Institutional and Legislative Systems for Early Warning and Disaster Risk Reduction

Indonesia Summary

Regional Programme on Capacity Building for Sustainable Recovery and Risk Reduction
1. Introduction

The Indian Ocean Tsunami of 26 December 2004 was one of the most devastating disasters in recorded human history. Within minutes, almost 200,000 lives were lost; populations were displaced; and livelihoods, homes and infrastructure were destroyed, setting back hard-earned development gains. After the tsunami, possibly the most disturbing realization was that many, if not most lives could have been saved had an effective Early Warning System (EWS) been in place. The development of EWS has therefore attracted an exceptional amount of attention and resources in the affected region. The main focus, however, has been on technical and instrumental arrangements and needs, and less on system reform and development.

This brochure argues that EWS needs to be embedded in a wider disaster risk reduction (DRR) strategy permeating governance and development thinking and practice at national and local levels. A sustainable EWS requires the formulation, enactment and implementation of institutional, policy and legal changes that emphasize preparedness and prevention. This includes the need to devote more attention to community-based or ‘people-centred’ and gender sensitive approaches in the establishment of EWS. Ultimately the success of EWS must be measured by the degree to which vulnerable communities are empowered to receive, understand and respond to warnings in an effective manner. Unless women and men participate actively in these systems, little progress can be made.

2. Background

UNDP has a long track record in supporting the capacity development of national risk reduction institutions and government agencies. Between 1984 and 2004 alone, UNDP engaged in over 50 DRR programmes in 63 countries. In 2004, the Disaster Reduction Unit of UNDP’s Bureau for Crisis Prevention and Recovery conducted a review of UNDP’s support to Institutional and Legislative Systems (ILS) for DRR. The review highlighted linkages between good governance including effective administration, risk reduction and the mitigation of impacts from recurring disasters. EWS are an intrinsic component of DRR and an important function of governance.

Since the 2004 tsunami, several disasters revealed the persisting shortcomings of national warning and response mechanisms in South Asia. There is a need to understand and analyse existing DRR strategies, policies, organizational relationships, mechanisms and processes, laws and
regulations, resources and procedures at all levels of administration. Responding to this need UNDP’s Regional Programme on Capacity Building for Sustainable Recovery and Risk Reduction commissioned a review of its support to ILS for Early Warning and DRR in Indonesia, Sri Lanka and Thailand in 2007. This brochure summarizes the main findings and recommendations of the report with the expectation that these may feed into further regional and national discussions amongst major stakeholders and strengthen EWS development in the region.

3. Institutional and Legislative Systems for Early Warning

The United Nations International Strategy for Disaster Reduction (UN/ISDR) defines Early Warning as:

“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.”

In March 2006, the Third International Conference on Early Warning sponsored by UN/ISDR and the German Government identified the following areas as critical for establishing a people-centred EWS. These areas provide a structured approach to EWS that this report follows:

1. Governance and Institutional Arrangements — The aim is to develop national institutional, legislative and policy frameworks that support the implementation and maintenance of effective EWS.

2. Risk Knowledge — The aim is to establish a systematic, standardized process to collect and assess data, maps and trends on hazards and vulnerability. This area includes the establishment of organizational arrangements, identification of natural hazards, analysis of community vulnerability, assessment of risk, and storage and accessibility of information.

3. Monitoring and Warning System — The aim is to establish an effective hazard monitoring and warning system with a sound scientific and technological basis.

4. Dissemination and Communication — The aim is to develop systems to ensure local, national and regional coordination and information exchange.

5. Response Capacity — The aim is to strengthen the ability of communities to respond to natural disasters through enhanced education of natural hazard risks, community participation and disaster preparedness.

The effectiveness of any EWS depends upon political will, the administrative and technical capacity of a given country and the degree of acceptance and awareness of rules by the population. EWS therefore require a people-centred approach where formal mechanisms such as laws, protocols and standards complement informal mechanisms such as the engagement and participation of communities. EWS become effective and sustainable when citizens can easily access credible information on hazards and on the performance of EWS, and when they realize their own rights and duties in early warning. Indicators of good institutional and legal systems for EWS are related to:

1. Gender equality. DRR measures consider the needs of women and men, girls and boys and protect the most vulnerable groups.

2. Policy priorities and commitment. National policies, plans and legislation assign clear mandates and adequate resources to undertake early warning activities.

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3. Multi-sector responsibility. The EWS is shared across all relevant sectors, levels of governance and society and addresses all of the hazards that threaten the population.

4. Accountability for warning. The design and coverage of the EWS matches transparent criteria of vulnerability prioritizing most at-risk areas. Clear roles and responsibilities are defined.

5. Resources. The level of resources allocated is appropriate and available resources are used efficiently.

6. Application. The EWS functions as part of a DRR system that is incorporated into longer term development planning and practice, including land use planning, human settlement development, environmental protection, etc.

7. Civil society and private sector participation. Civil society and the private sector are mobilized to participate in the design, implementation and monitoring of the system.

8. Decentralization of EWS. Resources are decentralized to support early warning activities, and decision-making is decentralized, and local actors have the necessary knowledge and tools to carry out their roles in EWS.

4. Main Findings of the Study

4.1 Governance and Institutional Arrangements

The Government of Indonesia has demonstrated its commitment to the development of a comprehensive DRR approach by passing a Law on Disaster Management in March 2007, developing a National Action Plan for Disaster Reduction 2006-2009, and establishing a National Disaster Management Agency (BNPB) on 26 January 2008 (as stipulated in the Law on Disaster Management) to provide DRR guidance and support to line ministries, provinces and districts. BNPB will have local offices at the provincial and district levels in the near future to enhance coordination and cooperation. Disaster mitigation and management is one of the priorities in the Government of Indonesia’s National Development Work Plan, and the National Development Planning Agency (BAPPENAS) has allocated funds from the national budget for relevant agencies to integrate DRR into development planning.

Among the numerous laws underpinning DRR, several pieces of legislation form the foundation for EWS. Overall, however, most laws focus on response rather than on prevention and preparedness, and EWS does not figure prominently or proportionate to its significance in legislation and policy. The Law on Disaster Management mentions EWS under the topic of preparedness; further elaboration will be required to set out clear responsibilities. A critical feature of the law is the inclusion of community participation in disaster management (Article 26). The National Action Plan for Disaster Reduction 2006-2009 offers a broad picture of the institutional, legal, societal and technical requirements for an end-to-end multi-hazard EWS. It mentions EWS among the five key priorities that must be addressed as well as activities to support EWS capacity development.

Following the 2004 tsunami, the Indonesian government assigned specific roles to 16 (and later to 20) government institutions to develop the Indonesia Tsunami Early Warning System (InaTEWS), with the State Ministry of Research and Technology (RISTEK) as coordinator. To avoid or minimize overlaps in EWS coverage and confusion over roles and responsibilities, the Coordinating Ministry for People’s Welfare (MENKO KESRA) issued a decree on 26 September 2006 stating the duties of each institution involved in developing InaTEWS. A review and amendment of the decree is planned in 2009 to better map out and define the mandates and authorities of all contributing agencies and actors in light of the progress made in developing InaTEWS. InaTEWS was inaugurated by the President at the Meteorological, Climatological and Geophysical Agency (BMKG) on 22 November 2008 and its full operation is expected by early 2010.

Although the roles and responsibilities for InaTEWS have been assigned to various agencies, the same level of detail for other hazards have not been determined. This gap has resulted in overlaps in EWS coverage as well as confusion over roles and responsibilities. Figure 2 provides a tentative overview of how the main four EW functions are currently distributed across the main institutional actors in Indonesia’s EWS.
Generally, resources for DRR and EWS are unevenly spread in the country and do not match levels of risk and vulnerability. Nonetheless, Indonesia has taken great strides in encouraging the participation of ‘non-government’ actors in DRR and EWS, for instance, in developing standard operating procedures (SOP), establishing the National Platform for DRR, and in the Hyogo Framework for Action progress review and reporting. Indonesia has also made significant progress in incorporating EWS and DRR in development planning through BAPPENAS and BNPB, and through the Safer Communities Through Disaster Risk Reduction in Development Programme (SC-DRR) as part of the Joint UN Strategic Plan on Disaster Reduction for Sustainable Development.

### 4.2 Risk Knowledge

Responsible organizations in Indonesia are putting considerable efforts into strengthening the systematic collection, sharing and analysis of data on hazards and vulnerabilities, and in disseminating this knowledge through training and education. However database development suffers from varying formats of data inputs, poor reliability of media sources, imprecise estimates of disaster losses, inaccurate information leading to improper action and difficulty obtaining reliable information from small districts. Recognizing these limitations, BNPB has developed a national disaster loss database – DiBi (Data and Informasi Bencana Indonesia) as part of the SC-DRR and the UNDP regional programme. Following its launch on 29 July 2008 with records of disaster losses from 2002 to 2007, BNPB has been collecting historical disaster data for the past 30 years from six provinces to build up the database. At the same time, BNPB has been organizing a series of training and socialization events on DiBi.

A wide range of different tools are currently used for the historical analysis and prediction of future disasters that would benefit from synchronization within the country and across the region. Very few risk assessments have been conducted at the community level, and the awareness and knowledge of risks is scattered with a few vulnerable communities benefiting from dedicated projects while others remain uncovered. Risk knowledge is not or insufficiently used to inform land use and development planning and/or promote the revision and enforcement of safety and building codes. Extreme population pressures on the environment coupled with obsolete legislation has resulted in dramatic increases in vulnerability.

### 4.3 Monitoring and Warning System

Of the five components reviewed in this report, Indonesia is well advanced in the development of hazard monitoring and EWS. Responsible organizations have upgraded...
computer systems and communication technology in recent years in order to improve access to real time data and reduce the lead time of warnings. Communications between central authorities and regional and international monitoring and warning systems are also getting better. As the main receiver/provider of data and data analysis for InaTEWS, BMKG has installed state-of-the-art equipment in its new building, including a decision support system and an information dissemination system. The systems have been developed to ensure integration with UN plans and strategies for the establishment of global and regional EWS coordinated by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC/UNESCO).

The systems of InaTEWS have contributed to the successful issuance of a warning within five minutes of the Bengkulu earthquake on 12 September 2007. Nevertheless, capacity development on end to end EWS within BMKG and for local governments is still required to consistently reach the vulnerable public with actionable messages. Moreover, the pace of development and environmental degradation is threatening to overtake the capacity to predict and warn, particularly for floods and landslides. Monitoring and early warning capacity needs to take a multi-hazard approach, and ensure that information generated are meaningful and relevant to the communities, and lead to warnings that can be acted upon.

4.4 Dissemination and Communication

The regional and national members of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS) have been forerunners in enhancing dissemination and communication systems, and in identifying technical and institutional gaps. In Indonesia, gaps include the fact that there are separate hazard-specific systems for dissemination of warnings and communications, and SOP for information exchange among government staff, media, civil society and the public require formalization and eventual institutionalization.

InaTEWS is being developed to meet international standards for effective exchange of data, and BMKG has announced its intention to serve as a Regional Tsunami Watch Provider in a coordinated regional warning system for the Indian Ocean. Central and provincial authorities are cautious to issue warnings, particularly for tsunamis that may prove to be false and/or trigger a panic. To ensure accuracy of warning, the Government of Indonesia has invested in a number of broadband seismographs, tide gauges and the Deep-Ocean Assessment and Reporting of Tsunamis (DART) buoys. Currently, InaTEWS operates 116 units of broadband seismographs, 90 units of tide gauges and 2 units of DART-buoys. InaTEWS grand scenario will consist of 160 broadband seismographs and 500 accelerographs for seismic observation, and 40 global positioning systems, 80 tide gauges and 23 DART-buoys for observing sea-waves. In addition, there are also improvements to minimize false warning. These include:

1. Providing detailed information on warning message content;
2. Identifying the potentially affected region for every event, prior to warning message dissemination;
3. Installing tsunami simulation database that will provide estimate of arrival time;
4. Risk mapping of potentially affected people, facilities and safe areas;
5. Aggregating information to confirm tsunami on real time basis; and
6. Installing a decision support system and its interface dissemination system.

An important weakness of the system, however, is the limited capacity of local government and communities to receive, interpret and further disseminate warning messages. An adequate feedback mechanism from the community to the national level that could help to analyse the effectiveness of warning messages is currently not in place. More can be done to enhance the critical role of the media in the dissemination of early warning messages.

To enhance dissemination and communication, BMKG with the support from UNDP and other stakeholders of InaTEWS, developed national SOP for earthquakes and tsunamis. The SOP development process has been participatory and inclusive involving relevant stakeholders. Subsequently local-level SOP that are linked with national systems have also been developed in the same manner.
4.5 Response Capacity

Successful warnings should activate an orderly movement of people out of harm’s way and motivate them to seek shelter and secure their assets. A technically sound warning is ineffective if people do not know what to do next. Efforts are underway in Indonesia to improve the ability of people to respond to warnings and — more broadly — to the hazardous impact of these events. Good practices in community participation in response to warning are already available from the experience in dealing with volcanic hazards. There are also several promising but small-scale community-based programmes to boost disaster management and response capacity.

While public education and awareness raising activities, disaster planning and warning response practice drills are increasing in numbers, the coverage of vulnerable areas by drills and evacuation information remains inadequate. The Law on Disaster Management mandates regular evacuation drills and they have now become an annual event to commemorate the 2004 tsunami. These drills are also used as opportunities to organize activities to raise public awareness on local preparedness. More efforts need to be undertaken to analyse the effectiveness of public awareness programmes in influencing the public perception of risks.

4.6 Gender Aspects

The institutional and legal frameworks governing DRR and EWS offer opportunities for ensuring that risk reduction and early warning policy and practices are supportive of the needs of both women and men. Overall progress on the Millennium Development Goals (MDG 3 in particular) is slow in Indonesia. The potential economic role of women is hampered by the Marriage Law, and gender-based violence and discrimination persist.

The Indonesian Ministry of Women’s Empowerment is taking the lead to increase access of women to high-level decision-making positions, and has been instrumental in the passing of a law that introduces a 30 percent quota for women in legislative bodies at the national, provincial and district levels. Nevertheless, women have not been able to increase their political voice in the legislature and their participation is lowest at the district level.

Gender aspects in governance include conflicts between adat (customary) laws and the constitution (that guarantees women’s equality), as well as issues surrounding the introduction and interpretation of Shari’a law at the local level. Women and children were the majority of casualties in the 2004 tsunami partly due to their activities at the time of day and weaker physical strength. Many men particularly the poorest suffered from loss of livelihoods; both genders were affected by psychosocial issues and lacked sufficient voice in the design and implementation of assistance strategies. While the 2004 tsunami and the May 2006 earthquake revealed the specific legal constraints women face in recovering from disasters, women also emerged as powerful forces for preparedness and recovery.

There is no doubt that the establishment of an effective EWS requires the participation of both women and men. The new DRR and EWS policies and plans offer opportunities to involve more women. Women are well placed to participate in risk assessments, the design of EWS and the promotion of DRR, and require targeted capacity development. Indonesia has already adopted a number of gender instruments including guidelines for gender mainstreaming, application of a Gender Analysis Pathway in a range of ministries, and the increasing inclusion of gender aspects in annual development plans at the district level. There is relevant capacity in the State Ministry for Women’s Empowerment, women’s study centres, several hundreds of non-governmental organizations (NGOs) working towards gender equality, and in community groups that arose out of the tsunami and other disasters. These institutions can help to ensure that far more women participate in EWS and that warning messages, processes and procedures employ a gender sensitive approach, and consider specific concerns such as physical strength, security and protection.
5. Main Recommendations for Stakeholders

5.1 Governance and Institutional Arrangement

Develop joint organizational efforts to promote the Law on Disaster Management while focusing on coordination, popular consultation, community participation, local DRR ‘culture’ development, socialization and commitment building.

Develop comprehensive plans and guidelines to cover EWS in structural and operational detail. While plans are already extensive under InaTEWS, ensure that investments made upstream (technology for monitoring, detection, etc.) are sustainable through decrees and permanent resource allocation and increase focus on downstream plans and implementation (local government and last mile capacity).

Agree on a prioritized plan for EWS capacity development that covers all major hazards and encompasses all member agencies of government, civil society and assistance providers. Develop a mechanism for assigning resources to cover the needed inputs.

- Within this plan concentrate material and human resources at the regional and district levels to provide support and coordination to key actors in the EWS including governors, Bupatis/Mayors, the local/regional parliament (DPRD) and the National Unity and Public Protection Bodies (BADAN KESBANGLINMAS) to reduce disparities and structural gaps.
- Share resources with and integrate early warning efforts of NGOs, media, the private sector, universities and community-based organizations.

5.1.1 Including women and men in governance and institutions for EWS

- Ensure that plans and regulations to implement the Law on Disaster Management and its EWS component emphasize a more active role of women in decision-making. Specifically, ensure that the plan for EWS capacity development encourages participation of women from different sectors (government, civil society, communities etc.)
  - Clearly stipulate activities that designate EWS roles of and protective measures for women and men, and girls and boys.
  - Provide support for gender awareness training to government staff and research to increase knowledge about gender aspects.

5.2 Risk Knowledge

Promote coordination for risk mapping and data collection/analysis, and address problems associated with ongoing database development including standardization of methodology across the country and in the region.

- Further promote and strengthen the use of the DiBi tool for the historical analysis and prediction of disasters. Supplement these with new risk assessment undertaken by other technical and scientific agencies.

Promote community-based vulnerability assessments and mapping nationwide, using networks of trained volunteers, community-based organizations and/or NGOs to reach isolated communities and groups requiring urgent protection.

Strengthen risk communication methods and access to risk knowledge to ensure that different target groups understand the risks they face. Use community vulnerability data to integrate and socialize DRR and EWS information.

Focus efforts on updating and enforcing laws and regulations related to building codes, land titling, environmental and natural resources protection, deforestation, and integrated coastal management in light of up-to-date knowledge of risks.
5.2.1 Strengthening understanding of gender-based vulnerability and capacity

- Use existing gender sensitive tools developed nationally to assess the vulnerability of each gender and their access to information regarding trends on hazards and vulnerabilities.

- Make effective use of education systems, female politicians and legislators, and organizations and groups with gender-related mandates to further risk knowledge and participation in risk management and EWS, particularly in the least developed provinces.

- Provide capacity development support to community groups and networks to help change attitudes and promote empowerment of women through risk knowledge.

- Ensure the participation of women in development of building codes, land titling and environmental protection laws and practices, particularly at district/municipality levels.

5.3 Monitoring and Warning System

Continue to enhance support for BMKG and the wider network of relevant agencies in the development of the InaTEWS forecasting and warning system.

Work on reducing information gaps between BMKG and other organizations monitoring various hazards, including central authorities, local authorities and community groups.

Ensure that resources are available to strengthen community level monitoring and early warning by lobbying with the local or regency/city government (PEMDA) and DPRD (local/regional parliament) to allocate sufficient funds, human resources and support for maintenance of relevant systems.

Involves NGOs such as the Indonesian Red Cross (PMI) and the private sector to push socialization and local capacity development.

Ensure community participation from the beginning to develop trust and ownership of the monitoring and warning system, as well as avoid vandalism of equipment.
5.3.1 Promoting the potential of women as EWS and DRR actors

- Empower women through training and replication of good practices to become actors in community-based DRR and EWS (to strengthen community-based monitoring and early warning in particular).
- Involve women in the development of policies to address the human causes of floods, landslides and fires.

5.4 Dissemination and Communication

Unify the concepts of warning dissemination and communication across organizations through development of a clear strategy/plan and flow-chart supported by cross-organizational SOP. Clarify the roles of information providers and distributors, and ensure that relevant stakeholders understand these roles and how they are linked.

Upgrade technical information and communication systems to international standards to allow information from BMKG to be swiftly disseminated to communities. The communication instruments and system may need to vary with the area, and traditional instruments and systems may need to be revitalized.

Strengthen the community’s ability to understand and act upon messages. Obtain consensus in communities and among various levels of authorities on the appropriate local warning system.

Facilitate feedback from the community on and promote circulation of messages in/by the community. Local wisdom and experience should be integrated into the InaTEWS and other EWS.

Develop a cohesive approach for dealing with the impact from false alarms, including those due to the malfunctioning of equipment or hoaxes set to cause panic, and for enhancing public understanding of the need for warnings.

Strengthen public perception of warnings as protective mechanisms. Conduct an intensive and long-term media campaign on the warning messages using examples from successful national and community-based information campaigns.

Support development of media partnerships in EWS, at national and at local levels.

5.4.1 Ensuring warning messages reach both genders

- Prepare actionable warning messages that employ a gender sensitive approach in the context of community disaster preparedness and awareness programmes. Various times of day and the activities that females and males will be engaged in should be considered in terms of how each group can be effectively reached and the reaction time they will need to flee to safety relative to the types of disasters they may face. The protection of children will require extra time for evacuation.
## 5.5 Response Capacity

Develop regulations and SOP that mandate the:
- Frequency of evacuation drills in high risk areas;
- Evaluation of drills according to specific indicators of success and feedback from participants;
- Clear identification and realistic mapping of evacuation routes;
- Identification of designated places for evacuation; and
- Development of specific procedures for where to seek shelter and how to reach these safe areas considering the needs of particularly vulnerable groups.

Establish a coordination forum on early warning to allow all actors to vet problems and concerns and to advocate for appropriate resources and capacity development. Involve local governments, NGOs, businesses, education institutions, community-based organizations and networks. Furthermore:
- Develop joint strategies and action plans for expanding the reach of community-based disaster management and capacity development programmes.
- Expand coverage of drills, evacuation information and response planning, particularly in high risk areas and communities.
- Promote well coordinated disaster response plans at district and community levels by strengthening the capacity of BNPB, and regional/provincial/district disaster management agencies.
- Ensure that NGOs and businesses have plans to support the response to warnings.

Undertake lessons learned exercises after evacuation drills or actual warnings, and ensure that a responsible coordinating body captures and analyses results for follow-up and incorporation into preparedness plans and training.

Strengthen optimal use of the Incident Command System\(^2\) by involving local authorities and communities in awareness raising and participation in planning efforts.

### 5.5.1 Learning to design EWS that work for women and men

- Make optimum use of good practices and lessons learned in previous disasters in Indonesia and other countries to support the critical roles played by women and men in preparedness and response, using national and community-based training programmes as vehicles.
- Evacuation drills, routes and procedures should be mapped taking into account gender considerations such as access, security, etc. for women.