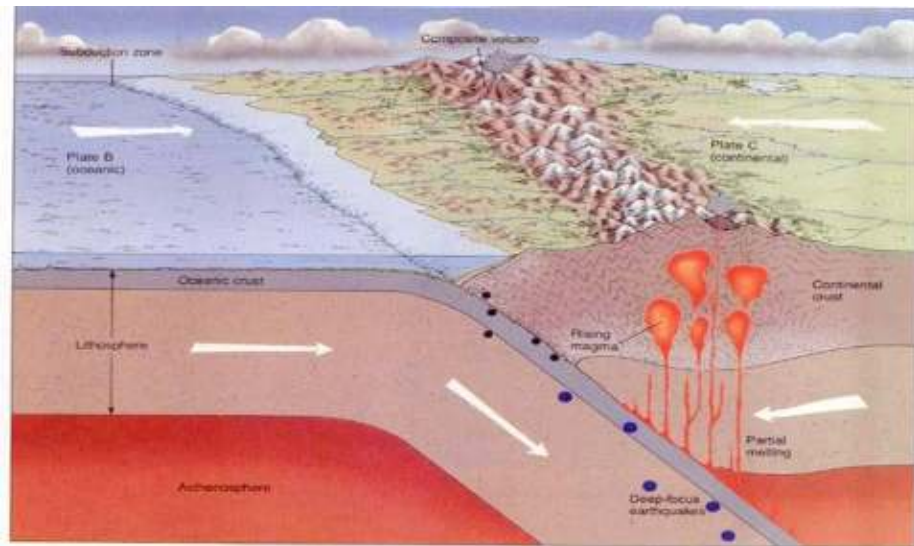
4. Context: Design of the Indonesian Tsunami Early Warning System

The “Gran Scenario” describes the mayor elements of the Indonesian Tsunami Early Warning System: Basically it consists of an earthquake monitoring component, which compares the registered data with a Tsunami Simulation and Data Base in order to assess the probability of a tsunami, the expected wave height and affected areas. Based on this information a first warning will be generated by BMG and distributed.



Design of INA TEWS

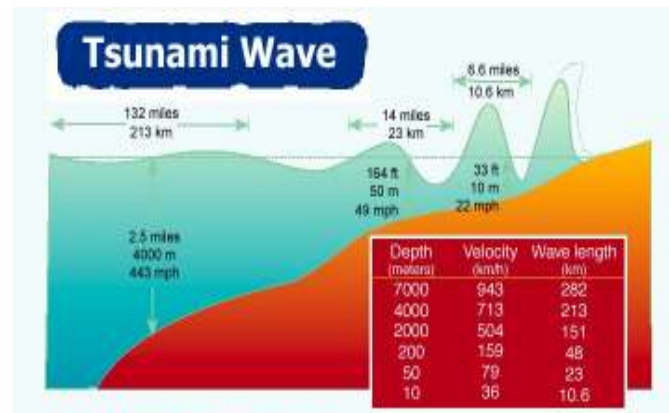
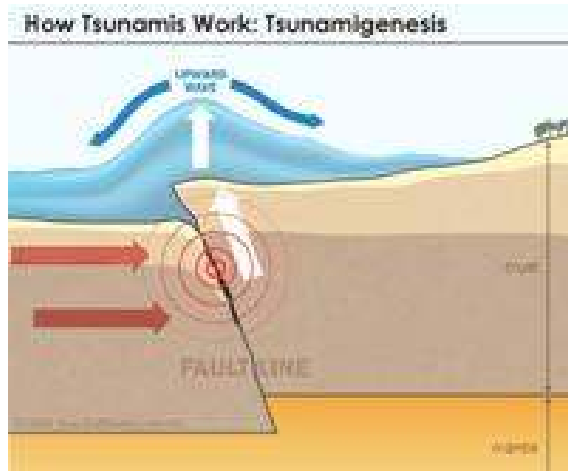
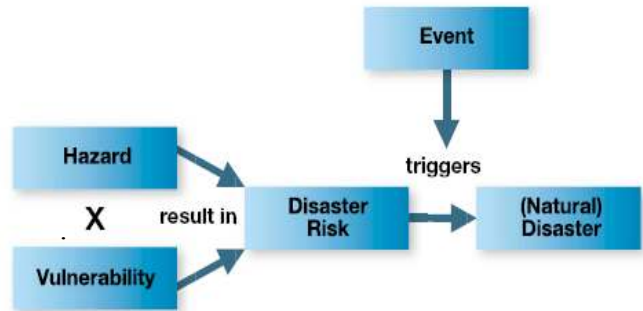
The second component monitors the ocean processes and determines whether a tsunami was generated. Warning dissemination is a task for several institutions and done by different technical means. Local government have an important role in assuring that the warning messages and evacuation orders will reach all people in risk areas of their community. Community preparedness is the clue to convert the warning effectively into action.



Risk Knowledge

TSUNAMI RISK KNOWLEDGE

Tsunami risk arises from the combination of tsunami hazards and vulnerabilities at a particular location. Assessments of tsunami risk require systematic collection and analysis of data and should consider the dynamic nature of hazards and vulnerabilities that arise from processes such as urbanization, rural land-use change, environmental degradation and climate change. Tsunami risk assessment map help to motivate people set up the early warning system and guide preparations for disaster prevention and responses.



Aim: Establish a systematic, standardized process to collect, access and share data, maps and trends on tsunami hazard and vulnerabilities.

Key Actors:

There are five mayor themes related to Risk Knowledge on the local level:

1. Organizational Arrangements established
2. Tsunami Hazard Identified
3. Community Vulnerability Analyzed
4. Tsunami Risks Assessed
5. Information Stored and Accessible

1.1. Organizational Arrangements established

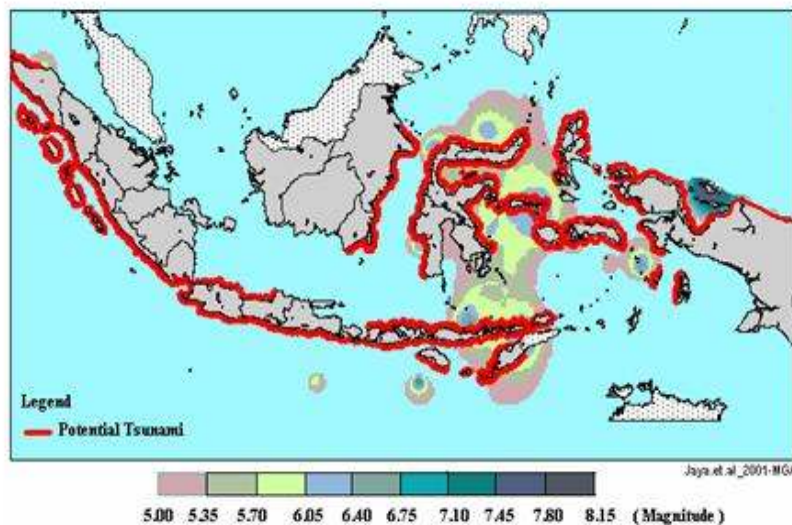
Local communities will have to define whom to involve in risk assessments and how to coordinate. Roles and responsibilities of involved actors as well as technical standards and methods should be clarified. Special attention should be given to participatory approaches especially for vulnerability assessments. Risk assessment products, like risk maps, should be validated and officially approved.

| Aspect | Progress | Action needed & Priority |
|--|--|---|
| <p>1. Actors roles in vulnerability assessments</p> <ul style="list-style-type: none"> <input type="checkbox"/> Key local government agencies and other actors involved in tsunami hazard and vulnerability assessments identified and roles clarified (e.g. agencies responsible for economic data, demographic data, land use planning, social data, coordination assigned to one local organization etc). | <p><input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4</p> <div style="background-color: yellow; padding: 5px;"> <p>0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished</p> </div> | <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3</p> <div style="background-color: yellow; padding: 5px;"> <p>1 high priority 2 medium priority 3 no action needed</p> </div> |
| <p>2. Local legislation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Local legislation or government policy mandating the preparation of tsunami hazard and vulnerability maps for the community in place. | <p><input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4</p> | <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3</p> |
| <p>3. Hazard, Vulnerability and Risk Assessments methods</p> <ul style="list-style-type: none"> <input type="checkbox"/> National standards for Hazard, Vulnerability and risk Assessments are identified and accessible to local <input type="checkbox"/> Hazard, Vulnerability and risk assessments are made in local level applying customized methods complying with national standards | <p><input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4</p> <p><input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4</p> | <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3</p> <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3</p> |
| <p>4. Population engagement</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mechanism to actively engage population in local tsunami hazard and vulnerability analyses applied | <p><input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4</p> | <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3</p> |

1.2. Tsunami Hazard Identified

First of all communities will have to identify, whether they are located in tsunami prone area. In order to identify the local characteristics of tsunami hazard communities should consult with RISTEK, LIPI and DKP for available information. It is important to know whether your community is at risk of a locally generated tsunami because they can reach the coast in very short time. Knowledge about possible impacts of tsunami on land is essential for preparedness planning. Run up maps are important tools for further planning. For that purpose historic data or models which simulate inundations for different scenarios can be useful. Focal point for Tsunami Modeling is BPPT. Models are not yet available for most locations. Communities could do own research on historical tsunamis in their location.

Tsunami Prone Areas in Indonesia



| Aspect | Progress | Action needed & Priority |
|---|--|---|
| 1. Local characteristics of tsunami hazard <input type="checkbox"/> Local characteristics of tsunami hazard (eg. Intensity, frequency and probability) analyzed and historical information evaluated. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <div style="background-color: yellow; padding: 5px;"> 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished </div> | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <div style="background-color: yellow; padding: 5px;"> 1 high priority 2 medium priority 3 no action needed </div> |
| 2. Tsunami hazard maps <input type="checkbox"/> Tsunami hazard maps developed to identify the geographical areas and communities that could be affected by tsunamis. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Integrated hazards map <input type="checkbox"/> An integrated hazards map developed (where possible) to assess the interaction of tsunamis with other hazards. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

1.3. Community Vulnerability Analyzed

Community Vulnerability Assessment (CVA) comprises the analysis of social, economic, environmental and institutional aspects. It will have to consider the elements at risk as well as available coping capacities. CVA requires the participation of local institutions and population. There are many different methods available, including community based approaches.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Community vulnerability assessments <input type="checkbox"/> Community vulnerability assessments conducted for tsunami hazard. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Historical data and potential future <input type="checkbox"/> Historical data resources considered in vulnerability assessments. <input type="checkbox"/> Potential future tsunami events considered in vulnerability assessments. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Other Factors <input type="checkbox"/> Factors such as gender, disability, access to infrastructure, economic diversity and environmental sensitivities considered. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| <div style="background-color: #ffff00; padding: 5px;"> <p> 0 not started yet 1 high priority 1 first steps done 2 medium priority 2 ongoing process 3 no action needed 3 nearly accomplished 4 fully accomplished </p> </div> | | |
| 4. Documentation and mapping of vulnerabilities <input type="checkbox"/> Vulnerabilities documented and mapped (e.g. people or communities, critical infrastructure along coastlines identified and mapped). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

1.4. Tsunami Risks Assessed

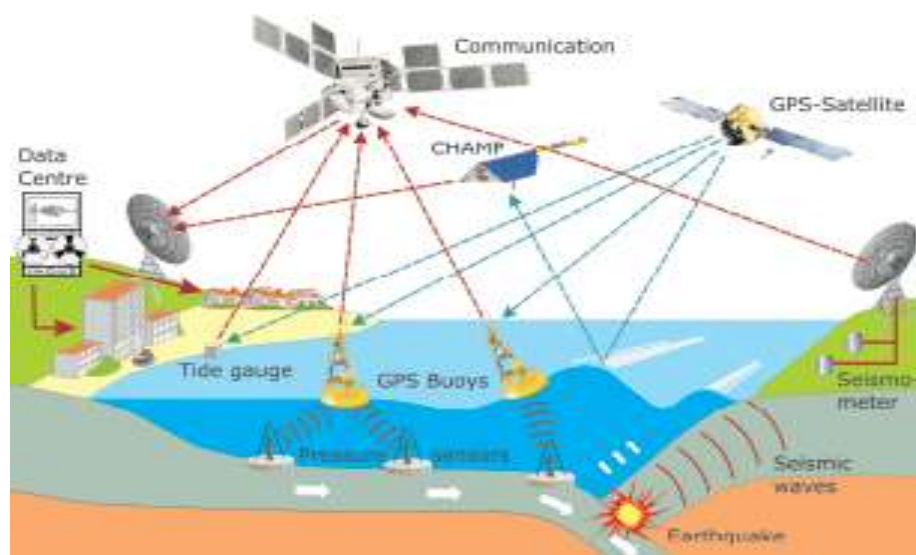
The tsunami risk assessment combines the information of hazard and vulnerability assessments pointing out the existing tsunami risk and risk factors, the underlying processes and causes and their social and spatial expression as well as options for risk reduction and intervention.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Interaction of tsunami hazard and vulnerabilities <input type="checkbox"/> Interaction of tsunami hazard and vulnerabilities assessed to determine the risks faced by the local communities. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Community and private sector consultation <input type="checkbox"/> Community and private sector consultation conducted to ensure risk information is comprehensive and includes historical and indigenous knowledge as well as local information and national level data. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| <div style="background-color: yellow; padding: 5px;"> <p>0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished</p> <p>1 high priority 2 medium priority 3 no action needed</p> </div> | | |
| 3. Other risk <input type="checkbox"/> Activities that increase risks identified and evaluated. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Integration into local risk management plans and warning messages. <input type="checkbox"/> Result of risks assessment integrated into local risk management plans and warning messages. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

1.5. Information Stored and Accessible

Information gathered during the assessments should be “translated” into tools for decision makers, planners and the general public. Generally tsunami hazard, vulnerability and risk maps and reports are suitable outputs of the risk assessment process. These documents should be easy available and updated from time to time.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Data storage <input type="checkbox"/> Data storage system is developed by official institution <input type="checkbox"/> Tsunami Hazard, vulnerability and risk maps and data are stored and available to government, the public and the international community (where appropriate). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Data update <input type="checkbox"/> Update developed plan and data regularly | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |



Monitoring and Warning Service

MONITORING AND WARNING SERVICE

Most of the Indonesian communities in tsunami prone areas are at risk of **local tsunamis**. Locally generated tsunami waves may reach the coast in very short time. For that reason local communities should pay special attention to natural warning signs.

The first warning communities may receive would be the **ground shaking** from a strong earthquake. Unfortunately, ground shaking is not a very reliable tsunami indicator as feeling of “strong ground shaking” may be highly subjective. Additionally there is a possibility that the location of the epicenter was on land and consequently no tsunami danger exists. There are also reports of local tsunamis where people did not notice a prior earthquake.

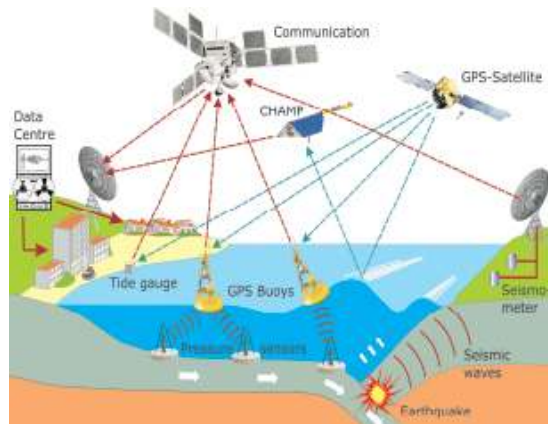
Withdraw of seawater below normal levels may be observed as a second natural warning sign. In this case the tsunami wave is on the verge of striking. It is vital that people immediately leave the coastal strip and river banks once they feel an earthquake or observe seawater withdraw.

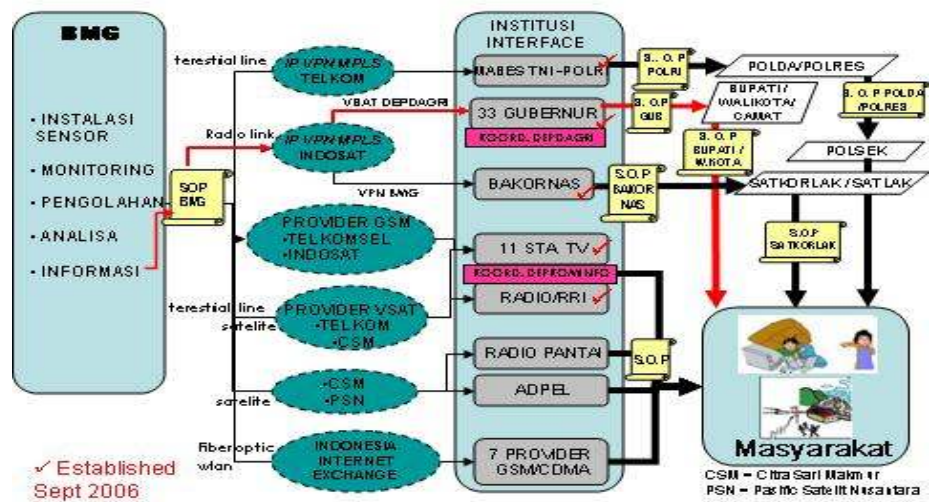
Communities can increase their capacity to cope with the tsunami threat **by linking themselves to the Indonesian Tsunami Early Warning System (INA-TEWS)**. INA-TEWS relies on **earthquake monitoring** and **ocean observation**.

The data are generated by many different countries operating an international network of seismic stations, DART buoys and tide gauges. In Indonesia, analysis of the data is responsibility of BMG.

The incoming seismic data is compared with a **Tsunami Simulation and Data Base** in order to assess the probability of a tsunami, the expected wave height and affected areas. Based on this information a first **warning will be generated by BMG and distributed**.

A second component monitors the ocean processes and determines whether a tsunami was generated. Monitoring and warning service operates 24 hours a day.

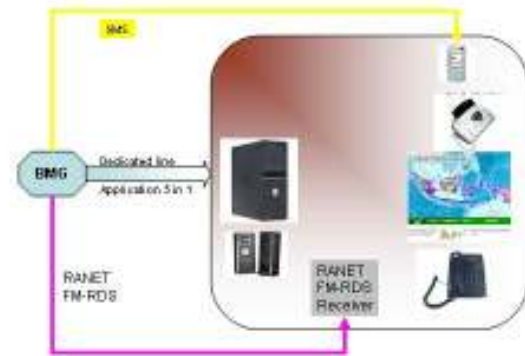




Dissemination and Communication

DISSEMINATION AND COMMUNICATION

BMG will forward warnings using a “5 in 1” communication system to selected **Interface Institutions**. Via public media (radio, TV) the general public will be informed. Additionally warnings will be disseminated to selected institutions and persons by SMS. Special radio and internet based communication technologies (RANET, FM-RDS) are applied to disseminate warnings directly to people and institutions in risk areas.



Communication technologies used by BMG

BMG will send out different types of warning messages: an **Advisory** will be sent out in case of a possibility of a minor tsunami (wave height less than 0.5 m) or a **Warning** in a more severe case (wave height more than 0.5 m). Warning messages will indicate that an earthquake happened that could have triggered a tsunami and will inform about geographical areas to be affected and the estimated wave height. Later on additional information about earthquake data and the tsunami characteristics will be given as well as an **All Clear** message once the danger is over.

After experiencing a strong ground shaking from an earthquake or receiving a warning from the national warning center, local government will have to decide, what kind of message will be distributed to local institutions and population. Messages given out should include a clear guidance on evacuation procedures or any other action to be taken. Local Government has an important role in assuring that the warning messages and evacuation orders will reach all people in risk areas of their community.

Aim: Develop communication and dissemination systems on local level to ensure people and communities are warned in advance of impending tsunami events and facilitate coordination and information exchange between national, provincial, and district level.

Key Actors:

There are three major themes related to Dissemination and Communication to be considered on the local level:

1. Organizational and Decision-making Processes Institutionalized
2. Effective Local Communication Systems and Equipment Installed
3. Warning Messages Recognized and Understood

3.1. Organizational and Decision-making Processes Institutionalized

Each community has to define, where, how and by whom the warning from BMG will be received and what kind of procedures will be started upon receiving an advisory or warning message. All local actors involved in warning dissemination have to be identified and roles & responsibilities as well as coordinating mechanism have to be agreed on. All procedures should be documented in form of SOP.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Local Policy & Legislation on Warning Chain Warning dissemination chain enforced through government policy or legislation, including: <ul style="list-style-type: none"> <input type="checkbox"/> How & where receiving warning from national/ regional Warning Center <input type="checkbox"/> Local decision making criteria how to react on incoming warning <input type="checkbox"/> Dissemination process to local institutions & public | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. 24/7 function <input type="checkbox"/> Local recognized institution (e.g. PUSDALOPS) with 24/7 function empowered to receive and disseminate warning message | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Local Actors <input type="checkbox"/> Identification of local actors to involve in warning dissemination | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Roles & Responsibilities <input type="checkbox"/> General process for warning dissemination defined <input type="checkbox"/> Functions, roles, and responsibilities of each local actor in the warning dissemination process specified in legislation or policy (e.g. local government, Satlak, Police, PMI, local media, NGO) | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| <div style="background-color: #ffff00; padding: 5px;"> <p> 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished </p> <p> 1 high priority 2 medium priority 3 no action needed </p> </div> | | |
| 5. Stakeholder coordination <input type="checkbox"/> Mechanism for stakeholder coordination established | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Local SOP <input type="checkbox"/> Local SOP for warning dissemination developed and tested for each actor involved | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 7. Volunteer Network <input type="checkbox"/> Volunteer network trained and empowered to receive and widely disseminate hazard warnings to remote households and communities | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 8. Cross Border Issues <input type="checkbox"/> Coordination with neighboring districts established | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

3.2. Effective Local Communication Systems and Equipment Installed

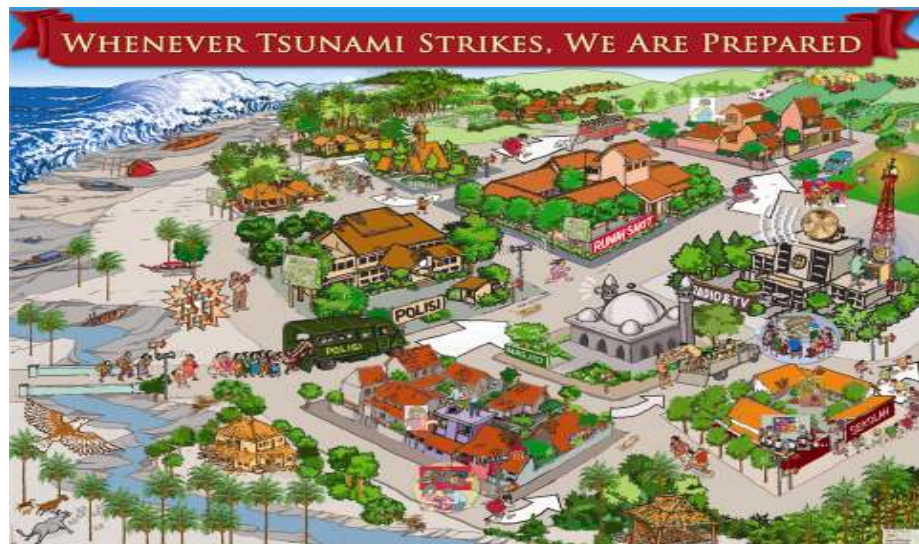
The use of multiple communication channels is necessary to ensure that as many people as possible are warned, to avoid problems in case of failure of any one of the used channels, and to reinforce the warning message. Every community will have distinct characteristics and needs regarding warning dissemination. Factors to be considered are (1) size and layout of the area; (2) make up and activities of the population; (3) financial resources of the community and (4) existing communication systems.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Tailor made system <input type="checkbox"/> Communication and dissemination system tailored to the needs of your communities (e.g. local radio, TV, sirens, Mosque's loudspeaker, kentongan, warning flags, etc) | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Coverage <input type="checkbox"/> Warning communication technology reaches the entire population, including seasonal populations and remote locations. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Available Technology <input type="checkbox"/> Access to information on available and tested local dissemination technologies | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Communication media <input type="checkbox"/> Different kind of communication media used for warning dissemination (e.g. mass media, telecommunication media, informal communication) | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 5. Private sector involvement <input type="checkbox"/> Agreements development to utilize private sector resources where appropriate (e.g. communication networks, amateur radios, etc) | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| d. Consistency for Multi-Hazard <input type="checkbox"/> Consistent warning dissemination and communication systems used for all hazards. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Interactive Technology <input type="checkbox"/> Communication system is two-way and interactive to allow for verification that warnings have been received. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 7. Maintenance and upgrade <input type="checkbox"/> Equipment maintenance and upgrade program implemented and redundancies enforced so back-up systems are in place in the event of a failure. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished | | 1 high priority 2 medium priority 3 no action needed |

3.3. Warning Messages Recognized and Understood

Clear messages containing simple, useful information are critical to enable proper responses that will help safeguard lives and livelihoods. It has to be assured that warning and instruction messages from the different levels and institutions are consistent in content and time.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Messages tailored to the specific need <input type="checkbox"/> Warning alerts, advisory and instruction messages tailored to the specific needs of those at risk (e.g. for diverse cultural, social, gender, linguistic and educational backgrounds). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Geographically-specific <input type="checkbox"/> Warning alerts, advisory and instruction messages are geographically-specific to ensure warnings are targeted to those at risk only. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Incorporation of values, concerns and interests <input type="checkbox"/> Messages incorporate the understanding of the values, concerns and interests of those who will need to take action (e.g. instructions for safeguarding livestock and pets). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Recognizable and consistent warning alerts <input type="checkbox"/> Warning alerts clearly recognizable and consistent over time and include follow-up actions when required. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 5. Specific warnings <input type="checkbox"/> Warnings specific about the nature of the threat and its impacts. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| d. All-clear mechanism <input type="checkbox"/> Mechanism in place to inform the community when the threat has ended. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Study and Lesson Learnt <input type="checkbox"/> Study into how people access and interpret early warning messages undertaken and lessons learnt incorporated into message formats and dissemination processes. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished | | 1 high priority 2 medium priority 3 no action needed |



Response Capacity

Response Capacity

Response Capacity includes public reaction to warning and response to the disaster itself. It is essential that local population understand their risks; respect the warning service and know how to react. Education and preparedness programs play a key role. It is also essential that disaster preparedness and management plans are in place, well practiced and tested. Disaster Preparedness Plan describes activities and measures taken in advance - before the disaster strikes - to ensure an effective response, including the issuance of timely and effective early warnings and temporary evacuation. The community should be well informed on options for safe behavior, available escape routes, and how best to avoid damage and loss to property.



Aim: Strengthen the ability of communities to respond to tsunamis through enhanced education of tsunamis risks, community participation and disaster preparedness.

Key Actors:

There are five mayor themes related to Response Capacity

1. Warnings and Guidance Instructions Respected
2. Evacuation Plans Developed, Disseminated to the Community and Practiced
3. Disaster Response Plan Established
4. Community Response Capacity Assessed and Strengthened
5. Public Awareness and Education Enhanced

4.1. Warnings and Guidance Instructions Respected

Timely and effective community reaction will be achieved when people respect and trust the warning service and understand the tsunami risk. Therefore, while the public perception of tsunami risk and warning service is being analyzed, strategies need to be developed by the local government to build respect towards warning and guidance services. This includes the assignment of a credible source authorized to generate and distribute warning and guidance, minimize false alarms, communicate the progress to set up the warning system and understanding the difference between warnings and guidance.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Credible Sources <input type="checkbox"/> Warning and instruction generated and distributed to those at risk by credible sources (e.g. government, spiritual leaders, respected community organizations). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Public Perception <input type="checkbox"/> Public perception of tsunami risks and the warning service analyzed to predict community response. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Credibility & Trust in Warnings <input type="checkbox"/> Strategies to build credibility and trust in warnings developed (False alarms minimized and improvements communicated to maintain trust in the warning system e.g. understanding difference between warnings and instruction?). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished | | 1 high priority 2 medium priority 3 no action needed |

4.2. Evacuation Plans Developed, Disseminated to the Community and Practiced

Evacuation Plans describe activities and measures taken to ensure temporary evacuation of people and property from threatened locations before the disaster strikes. Evacuation Plans have to be empowered by local law and targeted to the individual needs. Evacuation Planning requires participation from different actors. Risk information has to be utilized in order to develop the plan. Evacuation procedures need to be disseminated to the local population and exercised regularly.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Local Policy & Legislation on Evacuation Planning Evacuation Plan enforced through government policy or legislation <input type="checkbox"/> Authority to call for evacuation <input type="checkbox"/> Approval of evacuation maps, plans and signs <input type="checkbox"/> Dissemination process to local institutions & public | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Basis for Evacuation Planning <input type="checkbox"/> Evacuation planning based on hazard and run-up maps, including findings from risk analysis. In case this information is not yet available, general guidelines are applied. <input type="checkbox"/> Studies and analysis on specific local conditions for evacuation planning are available and results incorporated | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Evacuation Planning Process <input type="checkbox"/> During the planning process participation of all relevant actors is assured (local decision maker, emergency responder, disaster management experts) <input type="checkbox"/> Plans identify danger and safe areas, shelter sites, evacuation routes and options for vertical evacuation. <input type="checkbox"/> Plans consider possible destructions by simultaneous earthquakes, which may affect evacuation efforts | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Highly Vulnerable Groups and Locations <input type="checkbox"/> Groups of individuals who require special attention during evacuation processes identified and specific measures incorporated in Evacuation Plan (elder people, children, handicapped persons, etc.) <input type="checkbox"/> Institutions and critical infrastructure which require special attention during evacuation processes identified and specific measures incorporated in Evacuation Plan (hospitals, schools, bus stations,...) | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 5. Public Knowledge <input type="checkbox"/> Information materials, maps and signs developed to inform general public about evacuation procedures <input type="checkbox"/> Local population familiar with evacuation maps & signs | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Evacuation exercised <input type="checkbox"/> Regular tests and drills undertaken to test evacuation procedures | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

0 not started yet
 1 first steps done
 2 ongoing process
 3 nearly accomplished
 4 fully accomplished

1 high priority
 2 medium priority
 3 no action needed

4.3. Disaster Response Plan Established

Response Plans are tools to provide assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of affected people. It can be of an immediate, short-term, or protracted duration. Risk maps should be utilized in order to develop response plans. Regular tests help to develop rapid and coordinated response capacity.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Local Policy & Legislation on Response Planning <input type="checkbox"/> Disaster preparedness and response plans empowered by local law. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Response Planning Process <input type="checkbox"/> Tsunami hazard and vulnerability maps utilized to develop preparedness and response plans. <input type="checkbox"/> During the planning process participation of all relevant actors is assured (local decision maker, emergency responder, community leaders, disaster management experts) <input type="checkbox"/> Previous disaster events and responses analyzed, lesson learnt incorporated into disaster management plans. <input type="checkbox"/> Disaster preparedness and response plans targeted to the individual needs of vulnerable communities. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| <div style="background-color: #ffff00; padding: 5px;"> 0 not started yet 1 high priority 1 first steps done 2 medium priority 2 ongoing process 3 no action needed 3 nearly accomplished 4 fully accomplished </div> | | |
| 3. Maintain Preparedness <input type="checkbox"/> Up-to-date response plans developed, disseminated to the community. <input type="checkbox"/> Strategies implemented to maintain preparedness for tsunamis events | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Response exercised <input type="checkbox"/> Regular tests and drills undertaken to test the effectiveness of responses to tsunami events. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

4.4. Community Response Capacity Assessed and Strengthened

Community response capacity is a combination of all strengths and resources available within a community or organization that can reduce the level of risk or the effects of a disaster. Response capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Strengthening response capacities requires training programs, which should be based on assessments of previous experiences and lessons learnt.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Response ability <input type="checkbox"/> Community ability to respond effectively to early warnings assessed. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Lesson learnt <input type="checkbox"/> Response to previous disasters analyzed and lesson learnt incorporated into future capacity building strategies. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 high priority 1 first steps done 2 medium priority 2 ongoing process 3 no action needed 3 nearly accomplished 4 fully accomplished | | |
| 3. Capacity Building <input type="checkbox"/> Community-focused organizations engaged to assist with capacity building. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Education and training programs <input type="checkbox"/> Community and volunteer education and training programs developed and implemented. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

4.5. Public Awareness and Education Enhanced

Public knowledge and awareness is the “first line of defense”. It includes increasing the levels of consciousness about risks and informing the general public, what people can do to reduce their exposure to hazards. Information on natural warning signs for tsunami, sources and contents of early warning messages and evacuation procedures are essential to cope better with tsunamis. Specific training should involve public officials to support them in fulfilling their responsibilities to save lives and property in the event of a disaster. Disaster awareness activities in schools, participatory community action, “tsunami edu-entertainment”, the establishment of information centers and networks are possible approaches to increase knowledge and awareness. All different kind of media like television broadcasts, radio, print media and theater may be useful for that purpose.

| Aspect | Progress | Action needed & Priority |
|---|--|---|
| 1. Information material <input type="checkbox"/> Simple information on tsunamis, vulnerabilities, risks, and how to reduce disaster impacts developed and disseminated to vulnerable communities and decision-makers. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <div style="background-color: yellow; padding: 5px;"> 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished </div> | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <div style="background-color: yellow; padding: 5px;"> 1 high priority 2 medium priority 3 no action needed </div> |
| 2. EW knowledge <input type="checkbox"/> Community educated on how warnings will be disseminated and which sources are reliable and how to react after an early warning message is received. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Natural Warning Signs <input type="checkbox"/> Community trained to recognize simple geophysical hazard signals to allow immediate response. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. School curricula <input type="checkbox"/> On-going public awareness and education built in to school curricula from primary schools to university. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 5. Media <input type="checkbox"/> Mass media and folk or alternative media utilized to improve public awareness. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Campaigns <input type="checkbox"/> Public awareness and education campaigns tailored to the specific need of each audience (e.g. children, emergency managers, media). | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 7. Programs updated <input type="checkbox"/> Public awareness strategies and programs evaluated at least once per year and updated where required. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |



Cross Cutting Issues

Cross-cutting Issues

There are a range of overarching issues that should be taken into account when designing and maintaining effective early warning systems.

Effective Governance and Institutional Arrangements

Well-developed governance and institutional arrangements support the successful development and sustainability of sound early warning systems. They are the foundations upon which the previously outlined four elements of early warning are built, strengthened and maintained. Good governance is encouraged by robust legal and regulatory frameworks and supported by long-term political commitment and effective institutional arrangements. Effective governance arrangements should encourage local decision-making and participation which are supported by broader administrative and resource capabilities at the national or regional level. Vertical and horizontal communication and coordination between early warning stakeholders should also be established.



Aim: *Develop institutional, legislative and policy frameworks that support the implementation and maintenance of effective early warning systems.*

Key Actors:

There are four major themes related to Effective Governance and Institutional Arrangements

1. Early Warning Secured as a Long Term Local Priority
2. Legal and Policy Frameworks to Support Early Warning Established
3. Institutional Capacities Assessed and Enhanced
4. Financial Resources Secured
5. Other Aspects
 - Multi-Hazard Approach
 - Involvement of Local Communities
 - Consideration of Gender Perspectives and Cultural Diversity

5.1. Early Warning Secured as a Long Term Local Priority

The early warning system will be sustainable if integrated into local development planning, therefore senior government and political leaders responsible in the development process need to understand the importance of the early warning system and allocate sufficient economic investment for it. To support the process, examples and case studies of successful early warning experiences disseminated to the senior government and political leaders

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Economic benefits of early warning <ul style="list-style-type: none"> <input type="checkbox"/> Practical method is used to analyze Economic benefits of early warning (such as a cost-benefit analysis of previous disasters). <input type="checkbox"/> Economic benefits of early warning highlighted to senior government and political leaders | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Success stories dissemination <ul style="list-style-type: none"> <input type="checkbox"/> Examples and case studies of successful early warning experiences disseminated to senior government and political leaders. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished | | 1 high priority 2 medium priority 3 no action needed |
| 3. Integration into local development planning <ul style="list-style-type: none"> <input type="checkbox"/> Early warning integrated into local development planning. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

5.2. Legal and Policy Frameworks to Support Early Warning Established

One of the most essential issues in the early warning system is the establishment of the institutional and legal basis, i.e legislations or policies which clarify roles and responsibilities, coordination, cross-budget agreement, integration into disaster reduction and development policies, and monitoring and enforcement.

| Aspect | Progress | Action needed & Priority |
|---|--|---|
| 1. Legal basis for implementing, maintaining and upgrading early warning systems. <input type="checkbox"/> Local legislation or policies developed to provide an institutional and legal basis for implementing, maintaining and upgrading early warning systems. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished 1 high priority 2 medium priority 3 no action needed |
| 2. Clear roles and responsibilities <input type="checkbox"/> Clear roles and responsibilities defined for all organizations (government and non-government) involved in early warning | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 3. Coordination <input type="checkbox"/> Clear responsibilities and authority for coordination of early warning assigned to one national agency. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 4. Cross-border agreements <input type="checkbox"/> Provincial and cross-border agreements established to ensure early warning systems are integrated where possible. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 5. Integration into disaster reduction and development policies <input type="checkbox"/> Early warning integrated into disaster reduction and development policies. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 6. Monitoring and enforcement <input type="checkbox"/> Monitoring and enforcement regime in place to support policies and legislation | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

5.3. Institutional Capacities Assessed and Enhanced

The capacities assessment of organizations and institutions involved in tsunami early warning system will be done prior to capacity building planning and training program development. Government and Non-governmental include NGO and private sectors have to contribute for the capacity building.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Capacity assessment and capacity building <ul style="list-style-type: none"> <input type="checkbox"/> Capacities of all organizations and institutions involved assessed <input type="checkbox"/> capacity building plans developed <input type="checkbox"/> Training programmes developed and resourced. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Non-governmental contribution <ul style="list-style-type: none"> <input type="checkbox"/> Non-governmental (NGO, private sector) sector engaged and encouraged to contribute to capacity building | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

5.4. Financial Resources Secured

In order to secure the financial resources for early warning system the local authority needs to develop and institutionalized a funding mechanism for early warning and disaster preparedness. Aside from it, during the implementation, the local level may take into consideration the public/private partnership.

| Aspect | Progress | Action needed & Priority |
|--|--|--|
| 1. Funding mechanism <ul style="list-style-type: none"> <input type="checkbox"/> Local government funding mechanism for early warning and disaster preparedness developed and institutionalized. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| <div style="background-color: #ffff00; padding: 5px;"> <p>0 not started yet 1 high priority</p> <p>1 first steps done 2 medium priority</p> <p>2 ongoing process 3 no action needed</p> <p>3 nearly accomplished</p> <p>4 fully accomplished</p> </div> | | |
| 2. Public/private partnerships <ul style="list-style-type: none"> <input type="checkbox"/> Public/private partnerships utilized to assist with early warning system implementation. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

5.5. Other Aspects

Multi-Hazard Approach

Where possible, early warning systems should link all hazard-based systems. Economies of scale, sustainability and efficiency can be enhanced if systems and operational activities are established and maintained within a multipurpose framework that considers all hazards and end user needs. Multi-hazard early warning systems will also be activated more often than a single-hazard warning system, and therefore should provide better functionality and reliability for dangerous high intensity events, such as tsunamis, that occur infrequently. Multi-hazard systems also help the public better understand the range of risks they face and reinforce desired preparedness actions and warning response behaviors.

Involvement of Local Communities

People centered early warning systems rely on the direct participation of those most likely to be exposed to hazards. Without the involvement of local authorities and communities at risk, government and institutional interventions and responses to hazard events are likely to be inadequate.

A local, ‘bottom-up’ approach to early warning, with the active participation of local communities, enables a multi-dimensional response to problems and needs. In this way, local communities, civic groups and traditional structures can contribute to the reduction of vulnerability and to the strengthening of local capacities.

Consideration of Gender Perspectives and Cultural Diversity

In developing early warning systems it is essential to recognize that different groups have different vulnerabilities according to culture, gender or other characteristics that influence their capacity to effectively prepare for, prevent and respond to disasters. Women and men often play different roles in society and have different access to information in disaster situations. In addition, the elderly, disabled and socio-economically disadvantaged are often more vulnerable.

Information, institutional arrangements and warning communication systems should be tailored to meet the needs of every group in every vulnerable community.

| Aspect | Progress | Action needed & Priority |
|---|--|--|
| 1. Multi-Hazard Approach <ul style="list-style-type: none"> <input type="checkbox"/> Multi hazard disaster management system developed <input type="checkbox"/> Link and operational plan for multi hazard-based systems developed, include the cost-benefit approach | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 2. Involvement of Local Communities <ul style="list-style-type: none"> <input type="checkbox"/> The direct participation of those most likely to be exposed to hazards in placed. <input type="checkbox"/> A local, ‘bottom-up’ approach to early warning developed <input type="checkbox"/> The contribution of local communities, civic groups and traditional structures is monitored and lesson learnt developed | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 0 not started yet 1 first steps done 2 ongoing process 3 nearly accomplished 4 fully accomplished | | |
| 3. Consideration of Gender Perspectives and Cultural Diversity <ul style="list-style-type: none"> <input type="checkbox"/> Different vulnerabilities according to culture, gender or other characteristics that influence are assed during the vulnerability assessment <input type="checkbox"/> Different roles as well as access to information of women and men are assessed, as well as the elderly, disabled and socio-economically disadvantaged. <input type="checkbox"/> Information, institutional arrangements and warning communication systems tailored to meet the needs of every group in every vulnerable community. | <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |



Key Actors

Key Actors

Developing and implementing an effective Tsunami Early Warning System requires the contribution and coordination of a diverse range of individuals and institutions on the international, national and local level. The following chapter provides a brief explanation of the organizations and groups from international to local level that are involved in Tsunami Early Warning Systems.



International Level

The Intergovernmental Oceanographic Commission (IOC), established in 1960, is the commission for ocean sciences and ocean services and facilitates the international cooperation. IOC is coordinated by UNESCO and working together with WMO, UN-ISDR and other key partners contributing expertise and exchange of data and knowledge between individual countries and regions. The International Coordination Group (ICG) as a subsidiary body of UNESCO-IOC promotes, organizes and coordinates regional tsunami mitigation services including issuances of warnings. Japan Meteorological Agency (JMA) and the Pacific Tsunami Warning Center (PTWC) provide warning services for the Pacific Ocean and on a temporary basis also for the Indian Ocean Area. Seismic and Ocean Monitoring requires international networks and cooperation. Several countries and international institutions like United States Geological Survey (USGS), Japan Meteorological Agency (JMA) and the Geoscience Research Centre Potsdam (GFZ) are involved.

International cooperation supports Indonesia with advisory information, technical assistance, and policy and organizational support to develop INA TEWS and strengthening capacities of the involved institutions to operate the system.

National Level

Stakeholders involved at the national level are National Governments, National Leaders, Private Sector, Academic Institutions and National Associations and NGOs.

National governments are responsible for

1. **National policies** (Disaster Management Bill, National Action plan on Disaster Management, Decrees) and the **framework** (Grand Scenario) for early warning.
2. **Technical Systems** (Risk assessment, seismic and ocean monitoring, modeling, analysis of data and generation of warning and dissemination to Interface Institutions)
3. **Support** to Local Communities (capacity building, access to warning)
4. **Coordination and Partnership** between national governments, regional and international organizations

Local Communities

Local Communities are at the centre of effective early warning systems. Important stakeholders are Local Government, Private Sector, Community Leaders, Academic Institutions and NGOs. Participation of local organized population, particularly those most vulnerable, is fundamental to people-centered early warning systems. They should be actively involved in risk assessment, be aware of the hazards and potential impacts to which they are exposed; understand the warning message; and be able to take actions to minimize the threat of loss or damage.

Each of the local stakeholders has different roles and responsibilities:

Local Government is the key actor responsible for:

1. **Local-level policies** (PERDA, Decrees), **guidelines** (PROTAP, SOP, scenarios) and **plans** (evacuation, emergency, contingency) for Tsunami Early Warning and Response.
2. Development and maintenance of **Technical Systems** for dissemination of warning and response guidance to local stakeholder and local public
3. **Knowledge, Awareness Rising and Exercise** on local level (capacity building, Knowledge about hazards, early warning and response) with special attention to education sector
4. **Coordination and Partnership** among local stakeholders and national level

Non-governmental organizations play a role especially in building knowledge and awareness regarding community reaction to warning and response to disaster at all level of society. NGO are usually the ones, who advocate that TEW stays as the agenda of policy makers and facilitate emergency and preparedness planning at grass root level. They also can play a role in the implementation, monitoring and evaluation of TEW.

The private sector has responsibility to develop preparedness measures for their own safety. This includes developing early warning and response facilities and procedures as well as rising awareness among their personnel, managers and customers. As part of their Corporate Social Responsibility they can provide support to neighboring communities with know-how, skilled services and economic resources.

The local science and academic community provides specialized scientific and technical input to assist governments and communities related to the risk assessment, planning, design of warning services, data exchange and translation of scientific or technical information into simple and clear messages.

The **Population in general** is the main actor to save lives and assets. This requires sound knowledge about hazard and risks, the warning signals and messages and how to react appropriately and in a timely manner. Some of the elderly may keep local wisdom on Tsunami. This knowledge should be explored and used.

Tool: Stakeholder Analysis for Tsunami Early Warning

Developing and implementing an effective Tsunami Early Warning System requires the contribution and coordination of a range of different actors. Stakeholder Analysis is a tool which helps to identify the roles and responsibilities of each actor involved.

Objective of Stakeholder Analysis for Tsunami Early Warning

1. Identify the key actors & other actors involved
2. Identify their roles & responsibilities in accordance to the key elements of the TEWS
3. Identify institutional gaps for TEW
4. Generate basic information for stakeholder coordination

Proceedings

Stakeholder Analysis should be applied as a participatory tool involving all mayor players related to the TEWS. Participants should be familiar with the design of the Indonesian Tsunami Early Warning System and the key elements of Earl Warning.

The moderator should explain the objectives of Stakeholder Analysis, the methodological approach and the matrix to be applied. The Stakeholder Analysis is a simple three step exercise; time requirement is between two to four hours depending on the number of actors involved and depth of discussion during the last step.

First step: Identification of actors

- Identification of actors (Brainstorming)
- Selection of key actors
- Ensuring that all actors are identified

Second step: Documentation of Roles and Responsibilities

- Participants fill in the matrix for the institutions they represent, describing briefly the aspects covered by their institution.
- Additionally for each identified topic they indicate their role (decision making, implementing, knowledge transfer).
- For all remaining institutions listed which are not represented during the analysis, the participants should identify topics and roles as far as possible (distinguishing this information by using a different color). This information should be validated later on.

Third step: Analysis of Matrix

- Revision and discussion of the filled matrix by key element: conformity of described roles and responsibilities, double functions and / or gaps
- Document any conclusions and recommendations
- Define follow-up activities

Matrix for Stakeholder Analysis

| Actors | Roles & Responsibilities | | | | | | | | | | | | Planned activities 2007 |
|--------------|--------------------------|------|----------------------|------|--------------------------|------|------------|------|----------|------|------------------|------|----------------------------|
| | Risk Analysis | | Monitoring & Warning | | Dissemination of Warning | | Evacuation | | Response | | Awareness Rising | | |
| Key Actors | Topic | Role | Topic | Role | Topic | Role | Topic | Role | Topic | Role | Topic | Role | |
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| Other Actors | Topic | Role | Topic | Role | Topic | Role | Topic | Role | Topic | Role | Topic | Role | |
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DM – Decision Maker
 IM – Implementer
 KT – Knowledge Transfer

National Actors for the Indonesian Tsunami Early Warning System (INA-TEWS)



Grand Scenario Actors

There are 16 national institutions involved in the Indonesian Tsunami Early Warning System. Kemenristek is appointed as Coordinator and eight institutions are appointed as focal points.

The appointment is based on the Decree of the Coordinating Minister for People's Welfare of the Republic of Indonesia in the capacity of Executive Director for National Coordinating Agency for Disaster Management (Bakornas Pb), Number: 21/Kep/Menko/Kesra/Ix/2006, concerning appointment of a Government Institution as Focal Point and establishment of a Tsunami Early Warning System Development Team.

Structure:

1. The Advisory Board, led by a chairperson, provides policies on Tsunami Early Warning System Development
2. the Steering Committee, led by a chairperson, provides technical and operational directives on Tsunami Early Warning System Development
3. the Executive Team, led by a chairperson, coordinates technical and operational activities of Tsunami Early Warning System Development with all government institutions involved
4. Working Groups as needed by virtue of a separate decree of the State Ministry for Research and Technology

Kemenristek, Coordinator of Tsunami Early Warning System development; focal point for Human Resources Development; Conference/ Workshop/ Seminar/ Meeting; increasing local content in equipment; and Tsunami Drill

BMG, focal point for Seismic Monitoring (Deployment-Monitoring, Processing, Analysis-Dissemination); Operational Center (National Center for Earthquake and Tsunami Disasters, DART-Buoys Center, Tide Gauges Center, GPS Center; Dissemination System)

BPPT, focal Point for Oceanographic Monitoring (DART-Buoys System, Tide Gauges); Earthquake and Tsunami Modeling

Bakosurtanal, Focal point for Coastal Deformation (GPS Measurement); Geospatial Data and Information

LIPI, Focal point for Geological research & development; Community Preparedness and Awareness

Depdagri, focal point for Public education

Kemenkominfo, focal point for Information and Communication Technology



Action Plan

Action Plan

Having analysed the progress achieved so far in your community of implementing Tsunami Early Warning while using the systematic questions in the Checklists – you possibly will have identified a number of gaps and weak points as well as objectives, which still need to be addressed.

The ratings you assigned to each set of checklist questions concerning progress as well as priorities are a crucial basis for addressing these gaps and weak points. Targeted objectives can be achieved in a more structured way by implementing an Action Plan.

Objectives describe clearly and transparent for all stakeholder the aims to be achieved and are related to the main topics in each key element.

Actions relate to measures you have identified by using the checklist questions in order to implement or improve the different elements of the Tsunami Early Warning System, which you now plan to undertake.

In developing an Action Plan, be sure to:

- Assign **responsibilities** for objectives and important activities. (If no individual is responsible, nothing will happen)
- Develop and implement the required **procedures** and **actions**. (Who must do what, in what way? etc.)
- Establish a realistic but ambitious **timeframe**. (Who does what by when?)
- Follow-up by **checking** the **results**. (What progress was achieved by the set deadlines?)
- Evaluate the action and **monitor implementation**. (Were the objectives achieved? Why? Why not?)
- Communicate** and **reward** results
- Do a yearly **assessment** of the progress to identify further Preparedness opportunities and check that implemented measures have been sustained.
- Establish **new targets**. (Can further improvements to the Early Warning System be made?)

Matrix for Action Plan

| Action Plan | | | | | |
|----------------------------------|--|----------------------------|-----------------|---|---------------------------------|
| Objective | Actions to be taken | Necessary Resources | Priority | Responsible Person | Time schedule |
| <i>Tsunami Hazard Identified</i> | <i>Research about available tsunami information (intensity, frequency and probability) and maps in national institutions</i> | <i>Risk Maps</i> | <i>High</i> | <i>NN (BAKOSURTANAL, LIPI, BMG)</i> | <i>2 weeks (till 15.3.2007)</i> |
| | <i>Collect local descriptions about historic tsunamis</i> | <i>Involve students</i> | <i>Medium</i> | <i>NN (akademisi, sejarawan, masyarakat setempat, tokoh masyarakat, ilmuwan)</i> | <i>1 month (till 1.4.2007)</i> |
| | <i>Develop Hazard Map for district level</i> | <i>Access to GIS</i> | <i>High</i> | <i>NN (BAPPEDA, DKLH, Kimpraswil, Public Works)</i> | <i>3 month (till 1.7.2007)</i> |
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Acronyms

| | |
|---------------------|---|
| BAKORNAS | <i>(Badan Koordinasi Nasional)</i> National Coordinating Body |
| BAKOSURTANAL | <i>(Badan Koordinasi Survei dan Pemetaan Nasional)</i> National Coordinating Body for Survey and Mapping |
| BAPPENAS | <i>(Badan Perencanaan dan Pembangunan Nasional)</i> National Development Planning Agency |
| BMG | <i>(Badan Meteorologi dan Geofisika)</i> Meteorology and Geophysics Agency |
| BPPT | <i>(Badan Penelitian dan Pengembangan Teknologi)</i> Agency for Assessment and Application of Technology |
| CVA | Community Vulnerability Assessment |
| DART | Deep Ocean Assessment and Reporting of Tsunamis |
| DEPDAGRI | <i>(Departemen Dalam Negeri)</i> Department of Internal Affairs |
| DEPLU | <i>(Departemen Luar Negeri)</i> Department of Foreign Affairs |
| DKP | <i>(Dinas Kelautan dan Perikanan)</i> Marine and Fishery Department Provincial Office |
| ESDM | <i>(Energi Sumberdaya Mineral)</i> Mineral Resources Energy |
| FM-RDS | Radio-Data-System |
| GFZ | Geoscience Research Centre Potsdam |
| GITEWS | German Indonesian cooperation for Tsunami Early Warning System |
| GPS | Global Positioning System |
| GTZ-IS | German Technical Cooperation – International Services |
| ICG | International Coordination Group |
| INA-TEWS | Indonesian Tsunami Early Warning System |
| IOC | Intergovernmental Oceanographic Commission |
| ISDR | United Nations International Strategy for Disaster Reduction |
| ITB | <i>(Institut Teknologi Bandung)</i> Bandung Institute for Technology |
| JMA | Japan Meteorological Agency |
| KESRA | <i>(Kesejahteraan Rakyat)</i> People’s Welfare |
| KLH | <i>(Kementrian Lingkungan Hidup)</i> Department of Environment |
| KOMINFO | <i>(Komunikasi dan Informasi)</i> Communication and Information |
| LAPAN | <i>(Lembaga Antariksa dan Penerbangan Nasional)</i> National Institute of Aeronautics and Space |
| LIPI | <i>(Lembaga Ilmu Pengetahuan Indonesia)</i> Indonesia Institute of Science |
| LSM / NGO | <i>(Lembaga Swadaya Masyarakat/Organisasi Non Pemerintah)</i> Non Governmental Organization |
| PERDA | <i>(Peraturan Daerah)</i> Regional Regulation |
| PROTAP | <i>(Prosedur Tetap)</i> Standard Operating Procedures |
| PTWC | Pacific Tsunami Warning Center |
| RANET | Radio and Internet for the Communication of Hydro-Meteorological and Climate related Information |
| RISTEK | <i>(Riset dan Teknologi)</i> Research and Technology |
| SOP | Standard Operating Procedures |
| TEWS | Tsunami Early Warning System |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| USAID-IOTWS | U.S. Agency for International Development - Indian Ocean Tsunami Warning System Program |
| USGS | United States Geological Survey |
| WMO | World Meteorological Organization |

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