

External Evaluation of the UNISDR-Coordinated Tsunami Early Warning Systems Initiative

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UNISDR Tsunami Flash Appeal Evaluation Executive Summary

This is an evaluation of the use of UN Flash Appeal funds by the UNISDR in a programme called the *"Evaluation and Strengthening of Early Warning Systems in Countries Affected by the 26 December 2004 Tsunami"*. This programme cost \$10.5 million and the funds were mainly spent from 2005-6. The evaluation was conducted by an international consultant between December 2008 and February 2009, with assistance from national consultants in Sri Lanka and Indonesia. The methodology used was a review of documentation, field visits to Sri Lanka & Indonesia, and discussions with UNISDR staff in Bangkok and Geneva. The key evaluation questions relate to the efficiency, effectiveness, and sustainability of the Flash Appeal funding.

While acknowledging that much progress has been made since 2005-6, the key finding of the evaluation is that **the UNISDR needs to introduce both a stronger monitoring and evaluation 'culture' and a stronger M & E system throughout the organisation covering all major activities – project work, advocacy, research, and training.** (See recommendations below).

The evaluation asks whether it was the correct decision for the UNISDR to become involved in disbursing Flash Appeal funding, and whether this could be seen as a diversion from its key mission to ensure that the principles of the Hyogo Framework became incorporated in as many as possible of the Tsunami reconstruction programmes. The conclusion is that this funding was a real opportunity, rather than a diversion, but that the programme tried to cover too many partners and a huge geographical area, and it suffered from relatively weak planning, monitoring, and evaluation. While the logical framework was a useful starting point, it needed to be supplemented with individual logical frameworks at least for all the major grants.

In relation to efficiency the report argues that it is likely to be inherently more efficient to encourage countries and regions to invest funding on multi-hazard warning systems, rather than Tsunami-specific warning systems. Also resources put in to the community level, as was done in some of the national programmes were efficient in the sense that a relatively small amount of funding produced relatively large social benefits.

In relation to effectiveness, the evaluation found that both the countries selected for this evaluation, Indonesia and Sri Lanka have made tremendous progress in disaster reduction measures over the last 4 years. For both countries the Tsunami was a tremendous shock, and made both people and government at all levels aware of how poorly they had been prepared. From the UNISDR's perspective, in terms of building awareness about DRR, the Tsunami itself did in a few minutes what in a 'normal' country might take many years. This makes attribution of strong impacts to UNISDR hugely challenging. Additionally the 'project' was really 16 different projects designed

to achieve a common objective, but these individual projects had no performance indicators and no proper systems for monitoring. The key constraints are seen as a large number of very different 'partners', too few UNISDR staff, and limited time for implementation.

About one third of the total funding went into a regional programme implemented by UNESCO/IOC which aimed '*to provide an overall integrated framework for strengthening EW capacities of countries of the IO Region*'. This work is felt to have suffered from being over-focussed on Tsunami EW even though for most of the 16 countries covered, Tsunamis are very rare events. Even so, the different meetings funded are judged to have improved relationships between key staff in different countries and successfully highlighted the need to share EW information between them: on balance the UNISDR funding both filled an important gap at the regional and international level and achieved some useful outcomes.

The ADPC's training programme on Early Warning is seen as being too thinly spread over 4 countries; and the same criticism is made of the initiative in Africa, where it is difficult to evaluate what long-term impact the various workshops funded by the UNISDR have had. The research programmes like those of the UNU in Sri Lanka are seen as helpful to those academics and officials who came in contact with them, but did not always have sufficient impact at national level.

As regards publications, 33 publications were produced with Flash Appeal funding, most of them in English or other UN languages. There is a need for more publications on DRR and EW issues in local languages, and more evaluation of the usefulness of each publication

The national programmes funded by the UNISDR through UNDP and UNESCO in Sri Lanka and Indonesia respectively have largely had positive outcomes, and were characterized by strong commitment from the UN partners concerned and a growth in the DRR capacity of the implementing partners. The UNESCO project in Indonesia tried to bring together a wide variety of stakeholders to identify improved methods of assessing vulnerability: it had some initial difficulties, but much has been achieved, especially by the NGO KOGAMI in Padang. The methodology developed now needs to be disseminated more widely in the whole region.

This evaluation has found that sustainability in Preparedness and Early Warning is not too much of an issue at national level given the strong investment by both SL and Indonesia in DRR in general and EW in particular: but we would assume this sustainability is far more of an issue in poorer countries in the Region like Myanmar which both have less resources of their own and less engagement from international donors. In countries like Sri Lanka and Indonesia now regarded as 'middle income' countries a constraint on sustainability may well be a lack of continued core funding for local NGOs. Throughout the region, EW and Disaster Preparedness systems will only be sustainable if they cover most of the hazards (for example floods, cyclones,

and droughts) that both people and governments face every year rather than tsunamis which may come only once in a century.

The evaluation concludes that the UNISDR could have done more to ensure that DRR and EW issues were highlighted in the huge reconstruction effort following the Tsunami, especially in Aceh. As described in the country studies in Appendix 1 there is a need for the UNISDR to remain engaged in the question of how different government departments involved in EW and preparedness issues can best be co-ordinated. It needs to focus on the **strategic** part of its mandate. When countries suffer massive natural disasters like the Tsunami, and when there is a such a huge donor response, the UNISDR appears to be far more useful at a strategic and advisory level, rather than in project implementation.

Recommendations¹

1. In order to promote both stronger accountability and learning, although there have been some improvements since 2005, the UNISDR needs to introduce both a stronger monitoring and evaluation 'culture' and a stronger M & E system throughout the organisation covering all major activities – project work, advocacy, research, and training. (Action: MOB and Secretariat)
2. This strengthened M & E system needs to include tighter monitoring of each event or conference, more 'real time' evaluations and 'after action' Reviews, and more evaluations both of the impact of particular publications, and of particular advocacy campaigns. (Action: Secretariat).
3. In order to provide leadership in M & E, the UNISDR should consider recruiting at least one senior member of staff with strong evaluation expertise in Geneva, supported as necessary by staff with similar expertise in the regional offices.(Action: Secretariat)
4. As in other UN agencies, the UNISDR should ensure that all major evaluations are reviewed by the Management Oversight Board and are made publicly available. (Action: MOB & Secretariat)
5. The UNISDR needs to have a clear research and communications strategy, more focused on building national capacity for EW & DRR. This strategy needs to link research with communications and advocacy at different levels. Any individual research that is commissioned needs to both be consistent with, and support, this strategy. (Action: Secretariat)
6. While maintaining strong links with its UN system partners like the UNU the UNISDR needs to give greater priority to national and local organizations in the conceptualization, design and implementation of any research so that there will be greater national ownership of these efforts. Done in this way, there should be greater sustainability; the new

¹ These recommendations are given in order of priority.

frameworks and tools developed, and lessons learned will all be available in the country and there is a far greater chance they will be utilized in future. (Action: Secretariat)

7. Rather than sponsor regional institutions like the ADPC directly, the UNISDR should provide its national partners with training budgets which they can use to 'buy in' training from a range of providers, including regional institutions. (Action: Secretariat & Regional Offices).

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Acronyms

ABU	Asia-Pacific Broadcasting Union
ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AIDCO	European Commission: EuropeAid Co-operation Office
AIDMI	All India Disaster Mitigation Institute
ASEAN	Association of South East Asian Nations
CBDP	Community-based Disaster Preparedness
CBO	Community-based organization
CRED	Centre for Research on the Epidemiology of Disasters
DMC	Disaster Management Committee
DMC	Disaster Management Centre of Sri Lanka
DMT	Disaster Management Team
DRR	Disaster Risk Reduction
ECHO	European Commission's Humanitarian Aid Office
GLOSS	Global Sea Level Observing System
GTS	Global Telecommunication System
GTZ	German Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
ICG/IOTWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning System
IOC	Intergovernmental Oceanographic Commission
KOGAMI	Tsunami Prepared Community (local NGO in Padang, Indonesia)
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Science)
PPEW	UNISDR Platform for the Promotion of Early Warning
SOP	Standard Operating Procedure
TCDEW	Technical Committee for Disaster Early Warning of Sri Lanka
TEC	Tsunami Evaluation Coalition
TEWS	Tsunami Early Warning System(s)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOOSA	United Nations Office for Outer Space Affairs
UNU-EHS	United Nations University - Institute for Environment and Human Security
WCDR	World Conference on Disaster Reduction
WMO	World Meteorological Organization

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1. Introduction

The Indian Ocean Tsunami of 26 December, 2004 caused a total loss of life of more than 250,000 people in the affected countries and enormous losses of housing and infrastructure. By far the worst affected country was Indonesia where there were over 131,000 confirmed deaths and enormous economic losses in the province of Banda Aceh. In Sri Lanka there were over 31,000 deaths, and over 7,000 and 5,300 in India and Sri Lanka respectively.

The international response was equally unprecedented, and it was estimated that about \$14 billion was raised in total.¹ Even though the UN Appeal for the Tsunami was the third largest on record, it only raised about \$1.25 billion or about 9% of the total, and only a very small part of this, about US\$ 10.5 million, went to the United Nations International Strategy for Disaster Reduction (UNISDR), and even this was more than had been originally requested.

This was however the first time that UN Flash Appeal funds had been allocated to the UNISDR. Given its previous financing difficulties this was seen as something of a breakthrough. The funding was used for a programme called the *"Evaluation and Strengthening of Early Warning Systems in Countries Affected by the 26 December 2004 Tsunami"*. The ISDR Platform for the Promotion of Early Warning, administered by the UNISDR secretariat coordinated this initiative, which aimed to put into practice many of the principles agreed at the World Conference on Disaster Reduction in January 2005, now normally referred to as the Hyogo Framework for Action.

The UN Flash Appeal funding for the UNISDR was used to support a range of both regional and national institutions in different countries affected by the Tsunami. The activities within the initiative were focused broadly on early warning system development and preparedness and tried to promote a "people-centred early warning system" emphasizing (i) enhanced community level risk knowledge, (ii) monitoring and warning service, (iii) communications and dissemination of understandable warnings to those at risk and (iv) response capability and preparedness to act by those threatened. Sixteen partner organizations implemented and completed activities by 31 December 2007, and this is the programme evaluated in this report.

The report broadly follows the questions laid down in the TOR. The lessons learned are incorporated into all the sections, and sustainability issues are covered in the conclusions.

1.1 Methodology

The evaluation was undertaken from December 2008 to February 2009, and began with an extensive review of relevant documentation. Two national consultants, Rachel Perera in Sri Lanka, and Krishna Pribadi in Indonesia,

¹ M. Flint & H. Goyder: *Funding the Tsunami Response* : Tsunami Evaluation Coalition 2006

were recruited both to assist the Team Leader, and to ensure the evaluation took into account the rapid development in Early Warning Systems in both countries. Field work was undertaken in Sri Lanka and Indonesia as well as Bangkok, Thailand where the UNISDR has a Regional Office.

The main methods used in the evaluation have been:

- an extensive review of documentation
- individual interviews with a wide range of UNISDR partners and other stakeholders involved in Early Warning issues in Sri Lanka, Indonesia, and Thailand
- two field visits to UNISDR-funded projects in both countries
- a validation process, by which a draft report was discussed with UNISDR staff in meetings and phone interviews before this final report was produced.

The evaluation is based on the intended outcomes, outputs, and indicators of the overall programme logical framework, which is attached as an Appendix. This framework covers 5 'priority areas of support': the implementation of a regional TEWS; integrated risk management, public awareness and education, community based approaches, and co-ordination. While many of the indicators in this logical framework are useful, some appear a little too general to be evaluated. For example the indicators given under community-based approaches refer to improving the quality of data and dissemination of good practice, as well as '*strengthened community-based risk management at targeted locations.*' This seems a little too general as there is a need to define what might be the results of such improved risk management, including for instance the existence of well communicated contingency plans, supported by well understood Standard Operating Procedures (SOPS) covering such issues as evacuation. Equally the intended outcome of the public awareness and education component in the logical framework is '*targeted advocacy and media campaigns*', and the first indicator given is '*regional interaction and mechanisms for advocacy are strengthened*'. This does not really help identify what is the precise anticipated result or outcome of the advocacy.

The underlying assumptions of this evaluation are, firstly, that investment in EW systems can only be described as successful if they can be shown to increase a community's ability to prepare for a disaster. Secondly the evaluation assumes that a combination of EW instruments will be needed (e.g. improved weather forecasting, improved communication of information about natural disasters, and improved communications and preparedness plans both within countries and by communities). Most of these measures are necessary in themselves, but they will not on their own be sufficient to have real impacts at the community level. In summary it may be useful to see EW as a 'chain', with institutions concerned with technical and regional solutions at one end, and communities at the other. The challenge for the ISDR is to know at what points in this 'chain' funding will yield the highest returns.

Thirdly the evaluation accepts that the UNISDR has a relatively limited influence. To achieve strong and sustained EW and other community preparedness systems requires strong political will, strong local government

systems, and strong civil society engagement, backed up by an appropriate use of ICT.

Limitations

Every evaluation faces constraints, and this one was no exception. The first issue was that this evaluation took place rather late, and over two years since most of the funding was disbursed. This delay has reduced the usefulness of the evaluation in that all the funds have long been spent and thus its findings cannot be used to guide future disbursements.

Secondly the issue of attribution is especially problematic: the amount of funding, \$10.5 million, spent by the UNISDR was both relatively very small in relation to the wider international response to the Tsunami, and was dispersed between 16 different agencies with regional as well as national responsibilities. In addition to this, both Sri Lanka and Indonesia have made great strides to improve their EW systems, both for Tsunamis and other hazards, in the last four years. All these factors make it unusually difficult to attribute any outcomes or impact to UNISDR funding alone.

A third issue faced was a delay in securing financial information and in particular the lack of a summary table of allocations. This was requested at the outset, as the whole design of an evaluation like this should normally be based on ensuring the maximum coverage of the largest projects, with normally less coverage of smaller projects. However the evaluation had to be designed before the summary of allocations became available, and as a result too little time was given to the analysis of some of the largest grants.

A fourth limitation has been the absence of logical frameworks for the individual projects, which would have been the natural foundation for this evaluation, combined with a significant lack of information about the outcomes or impact of some of the grants made, especially many of the regional and research grants. While there is plenty of data about how the money was actually spent (for instance on research, a workshop, or a publication) it is often more difficult to find out what happened as a result of this expenditure. This evaluation cannot therefore claim to be a comprehensive study of all the grants made using Flash Appeal funding: the focus is on the projects funded in Indonesia and Sri Lanka; and there is only more superficial coverage of some of the regional grants where we found no evidence except for the partner's own reports.

An final limitation of this evaluation, and a wider issue to which we return, is the **absence of clear, internal monitoring processes within UNISDR itself in 2005/6, and as a result a limited capacity to 'track' the performance of the different projects.** We understand that since 2005 a number of steps (summarized in section 3.4 below) have been taken to improve this situation.

2. Evaluation Findings

Before coming to the findings it is helpful to emphasise the unusual context within which the UNISDR had to make its funding decisions. Although the Kobe Conference took place in January 2005, just after the Tsunami, it was not able to influence the Tsunami response to the extent that one might have expected. The reasons for this lie beyond the scope of this evaluation, but must relate to the unprecedented size and scale of the disaster, the huge amounts of funding raised, and the resulting pressure felt by all actors (national governments, the UN and NGOs) to offer relief and recovery assistance as quickly as possible.

A key question for this evaluation is whether in fact, given the timing, it was the correct decision for the UNISDR to become involved in disbursing Flash Appeal funding. While this could have been seen as a diversion from its key mission to ensure that the principles of the Hyogo Framework became incorporated in as many as possible of the Tsunami reconstruction programmes, ISDR staff point out that before the Tsunami the Secretariat was experiencing major funding difficulties, and that it was even experiencing difficulties in raising funds for the World Conference on Disaster Reduction in Kobe, Japan. But in early 2005 the Secretariat, while being willing to embrace the opportunities offered by Flash Appeal funding, was not well-equipped either in terms of personnel or management systems, and had to react rapidly to unfolding events.

The table below indicates how UNISDR allocated the Flash Appeal funding:

ISDR TSUNAMI FLASH APPEAL EVALUATION: SUMMARY OF MAJOR GRANTS

Grants:	Purpose	Disbursements (US \$)
UNISDR-ESCAP	Grant to Bangkok office	99,700
ADRC, Japan	Workshops, cost of national assessment missions, publications, Indonesia perceptions study	415,000
CRED, Brussels	Health impacts study, Tamil Nadu	157,814
Asian Broadcasting Union, Bangkok	Promotion of role of regional media in DRR	67,962
University of Geneva	Preparation of database for ISDR	56,000
AIDMI, India	Study of Potential of Microfinance for Tsunami Recovery	40,000
ADPC, Bangkok	Improving community response to Warnings; publication of ISDR Newsletter	154,000
SEEDS – A & N Islands	Strengthen Preparedness at Community level	40,000
	Sub-total:	1,030,476
UN Agency Partner		

Agreements:		
UNESCO	Indian Ocean Tsunami EW System	3,369,658
UN University	Research	324,000
WMO	Upgrading of weather forecasting	726,372
UNEP	Strategic Environmental Assessment (SEA) in SL; Support to Environment Ministries in Maldives & Indonesia	286,200
UNDP India	Strengthen EW at community level in Tamil Nadu	125,000
UNDP Sri Lanka	Support for EW at community level	125,000
UNESCO Indonesia	Strengthen Preparedness at Community level	351,000
UNOPS	Africa	615,850
UNISDR	Secretariat Costs	2,880,168
	Programme Support Costs	1,035,736
Grand Total		10,869,460

2.1 Efficiency

The question which this evaluation was asked in relation to efficiency was *'how efficient the resources were in achieving results – the right resource base?*

This proved to be one of the most difficult questions in the whole evaluation.

First, it should be stressed that there is a strong economic or 'efficiency' case for general investment in Disaster Risk Reduction (DRR) and for investment in Early Warning in particular. Provided such investment is effective (an issue to which we will return below) DRR should enable people to save both lives and livelihoods at times of disaster, and the 'efficiency case' is that this can almost always be done at a far lower cost than if no preparation is done.

It is though far more difficult to comment on the particular 'efficiency' of the grants made by the UNISDR using Tsunami Flash Appeal funding, as the **expected results** of the projects are not entirely clear. To comment on 'efficiency' an evaluation first needs to have a clear idea of the objective for each grant, and it is then possible to comment on whether the project selected the optimal, or lowest cost, means of achieving that objective. There were clear overall objectives for the programme and these were stated as *'improved public confidence and security, a rapid boosting of the capacities for action and planning by public authorities in the countries affected, authoritative information products needed by the humanitarian community, and a sound basis for coordination and informed implementation of tsunami warning systems in the region'*. There was also the overall objective for the

programme provided in the logical framework which was *'to provide an overall integrated framework for strengthening early warning capacities of countries of the Indian Ocean'* **If one was to evaluate efficiency one would need to have some idea of the alternative ways of achieving this overall objective, and the respective costs of these alternatives.**

There are however three areas worthy of comment in respect of 'efficiency'. First, it is likely to be inherently more efficient to encourage countries and regions to invest funding on multi-hazard warning systems, rather than Tsunami-specific warning systems, and in practice ISDR staff worked to ensure that more of the Flash Appeal funding was directed towards 'multi-hazard' Early Warning. This is simply because Tsunamis are historically extremely rare in most parts of the Indian Ocean Region, except in Indonesia. It could therefore be seen as 'inefficient' use of resources to invest too heavily in Tsunami-specific EW systems: as was pointed out in Indonesia, where these systems involve use of complex technology, there is a real danger that the technology used will be considered obsolete long before the next major tsunami, and it is not clear that donors or governments will be prepared to maintain the current levels of investment in the long term.

Secondly, all those contacted as part of this evaluation agreed that the greatest problems in relation to Early Warning tend to relate more to 'last mile' issues – of getting communities to respond appropriately to warnings, rather than in any lack of technological options. Therefore resources put in to the community level, as was done in the case of the UNDP project in Sri Lanka and UNESCO's support for KOGAMI in Padang, can be seen as more 'efficient' in the sense of a relatively small amount of funding producing relatively large social benefits, as compared with the returns from the same amounts of funding when committed to more 'upstream' and technological EW investments.

Thirdly, there is a particular difficulty with the concept of 'efficiency' when applied to Tsunami-related activities in 2005-6 given the broader context within which UNISDR had to programme its Flash Appeal funds. This context was highly competitive, with a large number of agencies of all types (UN, INGOs, bilateral donors, others) competing to disburse extraordinary sums of money in a relatively short time. While there was a strong incentive to disburse funding, there was little incentive for managers in any agency to identify the lowest cost ways of achieving objectives. As one of those involved in the disbursement of Flash Appeal funding said *'we felt we were short of time rather than money.'* and the UNISDR acknowledged this in its report of April 2005 when it said that *that substantial resources are being provided by the countries of the region, bilateral donors and many other organisations. Examples include India's commitment of around US\$ 30 million to develop its national system, Thailand's offer of US\$ 10 million to support a multi-partner regional early warning system fund, the offers of Germany, Australia and other countries of several tens of millions to support core system development, USAID's support project of US\$ 12,000,000, and UNEP's commitment of US\$ 1,000,000 to support environmental assessments and related activities. The International Federation of Red Cross and Red*

Crescent Societies (IFRC) and other non-government organisations bring significant financial and other resources to the support of early warning related activities

Finally, there are a number of efficiency concerns in relation to how programme support costs are shared between UN agencies, and how much funding is removed at each 'layer' of funding. Typically, and in accordance with normal UN rules, when the UNISDR was funding an agency like UNESCO it took 8% of the value of the project while UNESCO itself took 5%, making a total of 13%. Assuming a similar ratio of Project Support costs for all grants, this would suggest that \$1.36 million of the total allocated of \$10.5 million was shared between ISDR itself and its partner agency.

2.2 Relations with Partners

The word 'partner' appears to be used rather loosely by the UNISDR, and an insufficient distinction is made between agencies with which it has a long term 'partnership' as opposed to agencies which were simply once-off grant recipients. The TOR asked the evaluation to comment on whether *the right implementation partnerships formed and the right organisations selected to do the work*.

The decision to work at the technical end of EW systems, rather than focusing support on 'last mile' issues, had major implications for the choice of partners. For instance at the regional level, given the stated objective of the whole programme *'to provide an overall integrated framework for Tsunami EW,* the UNISDR had little choice of partners, since UNESCO/IOC has no real 'competitor' as the regional body linking the nations all around the Indian Ocean, while the WMO's Global Telecommunication System (GTS) links together satellite-based telecommunications sub-systems and the data-collection services of meteorological satellites. At the national level UNISDR would have found it difficult to support government agencies or local authorities directly, given its lack of infrastructure at this level. However other UN agencies, especially UNDP and UNESCO are now giving priority to both DRR and EW issues, and both appear to have been relatively successful partners at the national level.²

In general, where there was a previous relationship, as with the ADPC, or where funding was continued from other sources even after Flash Appeal funds finished (as with UNESCO in Indonesia) the agencies concerned viewed their relationship with the UNISDR as more of a partnership; but in those cases where it was once-off grant, it appears to be more like a sub-contract.

The major questions around choice of partners revolve round both the research organisations chosen, and also the choice of NGOs: for both the selection criteria are unclear, and never appear to have been documented. In

² The consultant had the opportunity to visit UNDP's DRR work in Tamil Nadu, some of which was funded by the UNISDR Flash Appeal, in January 2008.

particular, with the new partners which were supported with Flash Appeal funding it is not clear what organisational appraisal was undertaken before a decision was made to fund a particular agency. Two international research institutes (the UN University for vulnerability research and CRED, Brussels for epidemiology) were chosen because they were already established partners to the UN system. There is though an issue which we will explore in more detail in the next section about the extent to which the UNISDR should support these international researchers rather than national research institutes in the countries concerned. Also the UNISDR divided its Flash funding between no less than 15 partners, including partners in India which was less badly affected than Sri Lanka or Indonesia. Given the UNISDR's limited staff this relatively long list of 'partners' presented challenges for effective follow up and monitoring.

2.3 Overall Effectiveness

This section combines two questions from the TOR. The first question is how effective was the approach adopted in achieving results, and this refers to the overall design of the project and the extent to which beneficiaries were involved in implementation. The second question is the extent to which the projects funded by Flash Appeal funding were able to achieve real change, and the extent to which these changes can be sustained.

What makes finding answers to these questions more difficult is that both the countries selected for this evaluation, Indonesia and Sri Lanka have made tremendous progress in disaster reduction measures over the last 4 years. The country reports attached show that the HFA is now widely institutionalized and accepted. The best indicator of this is that in both countries Disaster Management Ministries have been set up and their core costs are funded by their respective governments, with some bilateral and UN assistance with equipment. In these countries ISDR's goal '*to increase commitment by Governments to engage and invest in disaster risk reduction as agreed upon in the Hyogo Framework*' has to a large extent been achieved. In both countries both the Hyogo Framework and UNISDR itself have had a strong influence on the thinking of both government and donors, but it is difficult to identify the precise nature of this influence in the rapidly changing context of the last 4 years.

The key point is that for both countries the Tsunami was a tremendous shock, and made both people and government at all levels aware of how poorly they had been prepared. From the UNISDR's perspective, in terms of building awareness about DRR, the Tsunami itself did in a few minutes what in a 'normal' country might take many years. This makes attribution of strong impacts to UNISDR hugely challenging.

An additional problem in the project design is a confusion about whether it is in fact one project with many components, or sub-projects, or in fact 16 different projects designed to achieve a common objective. Much of the time it is referred to as a single project, with the title '*Evaluation and Strengthening of Early Warning Systems in Countries Affected by the 26 December 2004 Tsunami.*' (The use of the word 'evaluation' in this context is somewhat

puzzling, since only a minority of the projects funded in any way ‘evaluated’ the current EW systems, and most assumed that these needed to be strengthened.) The project has a common Logical Framework, and 5 priority areas of support – core system implementation, integrated risk management, public awareness & education, community-based approaches, and co-ordination.

However there appear to be no logical frameworks covering the individual projects, and this is especially problematic for the larger grants, as it means that **no performance indicators were developed, and no proper systems were ever set up to monitor these projects**. One reason for this was that, according to Flash Appeal rules, the projects had to be completed and the funding spent within a strict timescale, but recruitment of staff with relevant M & E experience was very slow, with the staff member responsible for monitoring only joining at the end of September 2005.³ Given so many different partners, so few UNISDR staff, and such limited time, it was certainly challenging to undertake any kind of monitoring. Reports were certainly submitted, but these normally relate to particular activities, most commonly international meetings, or particular publications.

In all cases the money appears to have been correctly accounted for in accordance with UN rules. But there was no opportunity either to use monitoring data to make course corrections as the work proceeded, and the lack of monitoring also made it more difficult to judge the relative effectiveness of different types of funding for Early Warning. The overwhelming constraint was that there was too little time both for proper planning and appraisal of how the funds should be spent, and once received the funds had to be spent in a period of between 10 and 14 months. An internal, ‘mid-term’ review meeting was conducted in Geneva with partners in November 2005 but by this stage the funding was largely committed, and the review does not appear to have resulted in any significant changes in policy: one fund recipient thought that it would have strengthened the sense in being part of a ‘platform’ if the PPEW had brought the different partners together to discuss how they could support each other’s work at an earlier stage.

In assessing effectiveness we need to distinguish between three types of grants: regional, national, and others.

³ The original deadline for Tsunami Flash Appeal Funding was December 31st 2005. This was later extended to 30 June 2006, but some projects continued into 2007.

2.3 Regional funding

2.3.1. the support for UNESCO/IOC

4 years ago it took us up to 2 hours after an Earthquake to warn people there might be a Tsunami. Now we can get the warnings out in 5 minutes.
(Indonesian official in Meteorological Dept.)

The aim of the support for UNESCO/IOC was *to provide an overall integrated framework for strengthening EW capacities of countries of the IO Region.* Initially much of the funding went into international meetings designed to build up co-operation between different countries in the Indian Ocean Region. Funding was also supplied for the supply of equipment for sea level and for seismic monitoring, as well as 16 expert missions to countries in the region, and the supply of public awareness and outreach products in several languages, like the publication 'Tsunami Teacher.'

All these initiatives are very difficult to evaluate in the apparent absence of any critical monitoring by the UNISDR itself. Clearly much progress was made, especially during 2005. The initial IOTWS Meeting in Paris led to the establishment of an Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS) under UNESCO/IOC. One issue that appears to have never been fully resolved is whether all the 16 countries covered in the assessment missions really need a Tsunami Early Warning System as opposed to improved Early Warning of all hazards that can be forecasted. For many countries in the IO Region tsunamis are such a rare event that it makes little sense in investing in TEW systems; and even if such investments are made in the short term there must be major questions about whether both the technologies and the institutional arrangements will be sustained into future generations, and still be active at the time of any future Tsunami. Partners like the WMO took a broader approach which included improving regional EW for more frequent hazards like tropical cyclones. In general this is the kind of issue on which the UNISDR itself strongly favoured a 'multi-hazard' approach, but initially UNESCO/IOC was strongly focussed on the Tsunami EWS.

During this evaluation a few of those people who had attended the IOC meetings funded by the UNISDR's Flash Appeal questioned the feasibility of ever stabling an overall, integrated framework for Tsunami EW. A more realistic alternative, which is now emerging, is a series of national systems with far better linkages between them, and with clearly identified focal points in each country with responsibility for receiving and disseminating warnings in their own countries. Not all countries in the Indian Ocean Region are willing to share their data. India has many buoys off its coast which measure changes in tides, and this information could be vital to India's neighbours like Sri Lanka, but Sri Lanka feels it is reluctant to share this information due to national defense and security concerns. For Sri Lanka, the prime need is less for a fully integrated system and far more for better 'real time' information about earthquakes and tsunamis in Indonesia, since this is where tsunamis that affect Sri Lanka normally originate. From their perspective the most useful

solution is a bilateral arrangement with Indonesia by which all such information is immediately shared, rather than a fully international system.

A further problem in ensuring complete 'integration' of EW Systems is reported to be a sense of competition between the major nations (e.g. Indonesia, Thailand, & India) and both a technical and political reluctance to integrate systems, which is a key risk never properly addressed in the project design. In particular, decisions made at a technical level, for example by the kind of staff who came together for the international meetings financed from UNISDR Flash Appeal funds, need strong endorsement at the political level if any progress is to be made. A difficulty with the Logical Framework is that the outputs given could be seen as relatively 'easy wins' (eg *'undertake national needs assessments, training & study tours'*) which do not necessarily lead to the desired outcome. The original project design may have underestimated the reluctance of many countries to share information, or to give up their own systems.

However this investment by the UNISDR through UNESCO/IOC has definitely led to some progress. A useful initiative was the programme of assessment missions by an interdisciplinary expert team to 18 countries in the Indian Ocean Region to review these countries' capacity for Early Warning in response to tsunamis and other hazards and to suggest improvements. A positive element of this approach was that the assessments were only undertaken if a request was received from the governments of the countries concerned.

A further initiative taken by the UNISDR in support of national capacities for Early Warning was its initiation, at the Bonn Conference of March 2006, of an Indian Ocean Consortium, which brought together all the key agencies involved in Early Warning. It was not possible in this evaluation to get sufficient evidence to be able to assess the success of this initiative, but this kind of co-ordination and joint advocacy work is clearly of great potential value.

The results of all this activity was that as of 30 September 2007, according to UNESCO/IOC, over 40 out of a projected total of 75 core seismic stations had been installed across the Indian Ocean region with the remainder to be installed progressively up to 2010. Over 40 core network gauges were in operation, compared to 11 before the 2004 tsunami. Coastal sea level gauges have also been installed by some member states to provide data at a national level, but in 2007 these were not available at the global level on the core network.⁴ The system was tested to some extent by the 8.4 magnitude earthquake off Bengkulu, Sumatra on 12th September 2007, the response to which was evaluated by UNESCO/IOC. The conclusion of the evaluation was that that *'progress has been made in the development and implementation of the IOTWS. Some gaps and weaknesses were also identified, mainly at the downstream end of the system where national procedures for issuing tsunami*

⁴ Indian Ocean Tsunami Warning and Mitigation System (IOTWS). 12 September 2007: Indian Ocean Tsunami Event – Post-Event Assessment of IOTWS Performance. IOC Information Series No. 77. UNESCO 2008 (English)

warnings and evacuation orders require further attention in some member states.’ This 2007 evaluation further emphasises the need for a ‘platform approach’ by which improvements are made in all parts of the Indian Ocean EW system, with a greater focus of effort needed at the community level.

Apart from this progress at the technical level, one unexpected positive impact of the different meetings is the establishment of an informal consensus and better personal relationships between different individuals and departments concerned with Early Warning in the Indian Ocean countries. As a result there is now a far greater awareness of the need to share information on potential hazards very rapidly across the whole Indian Ocean Region. At a time of disaster, these informal networks may help fill some of the information gaps that still remain in the formal system

Should the UNISDR have invested roughly one third of its Flash Appeal funds in trying to build up an Indian Ocean-wide TEWS? Both the individual meetings and the whole project could and should have been more rigorously evaluated at a much earlier stage, and insofar as this kind of ‘real time’ evaluation work was not done, an opportunity was missed for the UNISDR to learn from this experience in order to get a better knowledge of the best approaches to regional co-operation in Early Warning: this gap was however partially filled by the IOC’s ‘after action review’ following the far smaller tsunami of September 2007.

A further problem seems to lie in the way in which UNESCO/IOC accounted for the UNISDR’s funding. For an evaluation like this it would be useful to compare the exact costs of different activities in the project, like the different international meetings and the 16 assessment missions, with the outcomes of these activities. In this way one could begin to see which activities absorbed most resources, and which had the greatest impact. However the one page financial statements produced by partners like UNESCO do not provide any evidence about the relative cost of different activities; and large sums are simply stated as having been spent on ‘contractual services’.⁵ While this kind of financial report is all that is officially required under UN procedures, it does not help answer the question of who, either in UNESCO/IOC or in UNISDR had real ‘oversight’ of this expenditure or had a strong interest in finding out what kinds of expenditure produced the strongest outcomes, and why.

Even with these concerns we would not wish to argue that the same funding could clearly have achieved more if applied to ‘last mile’ issues at the community level. A key point is that there were many other agencies funding national and community-level initiatives, and the UNISDR funding, even with the deficiencies noted here, both filled an important gap at the regional and international level and achieved some useful outcomes.

⁵ For example UNESCO/IOC’s 2006 Report states that \$759,418 was spent on ‘contractual services’.

2.3.2. Asian Disaster Preparedness Centre: Improving Community Response to Warnings.

This was a relatively small project implemented by a long standing partner of the UNISDR, with the objective of improving community response to warnings in the Maldives, Myanmar, Sri Lanka, and Thailand. This project illustrates both the strengths and weaknesses of the UNISDR's approach. The grant from the UNISDR was quite small in relation to other funding available to the ADPC for Tsunami-related work: for instance in 2005 the ADPC also had US\$16.5 million from USAID for the promotion of community-based programmes.

With the UNISDR funds the ADPC conducted a series of seminars designed to clarify roles of stakeholders in end-to-end warning, identify gaps in existing warning dissemination system, and recommend improvements. A strength of the initiative was that it covered vulnerable countries like Myanmar and the Maldives which had less exposure to DRR and Early Warning issues than other countries in the Region. The weakness was that, however effective the training, the very modest budget of \$114,000 only really allowed a single training activity in each country. Follow up in the form of specific EW communication activities was reported to be limited, with follow up activities only reported in Myanmar and the Maldives. (In Myanmar the real test of their Early Warning systems would have been Cyclone Nargis in 2008.). In Sri Lanka there were no follow-up activities and it was exceptionally difficult to organise a workshop at all due to so many other competing meetings at both regional and national level.

This experience illustrates the difficulty regional institutions, however expert they may be, if they are required to undertake a programme of workshops in 4 countries in a limited time. The result appears to be 'breadth' rather than 'depth'. A more strategic approach might have allowed the ADPC to focus more in depth, and for a longer time period, on a country like Myanmar where there is still much to be done in improving Early Warning systems, rather than Sri Lanka, where, as this report documents, Early Warning issues were already a high priority and officials were at that time already seriously overstretched. This evaluation concludes that the UNISDR should aim to build longer term relationships, or partnerships, with more national organisations (as it has done to some extent with KOGAMI in Indonesia). **It should then provide these organisations with training budgets which they can use to 'buy in' training from a range of providers, which could include, but should not necessarily be limited to the ADPC.**

2.3.3. Work in Africa

It is difficult to assess the value of the UNISDR's support for work in Africa, which cost \$615,850, as this evaluation did not visit the region. The objective of the project in Africa *was to increase the understanding, knowledge and capacity of African countries in disaster risk reduction through a set of activities which include public awareness, education, advocacy and enhanced community participation.* The East African countries involved in this initiative face many disaster risks, above all conflict, drought and climate change, but

apart from Somalia and Kenya, they were only marginally affected by the Tsunami which was an extremely rare event. Once again this initiative would have benefitted from some kind of Logical Framework that explained in more detail the rationale that lay behind the funding. For instance much of the money went into a regional consultative meeting in Nairobi in October 2005, which was attended by 35 delegates from 10 African countries. The meeting resulted in a list of regional priorities for action, but it is unclear who took responsibility for taking these issues forward, or what kind of *enhanced regional co-operation* resulted from this meeting.⁶

The reported benefit from this project was that it did at least expose a number of East African countries to disaster risk reduction and early warning, but in terms of effective follow up by the PPEW itself, there was a danger that the very small number of staff would quickly become very overstretched in trying to promote these concepts in such a wide range of countries. The PPEW itself saw the Flash Appeal funding as an unusual opportunity to put EW issues more firmly on national agendas. The issue to pursue now is the extent to which these countries can be realistically expected to give much priority to EW given many other competing claims. Would a more tightly focussed programme over a longer period of time, covering less countries, have yielded stronger results?

2.4 Research Programmes

It proved very challenging to evaluate research initiatives, most of which took place three years ago. In respect of the project led by the Institute for Environment and Human Security, United Nations University on *Strengthening Early Warning Capacities in Sri Lanka* most of the project activities were carried out between January – September 2006 and included a wide variety of research projects, workshops, and consultancies in collaboration with the the national level Technical Committee on Disaster Early Warning (TCDEW), with a particular focus on improving preparedness and EW systems in the city of Galle., As part of this project TCDEW members also attended the Third International Early Warning Conference and the Major's Conference on Early Warning held in Bonn at the end of March 2006, and a regional workshop organized by CRED, PPEW and UNU-EHS in Bangkok to disseminate the results of their respective research projects.

The outcomes three years later are difficult to track. We understand that Galle is seen as far better prepared for any future disasters than it was in December 2004, and it seems likely that the work done by the EHS-UNU has contributed to this. In addition the different international conferences and study tours helped widen the knowledge of senior government staff in relation to EW issues. Also one of those involved, Professor Hettiarachchi of Moratuwa University, the current Chairman of the Risk Assessment Working Group of the IOTWC, is now writing *Risk Assessment Guidelines* with German

⁶ See UNISDR Report *Strengthening Tsunami EW System in the Indian Ocean – One Year After* (ISDR 2006)

assistance, based on a modified and simplified version of the Rapid Assessment done in Galle with ISDR funding.

The UNU's detailed mapping of vulnerability in Galle had useful outcomes in the sense of helping both the municipal authorities and the community itself become more aware of the exact tsunami risks faced by different parts of the town. On the other hand it was more difficult for the UNU to achieve much impact at the national level in Sri Lanka due to the pressures faced by the government in 2005, and subsequent major changes both in ministerial portfolios and senior staff responsible for early warning and disaster management. One view expressed by senior government staff was that the activities implemented with the UNU-EHS could have been better coordinated with the relevant line ministries and key local institutions, and there was a concern expressed that the reports had not been widely distributed in Sri Lanka.

One lesson is that this kind of research work is likely to have a more lasting impact if the UNU or similar international research organisations is able to work through a local institution, which can maintain its influence even when the political context changes.⁷ A further advantage of such an arrangement is that it would help develop the capacity of national universities and research institutions in relation to vulnerability analysis and disaster preparedness. This has certainly happened to some extent through the work funded through the UNU, but if similar funding to the Flash Appeal comes available in future there is a case for the UNU to consider a longer term programme of collaboration with national institutions with expertise in EW and DRR, like the Bandung Institute of Technology in Indonesia.

The study by CRED, funded through the Flash Appeal, on "Risk Factors for Mortality and Injury: Post-Tsunami Epidemiological Findings from Tamil Nadu" was able to provide scientific evidence about the vulnerability of coastal populations to support what many agencies had been saying on the basis of more anecdotal evidence. This report showed how many more women than men had died in the Tsunami, and showed that their vulnerability could be reduced by providing swimming lessons, improvements in local housing and the provision of multi-purpose emergency shelters. This kind of evidence was clearly useful at the international level, but it was not possible within the short timescale of the Flash Appeal, for the UNISDR to follow up the study to see whether or not it had an influence on the policies of governments in the Indian Ocean Region.

The UNISDR also gave a grant of \$56,000 to the University of Geneva for a TEWIS to develop an on-line data base, for which a link is provided on the ISDR-PPEW website. However as this link no longer appears to be operational it was impossible to view the contents as part of this evaluation.

⁷ See Part II of this report which describes these changes in detail.

2.5 Publications

At least 33 different publications were produced with Tsunami Flash Appeal funding, the vast majority (72%) in English only. Generally the key publications are appreciated. However while a separate, more specialist evaluation is needed on the UNISDR's publications, during our work at country level there was a request for more materials written in local languages, contextualised to different local cultures, which cover the locally relevant issues relating to the last mile concept, how warnings will be disseminated to communities, evacuation plans, including detailed SOPs for the most vulnerable areas.

It may be worth pointing out that many other organisations which started off producing publications free of cost, now charge for these publications. This is not just for financial reasons, but because people tend to value and read publications for which they have to pay. In addition even charging modest prices that do not cover the full costs of production will provide better feedback on which publications are the most popular: at present it is not clear what criteria the UNISDR uses when deciding whether or not to commission or publish a particular piece of work, and it is not clear how, if at all, each the impact of each publication is evaluated.

2.6 Effectiveness of National Programmes

The national programmes funded by the UNISDR have largely had the positive outcomes, and are characterized in both Sri Lanka and Indonesia by strong commitment both from the UN partners concerned, the implementing partners, and other stakeholders.

2.6.1 UNDP: Strengthening Early Warning Systems in Sri Lanka

The project started at a time when the Ministry of Disaster Management and Human Rights was already receiving offers of funding from many multilateral and bilateral agencies, and in the light of these other offers the work plan had to be adjusted to avoid duplication of activities. The focus therefore shifted away from broader Early Warning issues to a specific project related to landslide and flood early warning, primarily in Ratnapura district. The project included a range of partners including the Department of Meteorology, the Landslides Studies and Services Division (LSSD) of the National Building and Research Organization (NBRO), Department of Irrigation, the Police, and training institutions such as ITC-Netherlands, which trained three scientists attached to the NBRO.

A national workshop held in April 2007 supported by the project clarified the roles and responsibilities of different technical agencies responsible for early warning message generation and dissemination in relation to flooding and related landslides. This resulted in an agreed set of Standard Operation Procedures (SOPs) on the responsibilities of each technical agency: the

DMC's 24/7 Emergency Operations Centre presently functions in accordance with these SOPs.

The innovative feature of this project has been the establishment of 'real time' landslide monitoring based on real time precipitation measurements. Five automatic rain gauges were manufactured locally by the Industrial Technology Institute (ITI) of Sri Lanka and installed in five of the most vulnerable Divisional Secretariat divisions of Ratnapura district. Real time rainfall data is collected and automatically fed into the dynamic landslide simulation model which has enabled the NBRO to issue real time landslide forecasts and analyse potential impacts. The NBRO has issued 13 successful early warnings using the data collected before the end of the project period.

Communities in 5 Villages in the district of Ratnapura (a landslide prone district), where the automatic rain gauges were installed, were trained and their capacities were built to make informed decisions and protect themselves based on the rainfall readings and the land slide zone maps developed and provided by the NBRO. The project has also financed the purchase of public address systems for the police both in Ratnapura and other areas frequently affected by landslides and floods. The public address systems were used extensively in recent early warning disseminations such as the tsunami early warning and evacuation on 12th September 2007.

ii) Longer term outcomes

This appears to be a successful project where small initiatives have gone a long way. Firstly it helped to form and strengthen the partnership between government/semi government agencies (the DMC, Department of Meteorology the NBRO, Industrial Technology Institute, district, divisional and village level government administration), UN organisations (UNDP & UN ISDR). A further positive feature of this project is the participation of the private sector: Dialog GSM, a privately owned telecommunications operator linked up with DMC and NBRO to communicate the data collected by the automatic weather stations through SMS, free of charge.

Secondly the project was community-centered and promoted community consultation and participation, including that of local religious leaders. It helped all the stakeholders especially the key government/semi-government institutions and UN organizations to better understand the issues at the community level and get their feedback to fine-tune project activities. Thirdly it strengthened the capacity for early warning forecasting and dissemination in Sri Lanka.

The specific achievements are that:

- The training has enabled NBRO to develop landslide simulation models to predict landslides based on landscape, land use and climatic data. Currently the organization is working with the Department of Survey to get land use data in areas where it is not available. The improved capability of NBRO for landslide modeling enabled it not only to issue early warnings for timely evacuations on landslide areas but also to assist development planning by simulating the potential landslide

hazards likely to occur due to land use modifications as a result of major development and infrastructure projects. This appears to be a long term enhancement of the NBRO's capacity.

- The project trained and motivated communities in 5 villages in Ratnapura to own and lead early warning and response activities in their villages. These groups are assisting other areas in the district affected by landslides. Local warning systems delivered to other areas have enabled communities to respond better for warning and evacuation.
- There is now greater collaboration of the police personnel in early warning efforts in the areas prone to natural hazards.

2.6.2 UNESCO-Indonesia

The overall objective of the project the UNISDR funded through UNESCO was to improve the preparedness at a community level for natural and human disasters, with a special emphasis on earthquakes and tsunamis. It undertook a Community Based Disaster Preparedness (CBDP) in a number of sites in order to establish the extent to which communities understood, and were prepared for, disasters, and as a follow up it has also supported initiatives on community based disaster preparedness in these same areas.

The project brought together a wide range of stakeholders from Government, research organisations, and NGOs and collectively this group defined five critical parameters for community preparedness including (1) Knowledge-Attitude-Practices regarding disaster risk; (2) Policy Statement & Legal Products; (3) Emergency Planning; (4) Warning System; (5) Resource Mobilization Capacity. Indicators were worked out for each parameter and were field tested in three sites (Aceh, Bengkulu, and Padang.)

There are acknowledged to have been initial problems in developing the preparedness assessment methodology. The lead agency in this process, LIPI was perceived as being too rigid and insufficiently open to ideas from others, including many practitioners, who had better experience of disaster reduction and disaster preparedness issues. The tension was that LIPI saw this as a research project over which it expected to retain control, and other stakeholders brought in to support the project sometimes felt marginalised. As a result it took time to agree the indicators and develop a methodology for field data collection.

The assessment tool that has now developed has a reasonably strong scientific basis, but for practical purposes it needs to be reshaped into a more "user friendly" assessment tool which can be used by various parties to measure community preparedness in a more systematic and straightforward manner. Some questions to assess various indicators have also to be reviewed and adjusted to be generic and universal enough to be used in different cultural contexts. The objective is to make the tool useful for mapping how community preparedness changes over time in different parts of the country, and what is required for this is a far smaller document containing the assessment tool with simple guidelines on how to use it. The assessment tool could also make greater use of the HFA principles and indicators in order

to be in line with the global commitment on disaster risk reduction actions.

If the UNISDR is to fund similar initiatives in the future, it needs to ensure that the implementing agency provides a clearer lead from the start: in particular it must maintain a strong focus on such a project providing real benefits at the community level: it must not be allowed to become just a research project under the control of a single research institution. Secondly our conclusion was that the initial time period (3 months, extended later to 5 months) was too short to achieve the expected outcomes, which were to improve community preparedness in the pilot sites selected in high-risk areas; and improve understanding of the links between TEWS and CBDP. It takes time to develop the initial model, field test it, improve it, finalise and document the work, and disseminate it as widely as possible.

The evaluation team was able to visit Padang and discuss the work undertaken by the local NGO KOGAMI, working in close co-operation with the local Municipal authorities and community groups. KOGAMI is a local NGO which originated from the need to improve tsunami preparedness in the city of Padang. It relies on a network of volunteers and has been very active in a number of community awareness activities, including the development of escape routes as well as the organization of evacuation drills.

Of the three areas surveyed in the UNESCO project, Padang was the one where communities were felt to be the 'best prepared' for natural disasters, though the City authorities themselves were felt to be far better prepared than those at lower levels.

Though the UNISDR's Flash Appeal funding could not be used after June 30 2006, UNESCO has been able to access other funds, (including EU AIDCO funding secured through the UNISDR) to continue activities in 2007/8. These include a project in support of disaster preparedness for school communities.

Even while recognising some of the constraints outlined above this project appears to have a number of positive features:

- It brought together a number of different stakeholders with expertise in Disaster Preparedness and EW,
- Though the methodology may be a little over-elaborate, it can be repeated in the same areas to show improvements in knowledge, attitudes, and practice in relation to communities' preparedness for disasters.
- It has had strong monitoring, which is able, for example, to show how the preparedness of schools has improved as a result of the capacity building efforts undertaken.
- It has helped encourage positive relationships, and what can indeed be called a 'partnership' between KOGAMI and the City authorities in Padang.
- This co-operation between KOGAMI and the City authorities led to the first-ever detailed SOP on disaster management developed at a municipality level in Indonesia

- Unusually UNESCO was allowed to use unspent Flash Appeal funds to continue to support DRR work in schools into 2007. From 2008 onwards the UNISDR has been able to continue the work using EU AIDCO funding. Thus greater sustainability has been achieved than with other Flash Appeal projects.

However, for all these achievements a key question that arises is the extent to which the UNISDR has been able to promote and disseminate the disaster preparedness methodology developed in the UNESCO-implemented project in Indonesia. This would seem a key need given its regional commitment to improving knowledge management in relation to DRR.

3. Conclusions

The question posed at the start of this evaluation was whether it was the correct decision for the UNISDR to become involved in disbursing Flash Appeal funding, and whether this could be seen as a diversion from its key mission to ensure that the principles of the Hyogo Framework became incorporated in as many as possible of the Tsunami reconstruction programmes. Our conclusion is that this funding was a real opportunity, rather than just a diversion, but that the programme tried to cover too many partners and a huge geographical area, and it suffered from relatively weak planning, monitoring, and evaluation. While the logical framework was a useful starting point, it needed to be supplemented with individual logical frameworks at least for all the major grants.

For example in retrospect from 2005-6 there needed to be stronger monitoring of the 26 training and other events that were held by ISDR or partners in this period using Flash Appeal funding. This monitoring system would have revealed not only the extent to which the different events met participants' expectations, but also the extent to which they contributed to the outputs and outcomes defined in the Log Frame.

3.1 Sustainability of outcomes achieved

This evaluation has found that sustainability in Preparedness and Early Warning is not too much of an issue at national level given the strong investment by both SL and Indonesia in DRR in general and EW in particular: we would assume this sustainability is far more of an issue in poorer countries in the Region like Myanmar which both have less resources of their own and less engagement from international donors. In the case of Sri Lanka, in the UNDP project there has been a useful investment in key national institutions like the NBRO, and the initiatives implemented at grass root level appear to be owned by the community and as such appear sustainable. In both Sri Lanka and Indonesia a constraint on sustainability may well be the need to ensure continued core funding for groups like KOGAMI and other local NGOs at a time when for different reasons donors may reduce their contributions to countries like which are now considered 'middle income' and hence of lower priority for donors.

In its internal review meeting of November 2005 the UNISDR reported that *Sustainability has been emphasized as an essential target yet difficult to ensure through the current project due to limitation of resources, timeframe, and the immediate emphasis on infrastructure*. While this evaluation largely endorses this earlier judgement, especially in respect of overall regional co-operation, three years later it does appear a little pessimistic in the light of the institutional progress made at the national level, at least in Indonesia and Sri Lanka. This progress is described in detail in Appendix I of this evaluation.

One issue (referred to in the summary of the same Review Meeting of November 2005) which may reduce sustainability is the lack of clarity of project scope, and in particular the ambiguity about whether through this funding the UNISDR was hoping to achieve a strong Early Warning System covering all hazards, or whether it wanted to retain the focus on an end-to-end EW system for tsunamis alone. As argued above, only in Indonesia is it really feasible to maintain a strong earthquake and tsunami focus in Early Warning, and in the other countries in the Region EW and Disaster Preparedness systems will only be sustainable if they cover most of the hazards (for example floods, cyclones, and droughts) that both people and governments face every year rather than tsunamis which may come only once in a century. While the UNISDR staff involved in the Flash Appeal were clear about the need for a 'multi-hazard' approach, it seems that not all the donors agreed, and the documentation on this point still remains somewhat ambiguous.

By mid-2006 the UNISDR was sufficiently concerned about sustainability to prepare a strategy document.⁸ This argued that while *'the Flash Appeal initiative has provided a sound basis for strengthening tsunami early warning systems of countries in the Indian Ocean region, much more work remains to be done to build the long-term sustained national capacities for resilience to tsunamis and to ensure the integration of these systems in development and disaster risk reduction strategies'*. This evaluation would broadly agree with this assessment.

3.2 Gaps

In addition to reviewing the effectiveness of the actual grants made, it may be useful to point out gaps in the coverage and areas that this funding might have missed.

A general point for both Sri Lanka and Indonesia is that the UNISDR could probably have done more to ensure that DRR concepts had a higher profile in the reconstruction work that took place after the Tsunami. Both countries faced major constraints in this respect, and both had to cope with what is sometimes described as a 'second tsunami' – a rapid influx of aid agencies of all types, the majority of whom had little experience of recovery operations on this scale. For the next three years at least there was tremendous pressure both on governments and donor agencies to rebuild the infrastructure and construct housing. Less attention was given to DRR issues, and in Sri Lanka

⁸ *Proposed Strategy for Building Resilience to Tsunamis in the Indian Ocean 2006-2008*

DRR issues became associated with the Government's attempt, throughout 2005, to set up a buffer-zone along the coast in which no development of any kind would be allowed within a certain distance from the sea.⁹ As one of the TEC Reports argued, the issue of buffer zones meant that *'risk reduction became an obstacle to both relief and development, rather than an inherent component of both'*.¹⁰ In Indonesia an opportunity may have been missed to ensure that the Reconstruction Authority in Aceh, BRR, introduced DRR concepts as a central part of all its reconstruction efforts; and probably more could have been done by the many agencies working in Aceh to build more consciousness about disaster preparedness at the community level, especially in the light of the UNISDR funded UNESCO/LIPI survey that people in Aceh had far less awareness about preparedness than communities surveyed in other coastal areas.

A second gap noted in the country visits was probably not evident in 2005 but is emerging now. This relates to the overlapping mandates of government ministries and institutions in relation to EW and DRM, with the attendant dangers of duplication of efforts or lack of ownership of some of the functions. As described in more detail in the country reports in Appendix 1, in Sri Lanka, the DMC could take a stronger co-ordination role; and similarly in Indonesia, there are at least 4 different government agencies involved (BMG, LIPI, BNPB, and RISTEK) with RISTEK meant to provide overall technical leadership. There are also issues, especially in Indonesia, about co-ordinating the many different bilateral and multilateral donors now involved or seeking to become involved in EW and DRR issues. UNISDR and OCHA could probably play a useful role in advising governments on the most effective institutional structure to co-ordinate all these efforts.

Finally there still appears to be a continuing need for more relevant materials related to EW dissemination and awareness raising for communities in local languages. UNESCO has certainly started to do this with the UNISDR's support in Indonesia, but there seems to be a strong need for more very simple and brief booklets and pamphlets in a wider variety of local languages in all countries in the region.

3.3 Relevance of UNISDR.

There appear to be many overlapping activities within the UN system in terms of responsibility for DRR and Early Warning, especially between UNDP, UNESCO, and UNISDR. In addition most national governments, bilateral donors and INGOs are giving priority to these issues, especially in the areas affected by the 2004 Tsunami. To some extent this reflects a degree of success in mainstreaming the ideas of the Hyogo Framework, to which the UNISDR itself has made a significant contribution. But it also poses a challenge for the UNISDR in the sense that agencies like UNDP, and especially the BCPR, not only have significantly more resources for DRR, but also appear to have stronger project management systems.

⁹ This was originally 100 metres, later revised to 200 metres.

¹⁰ LRRD Study - Tsunami Evaluation Coalition – July 2006

Finally a useful lesson for the UNISDR from the experience of the last four years is the need for it to focus on the **strategic** part of its mandate. This evaluation has tried to show how, when countries suffer massive natural disasters like the Tsunami, and when there is a such a huge donor response, the UNISDR needs to be involved more at a strategic and advisory level, rather than in project implementation: its facilitation of the Indian Ocean Consortium in 2006 was one positive example of this strategic approach. It also needs to focus its quite limited resources on the countries at risk from disasters that are less well covered by other UN and donor agencies, and avoid interventions like some of those evaluated here, which could have easily been funded by other donors.

3.4 Progress made by UNISDR since 2005

In the light of its Flash Appeal experience, in February 2007 UNISDR established a Project Review Committee with a mandate to review all proposals that would involve the ISDR Secretariat in project management responsibilities. In the AIDCO (EU) project which succeeded the Flash Appeal, the Secretariat has followed a more rigorous and better documented process of screening partners and approving proposals for funding, and the evaluation due to be undertaken in 2009 should be able to assess the success of these measures. Since March 2006 a Management Oversight Board has been established to assist the USG for Humanitarian Affairs to oversee the ISDR Secretariat and provide strategic guidance to the ISDR system: the extent to which these changes have been successful is beyond the scope of this evaluation.

In conclusion this evaluation simply underlines what is already very well known – that effective work in DRR and EW requires long term funding. Though the Flash Appeal funds was useful in promoting Early Warning systems at different levels, this kind of funding is primarily designed for relief and reconstruction and has to be spent within a limited timescale within which it is unrealistic to expect major DRR impacts. This suggests an urgent need for the UNISDR to seek more ‘untied’, longer term donor funding. The recommendations that follow focus on the major **opportunity** for the UNISDR to make greater use of monitoring and evaluation both for purposes of accountability and to gather more robust evidence about the impact of its efforts. It is this evidence which should in the long term help generate the kind of long-term funding that is needed.

4. Recommendations ¹¹

1. In order to promote both stronger accountability and learning, although there have been some improvements since 2005, the UNISDR needs to introduce both a stronger monitoring and evaluation ‘culture’ and a stronger M & E system throughout the organisation covering all major

¹¹ These recommendations are given in order of priority.

activities – project work, advocacy, research, and training. (Action: MOB and Secretariat)

2. This strengthened M & E system needs to include tighter monitoring of each event or conference, more 'real time' evaluations and 'after action' Reviews, and more evaluations both of the impact of particular publications, and of particular advocacy campaigns. (Action: Secretariat).
3. In order to provide leadership in M & E, the UNISDR should consider recruiting at least one senior member of staff with strong evaluation expertise in Geneva, supported as necessary by staff with similar expertise in the regional offices.(Action: Secretariat)
4. As in other UN agencies, the UNISDR should ensure that all major evaluations are reviewed by the Management Oversight Board and are made publicly available. (Action: MOB & Secretariat)
5. The UNISDR needs to have a clear research and communications strategy, more focused on building national capacity for EW & DRR. This strategy needs to link research with communications and advocacy at different levels. Any individual research that is commissioned needs to both be consistent with, and support, this strategy. (Action: Secretariat)
6. While maintaining strong links with its UN system partners like the UNU the UNISDR needs to give greater priority to national and local organizations in the conceptualization, design and implementation of any research so that there will be greater national ownership of these efforts. Done in this way, there should be greater sustainability; the new frameworks and tools developed, and lessons learned will all be available in the country and there is a far greater chance they will be utilized in future. (Action: Secretariat)
7. Rather than sponsor regional institutions like the ADPC directly, the UNISDR should provide its national partners with training budgets which they can use to 'buy in' training from a range of providers, including regional institutions. (Action: Secretariat & Regional Offices).

APPENDIX 1: COUNTRY STUDIES

PART 1: SRI LANKA

Introduction:

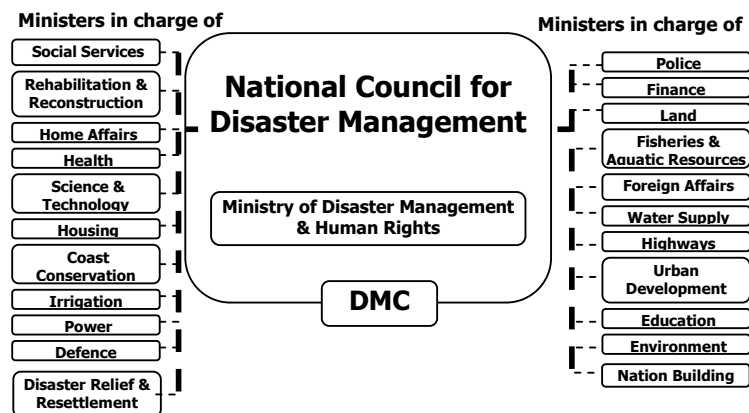
Before December 2004 the subject of disaster management and early warning received little or no importance in the history of Sri Lanka. Neither the disaster mitigation plan of 1991 nor the 2002-National Plan for Disaster Management developed by the National Disaster Relief Centre (then known as National Disaster Management Centre) received any recognition. The National Disaster Counter measures Bill which was developed in 2002 continued to remain in the legislative queue for many years. When the Tsunami struck the country there was no legislation, policy or guidelines to handle post disaster recovery and disaster mitigation. In this setting, the subject of early warning too was not given any weight, apart from flood warnings in limited areas.

1. Institutions involved in DRM and EW Activities in Sri Lanka

Following the Tsunami the GoSL set up an interim bi-partisan committee, the "Parliament Select Committee on Natural Disasters" to guide the government in legislative and policy efforts. The result was the *Sri Lanka Disaster Management Act No. 13 of 2005* which provides for a framework for disaster risk management in Sri Lanka and addresses disaster management (DM) holistically, leading to a policy shift from response based mechanisms to a proactive approach toward DRM; and for establishment of Institutional and Legislative systems for a 'legal' framework for DRM. The act paved the way for the establishment of a National Council for Disaster Management (NCDM), a high level body chaired by the President and the Ministry of Disaster Management and Human Rights, which was the focal point for DRR and related activities. The Disaster Management Center (DMC) operates under this Ministry.

The Parliament Select Committee in its report has recommended a five year program to strengthen the disaster risk management system including establishment of a country-wide Early Warning System (EWS).

Institutional Framework for Disaster Management

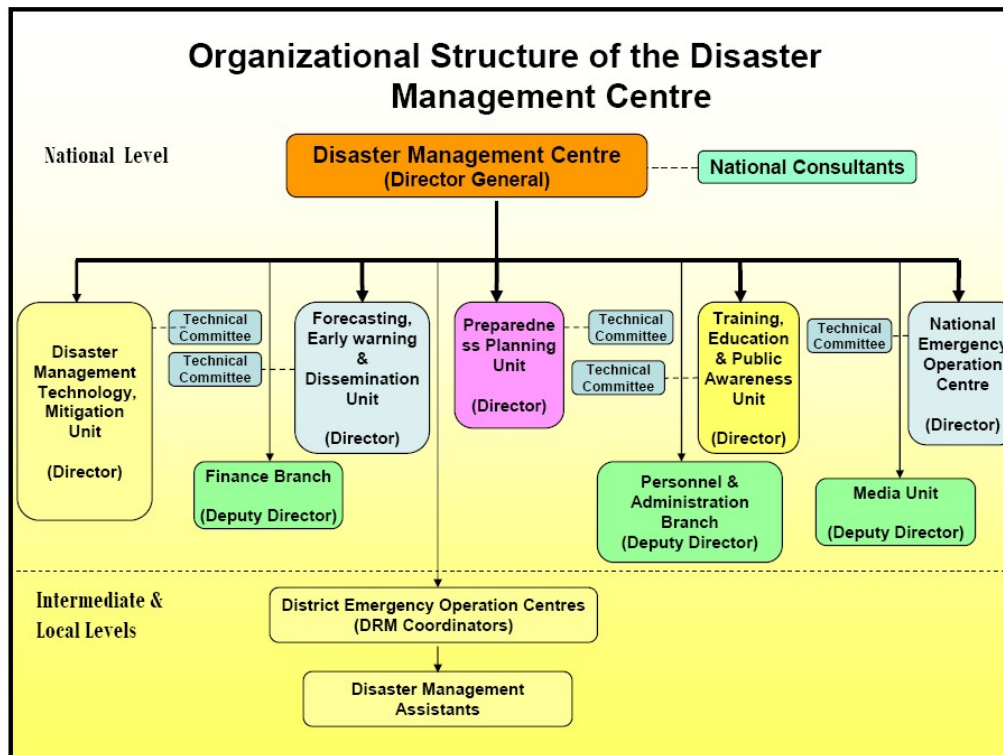


The institutional framework helps to understand the number of institutions involved.

Ministry of Disaster Management and Human Rights: As per the act a new Ministry was formed in 2005. Effective prevention and mitigation of natural and man-made disasters is the main function.

National Council for Disaster Management (NCDM): The council comprises of all relevant ministries and departments and was set up to oversee all aspects of DRR advising the Cabinet of Ministers on potential and actual disasters and recommending allocation of funds from the Reconstruction and Rehabilitation Fund. It is also the governing body of the Disaster Management Centre (DMC). It monitors the implementation of the National Disaster Management Plan and gives guidance for the operation of the DMC.

Disaster Management Centre (DMC): DMC has responsibilities to monitor and coordinate all aspects of natural disasters with proactive attitudes as provided for in the Act.



It assists NCDM with planning and, ensures that disaster management plans prepared by ministries, government departments, or public corporations conform to the National Disaster Management Plan. The Centre coordinates with government, NGOs, district and division secretaries, issuing instructions and guidelines on disaster management activities and their implementation. The 24/7 National Emergency Operations Centre is housed here and serves as the *early warning dissemination centre*.

DMC is assisted by many donors. *UNESCAP* is currently involved in setting up a EW network in the districts of Galle and Batticaloa. This assistance is intended to reduce the loan taken from *Netherlands* for similar purpose. This project will establish a EW

network by erecting Tsunami towers, UHF / VHS radio network etc. It focuses on capacity building too.

The Japanese *ADRC* is also providing rain gauges to monitor landslides and seek community involvement to make evacuation plans etc. *UNDP* will procure 1000 manual rain gauges to disaster prone areas so that the community could make informed decisions on evacuation. *ADPC* is supporting a community based project.

JICA is involved in a comprehensive study of DM for 17 communities in 7 districts. The Grama Niladari is expected to play a key role in EW message dissemination. Community drills have been conducted in areas experiencing landslides, floods and coastal areas which were affected by Tsunami. The *Italian government* is supporting a similar initiative as *JICA* in Gampola and Kalutara district (Matugama area). ISDR funding has helped the DMC in setting up automated rain gauges in the district of Ratnapura.

Department of Meteorology (DoM): DoM was first established in 1948 under the Ministry of Science and Technology and is now placed under the Ministry of Disaster Management and Human Rights. It has been designated as the lead agency for tsunami early warning and its current activities include provision of meteorological, hydrometeorological, agrometeorological, climatological, and astronomical (limited) services as well as related research. DoM is the key actor in the DMC's Early Warning Unit and operates 24/7. It collaborates with the IOC and other projects for tsunami early warning. Most of the weather data collection which will serve the multi-hazard system originates in-country with the DoM. The department provides information, forecasts, advisories, and warnings on floods, tropical cyclones, and drought. In the recent years the DoM has increased its capacity to give flood and weather warnings to selected communities.

Prior to the Tsunami the DoM had zero capacity in terms of EWS. However after Tsunami, many donors assisted the government institutions involved in disaster management and DRR. UNISDR was the first agency to expose senior officials to the latest ideas, equipment and systems in the EW field. The knowledge gained thus helped the department to deliver its mandate much more efficiently and confidently. The automated rain gauges installed in landslide prone areas are an example of how the DoM, National Building Research Organization (NBRO) and Industrial Technology Institute (ITI) worked together to provide warning to the community. The usefulness of this technology has enabled these institutions to design an automated weather station which sends data to a website. The data is analyzed and appropriate information is then provided to farmers and fishermen. The ITI has made use of sensor technology to improve the design and working of the equipment.

Irrigation Department, which comes under the Ministry of Agriculture, Livestock, Lands, and Irrigation, is responsible for flood forecasting, monitoring, warning and control. The Department ensures sustainable utilization of water resources in consideration of catchment area conservation needs and competing water demands. River levels are monitored by it and provide warning on the flooding potential on the Kelani, Kalu, Gin, Nilwala, and Mahaweli rivers and 103 smaller rivers. River level data are maintained. *JICA* is currently helping the department to improve EW efforts. The automated rain gauges developed with ISDR assistance will be used in areas where rain water is measured. Other institutions responsible for monitoring and mapping flood prone areas downstream of reservoirs and dams are the **Mahaweli Authority of Sri Lanka**, the **Ceylon Electricity Board** and the **National Water Supply and Drainage Board**.

National Building Research Organisation (NBRO): NBRO is a semi-government institution, which focuses on landslide risk identification and mitigation. It identifies landslide-prone areas, conducts mapping, develops and trains on guidelines and engineering practices for landslide mitigation, and promotes public awareness of landslide risk and vulnerability. The Landslide Hazard Mapping Project undertook landslide mapping from 1991-96 with the goals of delivering a complete set of landslide hazard maps at a scale of 1:10,000 for districts of Badulla and Nuwara Eliya, assessing the socio-economic impact of landslides while incorporating the risks into land use planning and creating public awareness of the risks. This project was largely successful although the maps were not widely used due to lack of awareness of the potential users and lack of regulations imposing their mandatory use in land management and planning.¹ This project established a database and a manual. The project was later extended to include Ratnapura, Kegalle, Kandy and Matale. Mapping of Matara, Galle and Hambantota is underway. The maps have been incorporated into the National Physical Planning Department's fragile areas guidelines and in the Ministry of Agriculture's draft land use policy.

Geological Survey and Mines Bureau (GSMB): It was formerly known as the Geological Survey Department. The bureau undertakes geological investigations, seismic activity monitoring, geological research and provides geological consultancy services.

Prior to the tsunami the Bureau had only one seismological station located at Pallekelle. It was increased to 3 by establishing 2 more in Hakmana and Auradhapura. Discussions with some officials indicated that the country does not need separate stations if one of the neighbouring countries could share data.

National Aquatic Resources, Research and Development Agency (NARA): NARA was established in 1981. It promotes and conducts research in oceanography, hydrography, marine biological resources, inland aquatic resources and aquaculture, fish technology, post harvest, and environmental science. Its GIS and remote sensing, and extension divisions provide support.

NARA has 3 sea level monitoring stations in Colombo, Trincomalee and Kirinda. These stations measure sea level variations every 15 minutes and transmit via satellite. NARA has a 24/7 monitoring centre. NARA is using a software developed by Proudman Oceanographic Laboratory. If there is a huge variation in the sea level it sends SMS alerts to specified telephone numbers. The agency also has an Ocean Observation and Forecasting System.

Prior to the tsunami NARA did not have any equipment or systems to monitor the ocean except for the tide gauges which could be used to monitor water levels. The agency did not have expertise in EW field. After tsunami, BHS (Federal Hydrographic Office – Germany), University of Hawaii-Sea Level Centre and Proudman Oceanographic Laboratory, provided equipment and technical training to NARA. This enabled the organization to have real time data for analysis.

Ministry of Fisheries and Aquatic Resources: The Ministry operates a warning dissemination system in all fishery harbors. Within the Ministry, the **Coast Conservation Department** develops the coastal management plan, and regulates and oversees all development activities in the coastal zone.

Center for Housing Planning and Building (CHPB): It is in the Ministry of Housing and Construction Industry and conducts disaster mitigation training for government and other actors. The CHPB has developed emergency management and response

¹ Karunaratne, Geethi, "Sri Lankan experience in Natural Disaster Mitigation", 2001.

plans for Ratnapura and Kandy Municipal Councils, and local authorities along the Kelani River from Awisawella to Colombo. The Sri Lankan Multi-Hazard Disaster Mitigation Project (SLUMDMP) was managed by it, involving the NBRO and the Urban Development Authority as well as the regional ADPC, and produced digitally integrated multi-hazard maps in three selected localities combining flood mapping, landslide hazard mapping, and disturbance from gem mining overlaid on human settlement and infrastructure maps. An Environmental Map Workbook was developed for the purpose of revising the land use plan and contained a database for the targeted areas.

Urban Development Authority undertakes flood hazard zone mapping with information provided by the Irrigation Department

National Physical Planning Department: It operates under the Ministry of Urban Development and Water Supply and integrates information on natural disaster prone areas and disaster mitigation aspects into the planning process. It works with government agencies and local government bodies under the Town and Country Planning Ordinance No. 13.

National Science Foundation (NSF): It is under the Ministry of Science and Technology and coordinates research and public awareness through its Committee for Science and Technology Initiatives for Disaster Mitigation and Management.

Ministry of Health (MoH): MoH has a well established epidemiological surveillance network and is able to make a prompt response to potential epidemics.

Police Department: serves as a channel for warning dissemination utilizing a high frequency radio system.

Sri Lanka Navy provides decision-making support, coordination, and information dissemination for tsunami early warning

PART 2: INDONESIA: Current Status of Indonesian Tsunami Early Warning System

1.0 Background and Introduction

This is a preliminary survey result of the current status of the Indonesian Tsunami Early Warning System (Ina-TEWS) is reported here by the National Consultant, based on secondary documents available at this moment. The report can be used as a basis for further evaluation of the benefits brought up by the Tsunami Flash Appeal Initiative.

2.0 Establishment of the Indonesian Tsunami Early Warning System (Ina-TEWS)

The 24 December, 2004 earthquake and tsunami disaster that occurred in Nangroe Aceh Darussalam and North Sumatera, which have caused many sufferings from more than 200.000 loss of life and damages to properties and infrastructures, and causing disruption to social economic activities as well as the loss of livelihoods to many people, has been considered as a serious “wake-up” call to many people in Indonesia, a country prone to earthquakes

as well as tsunamis, due to its geodynamic position within the seismo-tectonic plate convergence system of Indo-Australian, Pacific and Eurasian plates. With its second longest coastline in the world, Indonesian coastal areas are subject to high tsunami risk. According to Indonesian historical tsunami records, a total of 163 tsunamis caused by earthquake occurred in the region for a period from year 1801 to 2006 (RISTEK, 2008).

The Indonesian tsunami early warning system (Ina-TEWS) was prompted by the event as well as by the pressures from the national as well as international communities, and materialized with the issuance of a Decree from the Coordinating Minister for People's Welfare (MENKOKESRA). This decree stated that the Ministry of Research and Technology was appointed as the focal-point of the Ina-TEWS development and its responsibility is to coordinate technical and operational activities of Ina-TEWS development with all agencies and institutions members assigned by the Decree, including all interested international-bilateral agencies willing to contribute to the process. The legal framework for the early warning system can be found in the new Indonesian law on disaster management, the Act No. 24 on Disaster Management, which was enacted in April 2007.

3.0 Institutional Arrangements

The Coordinating Ministry for People's Welfare (MENKOKESRA) is responsible for the legal aspect of the Ina TEWS development team. The ministry is also responsible to coordinate with all relevant organizations in the development of Ina TEWS.

One of the roles of the Ministry of Research and Technology (Ristek) is to adapt the highly sophisticated technology of the Ina TEWS into the Indonesian culture. The Agency for Meteorology, Climatology and Geophysics (BMKG) is responsible for the seismic monitoring system. Before the December 2004 event, BMKG (previously named BMG) had already operating 30 geophysical stations and 5 regional centers equipped with 27 remote seismic sensors. To accelerate the installations of broadband seismic sensors, BMKG set up most of the seismic sensors in BMKG stations, with the understanding that a tsunami will normally only be generated by large earthquakes.

The Agency for the Assessment and Application of Technology (BPPT) is responsible for the deployment and operation of buoys from which the data is transmitted to BMKG and to BPPT. This agency operates the research vessels Baruna Jaya needed for installation, maintenance, and relocating the buoys. BPPT is also responsible for tsunami run-up modeling.

The National Coordinating Agency for Survey and Mapping (Bakosurtanal) is responsible for installing and operating tide gauges and GPS networks. Before the earthquake and tsunami of December 2004, Bakosurtanal has already been operating 60 tide gauges stations consisting of 35 analogue and 25 digital instruments.

The Indonesian Institute of Sciences (LIPI) is responsible for preparing modules for public awareness and preparedness. LIPI has conducted several field surveys to socialize and inform the local government and community about earthquake generated tsunami hazard. It will also be responsible for conducting research in geo-science including tsunami hazard.

The Ministry of Communication and Information Technology (Depkominfo) is responsible for coordinating all mass media and telecommunications providers, so its role is very important in the warning dissemination process.

The National Disaster Management Agency (BNPB) established by the Presidential Decree No 8 year 2008 is the focal point for all activities related to disaster mitigation, preparedness, emergency response, rehabilitation and reconstruction in the country, including dissemination of the tsunami early warning.

The Ministry of Home Affairs (Mendagri) has the responsibility of coordinating the local governments in the country, and the programs for public education, public awareness and preparedness are coordinated through this ministry.

The National Police Force (POLRI) has a very good communication network linking the headquarters to the Regional police (POLDA) down the local police commands and units and stations (POLRES/POLTABES/POLSEK). These facilities are used for sending tsunami warnings to the areas at risk from the predicted tsunami hazard.

Institut Teknologi Bandung (ITB), the first engineering and science education institution in Indonesia which was established in 1920, is responsible for prepare the tsunami database that will be installed at the national warning center in BMKG. ITB is also responsible for the preparation and development of the human resources needed to sustain Ina TEWS in the future.

Figure 2 presents a summary of the institutional framework of the Ina-TEWS development, while Figure 3 presents the concept of the institutional arrangement of the future operation and development of tsunami early warning and mitigation system.

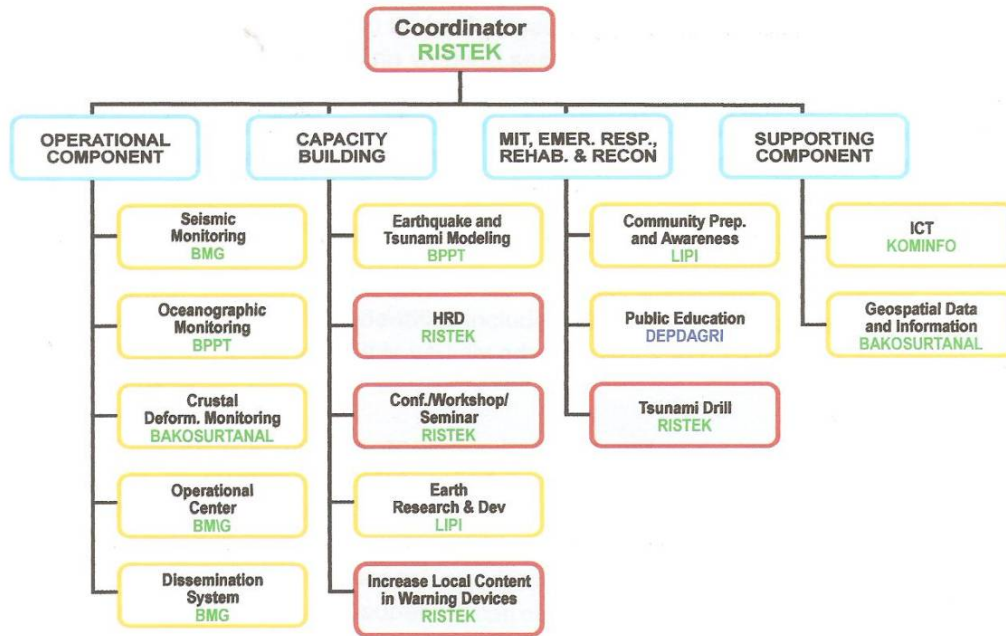


Figure 2. Ina-TEWS Organization Chart (Stapke, 2008)

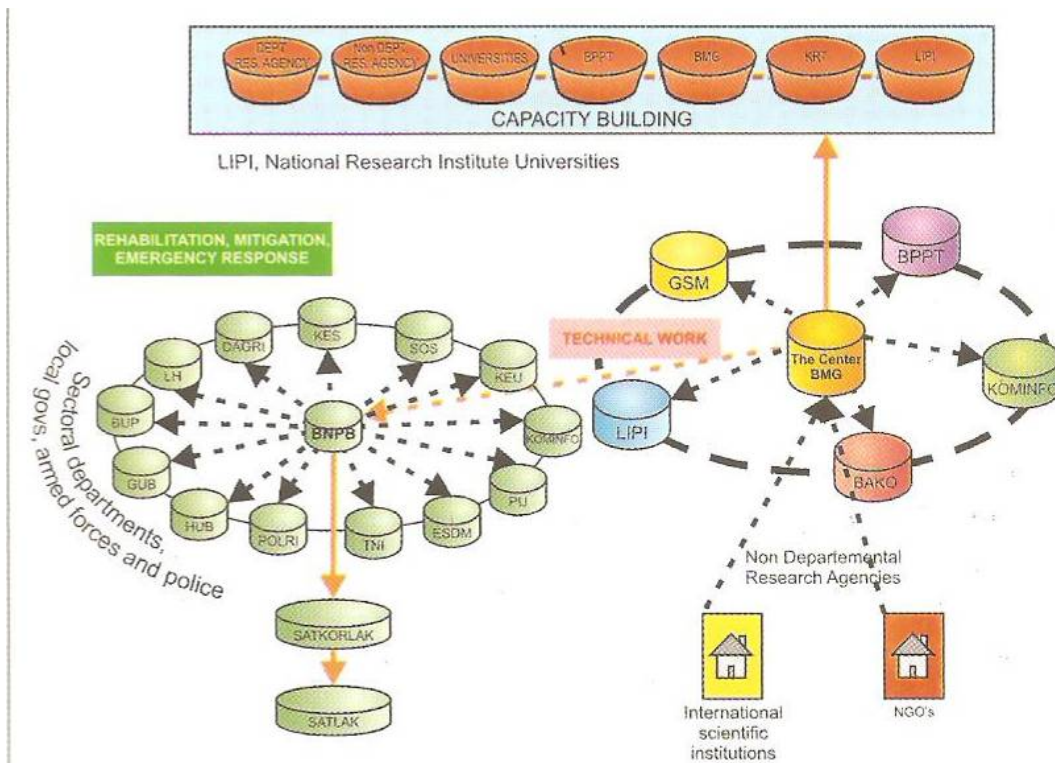


Figure 3. Institutional Set-up of Ina-Tsunami Warning and Mitigation System (Source: BMKG, 2008)

4.0 Current Status of the Ina-TEWS

4.1 Design Concept

The concept of Ina-TEWS is based on the model proposed by the International Tsunami Information Center (ITIC), an end to end tsunami early warning system with three basic components, known as the Ina-TEWS triangle shown in Figure 4 (BMKG, 2008):

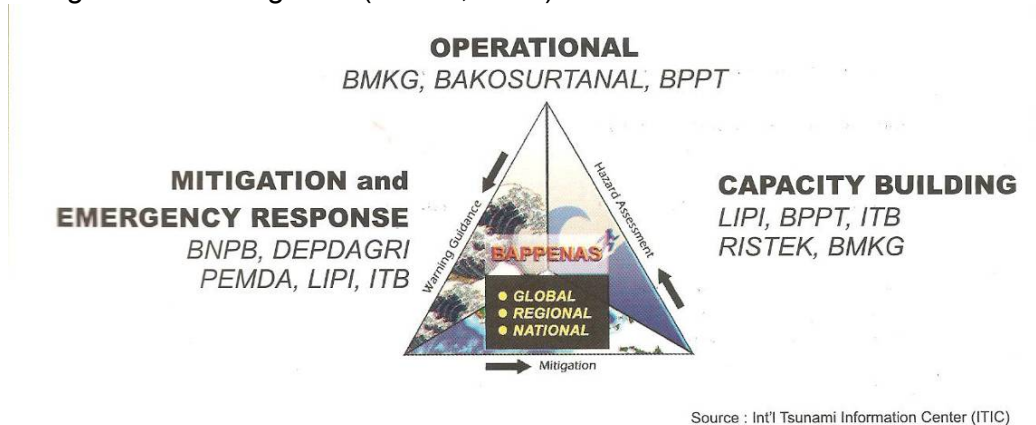


Figure 4 Basic Concept of Ina-TEWS (Source: BMKG, 2008)

The components consist of the following :

1. **Operational component** : activities for monitoring, processing, analyzing, preparing warning, issuing and dissemination
2. **Mitigation and Emergency Responses Component** : activities related to emergency response, public education, improving community preparedness and awareness, shelter and logistic preparation, evacuation map, field training, etc
3. **Capacity Building Component** : provides support to the other components through research and development, validating component 1 and 2 and also developing and improvement of the capacity of human resource

A Grand Scenario of the Development of Indonesian Tsunami Early Warning was established by the State Ministry of Research and Technology (RISTEK), consisting of the following components:

- **Earthquake Monitoring System (EMS)**: a crucial part of the system, earthquake monitoring has been operating as one of the most important geophysical monitoring activities in the earthquake prone Indonesian region. A reliable earthquake monitoring system will support the timely notification of a tsunami warning in case of the occurrence of a tsunamigenic earthquake. The EMS should determine the earthquake parameters (epicenter, depth, and magnitude) in the Indonesian region within minutes after the earthquake occurrence. The EMS is to be improved to support the Indonesian TEWS, thus enabling it to be a network of networks and center of centers for the Indian Ocean TWS (IOTWS) as well as for the TWS in Pacific, Southwest Pacific and South China Sea regions.
- **Oceanographic Monitoring System** : used to confirm a tsunami threat caused by an earthquake occurrence. The ocean (sea level) monitoring system consists of two main instruments; tsunami buoy and tide gauge.

The sea level information from tide gauges and/or tsunami buoy stations will provide data that will confirm the tsunami occurrence, thus the warning bulletin can be issued. Should the sea level monitoring data does not support the anomaly of the sea level, warning cancellation can then be issued.

- Tsunami Model Database : tsunami modeling and simulation is used to support the Tsunami Early Warning System, through the prediction on the possibility of tsunami occurrence, height and travel speed. Through modeling and simulation, the Tsunami Early Warning System can provide more accurate information on the location and time of arrival of a tsunami.
- Other components of the system consists of activities related to the following :

- Crustal Deformation Monitoring : provides means to help understand the complex and dynamical tectonics in the Asia-Australia region, notably the circum-Indian Ocean (Australia plate) boundaries and the India-Eurasia collision zone as one of the world's most active crustal deformation zone, where natural hazards such as earthquakes, tsunami, and volcanic activities are generated.
- Information and Communication Technology : Communication system as one of the important element in Tsunami Early Warning System comprises two main parts, i.e. the upstream data communication and the downstream information communication.
- Community Preparedness : activities to prepare local communities and local authorities to respond and act properly and timely to the warnings given by the system. They also help develop the community resilience against tsunami hazard.
- Capacity Building : to prepare and provide capable national human resource to develop, operate and maintain the system.

4.2 Operation of the system

The end to end early warning system provides warnings which are delivered by BMKG, based on the earthquake monitoring results and confirmed by tsunameter monitoring results. Information from tidal gauges confirms the occurrence of the tsunami or the cancellation of the warning. Early warning is disseminated to interface organizations through several media, and consists of several parts, i.e. warning about earthquake that occurred in one region; warning about the potential of tsunami, and confirmation or cancellation of the warning.

Figure 7 presents the time sequence of a tsunami warning issuance of the Ina-TEWS.



Figure 7 Time sequence of a tsunami warning issuance (RISTEK, 2008)

The Indonesian Tsunami Early Warning System is a comprehensive system encompassing two main components:

- Upstream, is a mechanism of data collection from equipment placed in the field, data transmission to data processing center, data and information analysis process, information and early warning dissemination to authorized parties and communities. The upstream activities are full of technology components starting from seismic monitoring, sea-level monitoring, telecommunication system, data transfer and processing and information communication system;
- Downstream, the Tsunami Early Warning System disseminates warnings, interconnects central and local governments' roles in early warning dissemination and is responsible for community preparedness at all levels; central, regional and local.

The GOI plans to increase five existing seismic centers in North Sumatra, Jakarta/West Java, Bali, South Sulawesi and Jayapura/North Papua to ten, and acquire broadband capability to better detect surface waves (a more accurate measurement of oceanic earthquakes and possible tsunamis). It also wants to accelerate automatic data processing and transmission. The goal is reduce detection time of source earthquakes from the current 10 minutes (with a manual system) to about 3-5 minutes with an updated automated system. Additional "strong motion accelerographs" would allow more accurate measurement of seismic activity.

4.3 Capacity Building and Community Preparedness

Awareness and community preparedness is the main key in protecting the community from disaster threats and it is one of the three integral components of Ina TEWS. A sophisticated Early Warning System would not be of a great assistance if the community and its components are not ready for taking proper actions when disasters struck. For this reason, community awareness and education should be conducted simultaneously along with the development of Early Warning System.. This requires Standard Operating Procedures at all levels; from local governments to community leaders, evacuation drills, simulations, evacuation procedures, and building community awareness through leaflets and brochures

There are 8 stages of developing community awareness and preparedness according to LIPI, i.e. (Source: BMKG, 2008):

1. Training for government staff at local government
2. Training for community representative
3. Module development for public education
4. preparation of evacuation map
5. preparation and assembling sign of tsunami evacuation
6. tsunami drill and evacuation process
7. public socialization through electronic and printing media
8. drill for school children

Educational efforts are conducted to improve preparedness of community by various actors: RISTEK, LIPI, BMG, Universities, PMI, Local Government, NGOs, UNESCO, GTZ, and others. All these institutions have actively participated in various educational activities and community preparedness through workshops, tsunami simulation, table top simulation, and they work together with various parties, especially with the local governments.

5.0 Tsunami Modeling

Tsunami modeling is developed to predict the possibility of tsunami occurrence and tsunami heights and the arrival times at certain coastal area. Basically tsunami modeling can be utilized in tsunami early warning system in two ways (RISTEK,2008):

- Real-time monitoring of the tsunami evolution and prediction of coastal effects; in which real-time tsunami warnings are the mission of tsunami warning centers
- Support the evacuation plans and community preparedness by means of calculations of historic or hypothetical events that show how far the water from a tsunami may reach, and to what depth.

According to the Ina-TEWS design, the earthquake parameters will be determined within 3 minutes after the earthquake occurrence. When the earthquake characteristic is determined as tsunamigenic, the tsunami modeling will be retrieved from the database to give estimation of tsunami heights and their arrival time at several locations along the coastal area. Therefore, the availability of a database of tsunami modeling is important in

supporting the tsunami warning and will be developed for the 10 regional centers.

5.1 Readiness Tests

To prepare the community in the Ina-TEWS, tsunami drills are conducted by the government and community in order to have proper community response to the tsunami early warning that will be issued by BMKG or intermediate institutions (such as local governments authorities). Tsunami drills were conducted to test the readiness of the system, in particular the preparedness of the community. Various tsunami drills were conducted under the coordination of the Ministry of Research and Technology in:

- Padang in 2005
- Bali in 2006
- Serang, Banten in 2007
- South Sulawesi (Makasar) in 2008
- Gorontalo, North Sulawesi, in 2008

5.2 International Support

There is considerable international support in the development of Ina-TEWS, i.e.:

- Germany, through GITEWS project, comprising the development of monitoring systems, situation centers, telecommunications, capacity building (human resources, research, local and institutional)
- China through ICDN, is contributing seismic monitoring stations, to BMKG operational center telecommunications and capacity building
- Japan through real-time JISNET, is involved in part of seismic monitoring system. Through JICA, a contribution is made to BMKG operational center and capacity building.
- France is involved in upgrading the exiting seismic network and Tremors
- USA, USAID through multi institutions involves in seal level monitoring, capacity-building, conducting local, national and international workshops and visits. USTDA in the form of technical assistance.
- UNESCO, IOC, ITIC supports infrastructure development, capacity building, technical assistance
- IFRC supports capacity building

The German-Indonesian Tsunami Early Warning System (GITEWS) costing €45 million will fund 10 tidal gauges, 25 seismometers, 10 GPS systems, and a buoy-equipped research vessel. Japan, China, France, the USA and UNESCO also contributed equipments and technical assistance, and 120 seismological stations and 37 tide gauges have already been installed. Currently, 11 GPS stations and five buoy systems are operating. During an initial two-year development phase the system will be jointly operated by Germany and Indonesia.

6.0 Outstanding Issues

All the buoys should be installed by early 2009, and the German team will remain in Indonesia another year to help train local staff.

The stations of Bakosurtanal and BMKG are still not yet operating in real-time data transmission. Similarly, the GPS network consists of 9 stations which are also still stand alone units. Both, tide gauges and GPS data will be sent to BMKG in near-real-time to enhance the accuracy of the warning.

Proposed action plans for tsunami modeling for the development of the Ina-TEWS:

- Identification of the possible tsunami sources (tsunamigenic earthquakes) in each regional centers
- Development of the database of tsunami modeling for each regional centers
- Development of inundation maps for selected coastal areas

7.0 Conclusion

Ina-TEWS is developed in order to enhance community and government resilience, especially to face the future tsunami disaster as mentioned in Hyogo Framework for Action. Many government institutions are involved in the Ina-TEWS system, especially the institutions that are responsible to MENKOKESRA. BGR also proposed new models of organization structure of Ina-TEWS in the National Disaster Management system. The establishment of Ina-TEWS is also supported by international, such as German, Japan, USA, China, and France. Ina-TEWS has also been launched on November 11, 2008 in Jakarta and on the November 12, 2008 in Bali. From 2010 on the Indonesian government will maintain the system on its own.

List of Terms and Abbreviations

Ina-TEWS	:	Indonesia Tsunami Early Warning System
MENKOKESRA	:	Coordinating Ministry for People's Welfare
Bakornas PB	:	National Coordinating Board for Disaster Management
RISTEK	:	Ministry of Research and Technology
BMKG	:	Agency of Meteorology Climatology and Geophysics
Bakosurtanal	:	National Coordinating Agency for Survey and Mapping
LIPI	:	Indonesian Institute of Sciences
DEPKOMINFO	:	Ministry of Communication and Information Technology
BNPB	:	National Disaster Relief Agency
MENDAGRI	:	Ministry of Home Affairs
POLRI	:	Police of the Republic of Indonesia
POLDA	:	Regional police
GI TEWS	:	German Indonesia Tsunami Early Warning System
BGR	:	Federal Institute for geosciences and Natural Resources

APPENDIX 2 - TERMS OF REFERENCE

UNISDR-Coordinated Tsunami Early Warning Systems Initiative

BACKGROUND AND CONTEXT

Since the adoption in January 2005 of the *Hyogo Framework for Action, 2005-2015: Building the Resilience of Nations and Communities to Disasters*, there has been an ever increasing understanding by a broad range of stakeholders of the importance of taking urgent action to reduce disaster risk in order to save lives and livelihoods, particularly among the most vulnerable. Governments and international partners are also coming to understand that effective action in reducing disaster risk must involve coordinated action by a range of stakeholders.

For the first time United Nations International Strategy for Disaster Reduction (UNISDR) has been involved in a US\$ 10.5 million **Tsunami Flash Appeal Initiative "Evaluation and Strengthening of Early Warning Systems in Countries Affected by the 26 December 2004 Tsunami"**. This was also the first time that implementation of a Flash Appeal supported a multi-country disaster risk reduction initiative following a major disaster. The Initiative provided an overall integrated framework for strengthening early warning systems in the Indian Ocean region. A major highlight of the Initiative was the establishment of partnership and coordination mechanisms across a wide range of partners and donors, providing an example of an integrated apparatus to support the implementation of the Hyogo Framework for Action.

The Initiative was facilitated and coordinated by ISDR Platform for the Promotion of Early Warning" (ISDR-PPEW), currently administered by the UNISDR secretariat.

Activities focused broadly on early warning system development and preparedness and promoted a "people-centred early warning system" emphasizing (i) enhanced community level risk knowledge, (ii) monitoring and warning service, (iii) communications and dissemination of understandable warnings to those at risk and (iv) response capability and preparedness to act by those threatened aspects. Sixteen partner organizations implemented and completed activities by 31 December 2007.

With the closure of all Flash Appeal activities and receipt of final reports by all implementing partners, as per the agreement set out at the launch of the initiative, **a final evaluation of the Initiative's effectiveness relative to the programme's objective and expected outcomes will be undertaken.**

PURPOSE

The evaluation should measure the effectiveness of the programme from a results based management perspective by answering the following *five* questions:

1. How efficient the resources were in achieving results – the right resource base (funding)?
2. How efficacious the results were in making the changes stakeholders expected – the right thing to do to make a change (incl. sustainability issues)?
3. Were the right implementation partnerships formed – the right organisations to do the work (incl. process of selection and tracking implementation)?
4. How effective the approach (method and means) was in achieving results – the right way to do the work (project/s design and beneficiary involvement)?

5. What lessons were learned (good and bad practices) from an examination of findings in answering the above four questions?

METHODOLOGY & DELIVERABLES:XX

Desk Review and Inception Report (2 weeks)

Following an extensive desk review of the following key documents (as well as other as necessary)

- All project documents (available from ISDR-PPEW) and/or work plans undertaken by the sixteen partner organisations
- The final consolidated report of the programme of work prepared by ISDR-PPEW available at http://www.unisdr.org/ppew/tsunami/key-documents_FlashAppeal.htm
- Findings of other monitoring and evaluation processes related to Indian Ocean post-Tsunami initiatives e.g OCHA and WHO for contextual relevance to this body of projects.

The international consultant will draft and submit to ISDR-PPEW an inception report that outlines the following:

- A programme of work, devised from questions and gaps in information/knowledge identified from the desk review as well as consideration of the overall purpose of the evaluation study (the five key questions above)
- Estimated resources needed – other consultants / finance
- A field visit plan (outlining countries and timing, who will be interviewed and what projects sites to visit – necessary to set up meetings / logistics prior to arrival)
- A timeline for the schedule of activities and
- The Final Evaluation Report structure

Field Visits (3 weeks)

The Consultant will undertake missions to the relevant countries upon endorsement of the inception report by ISDR-PPEW. During the missions, it will be important that the Consultant conduct semi-structured interviews (in-person, telephone, and videoconference) and roundtables with beneficiaries as well as stakeholders.

Final Report (3 weeks)

The Consultant will present a final evaluation report to ISDR-PPEW and the UNISDR secretariat. The report will include an Executive Summary (up to 2,500 words) and be no more than 20,000 words (excluding appendices) sent electronically in Word format. The report will be considered finalized upon incorporation of comments and issues raised via ISDR-PPEW from UNISDR staff and other stakeholders as necessary.

SKILLS AND KNOWLEDGE REQUIRED

- Knowledge of disaster risk reduction, Hyogo Framework for Action, tsunami early warning systems and linkages between relief, recovery and development
- Expertise in evaluation of large-scale (geographically and operationally) multi-partner technical-cooperation projects;
- Expertise in strategic management and project implementation;
- Knowledge, including field experience, in South and South East Asia in the countries of proposed site visits;
- Experience working with UN and NGO actors;
- Proven expertise in facilitating different types of consultative, evaluative workshops for comparable organizations; and
- Familiarity with disaster preparedness methodology and tools

APPENDIX 3

List of People met and Itinerary**1. Sri Lanka**

Mr. Ananda Mallawatantri, Assistant Resident Representative, United Nations Development Programme (UNDP)
 Maj. Gen. Gamini Hettiarachchi, Director General, Disaster Management Centre (DMC)
 Mr. Chandradasa, Deputy Director-General, Disaster Management Centre (DMC)
 Mr. Menaka Wijesinghe, Deputy Director/Early Warning, Disaster Management Centre (DMC)
 Mr. Damith Chandrasekera, National Program Officer, UNISDR / Disaster Management Centre (DMC)
 Mr. A.S. Pannila, Head/Electro Technology Laboratory, Industrial Technology Institute (ITI)
 Dr. Rohan Samarajiva, Executive Director, LEARNasia,
 Mr.Priyanga, UNV, Ratnapura
 Dr. Wijayananda, Chairman, Geological Survey and Mines Bureau (GSMB)
 Mr. R.M.S. Bandara, Head / Landslide Studies & Services Section, National Building Research Organization (NBRO)
 Mr. Lalith Chandrapala, Director, National Council for Disaster Management (UNU-EHS Project)
 Mr. Anil Premaratne, Additional Director/Coast Conservation, Coast Conservation Department, Ministry of Fisheries and Aquatic Resources
 Mr. Rajind Seneviratne, Unit Manager/Business Development, Dialog Telekom PLC
 Mr. Michael de Zoysa, Senior Manager/Corporate Responsibility & Public Policy, Dialog Telekom PLC
 Mr. Indu Abeyratne, Project Manager/Disaster Early Warning, Sri Lanka Red Cross Society (SLRCS)
 Col. Janath Hettiarachchi, Executive Director/Disaster Management, Sri Lanka Red Cross Society (SLRCS)
 Prof. S.T. Hettige, Faculty of Arts, University of Colombo
 Prof. Samantha Hettiarachchi, University of Moratuwa (UNU-EHS Project)
 Mr. Sumith Wijesinghe, Project Manager/Disaster Management, Sarvodaya
 Ms. Dias, Deputy Director, Hydrology Section, Department of Irrigation
 Dr. E.M.S. Wijeratne, Head/Oceanography, National Aquatic and Resource Agency (NARA)

2. Indonesia**UNESCO:**

Ardito Kodijat
 Koen Meyers
 Yuli Sari Yeni

UNOCHA: Mr Fernando Hesse, Laksmi Noviera
 UNDP: Kristanto Sinadang, David Hollister, Angger P.Wibowo
 MPBI (Indonesia Society for Disaster Management): Faisal Djalal
 BNPB: Sugeng Triutomo
 GTZ: Ms. H.D.Vidiarina

RISTEK: Edie Prihantoro
ITB: Dr Wayan Sengara
BMG: Dr Fauzi
KOGAMI: Ms. Patra Rina Dewi
Andalas University – Padang: Benny Hidayat
BAPPEDA – Padang: Mr Indra Catri
GTZ- Padang: Willy Wicaksono

3. Bangkok:

Charles Davies – UNESCAP
Sanny Jegillos, Rajesh Sharma – UNDP Regional Centre
Loy Rego, Roopa Rakshit, Jaiganesh Murugesan, Lolita Bildan – ADPC
Jerry Velasquez – UNISDR Bangkok
Scott Cunliffe – Consultant – UNISDR

Others:

Juan Carlos Villagran de Leon (ex UNU-EHS-phone interview)

Evaluation Itinerary:

January 11-18: Sri Lanka (Colombo with field visit to Ratnapura)
January 19-27: Indonesia (Jakarta, with visits to Bandung and Padang)
January 28-31: Bangkok

APPENDIX 4: LOGICAL FRAMEWORK FOR EARLY WARNING STRENGTHENING PROJECT

HYOGO Goal	Development and strengthening of institutions, mechanisms and capacities to build resilience to hazards
International Strategy for Disaster Reduction	<p>To increase commitment by Governments to engage and invest in disaster risk reduction as agreed upon in the Hyogo Framework</p> <p>To facilitate closer partnership and cooperation between UN, regional and sub regional organizations, civil society, and governments</p> <p>To promote the leadership and commitment of individual specialized agencies/institutions for the integration of disaster risk reduction into their own programmes and policies</p>

II) PROJECT 's RESULTS & RESOURCES FRAMEWORK

Project Objective	Provide an overall integrated framework for strengthening early warning capacities of countries of the Indian Ocean.			
Priority Area of Support	Intended Outcomes	Intended Outputs	Indicators (means of verification)	Inputs Resources Actors
Core System Implementation	(1) A regional consensus on the nature and core elements of a tsunami early warning system	<ul style="list-style-type: none"> Obtain political and technical consensus on system's key elements. Define the system technical requirements. Identify and confirm national tsunami warning centre responsibilities. 	<p>Regional consensus is obtained through meetings & dialogue.</p> <p>Regional EW technical system needs are identified by expert group.</p> <p>National commitment asserted and national tsunami EW centres functioning.</p>	<p>US\$ 4 million</p> <p>Technical Expertise</p> <p>Field missions</p>

		<ul style="list-style-type: none"> • Institute a mechanism for regional policy setting and coordination 	Regional mechanism for coordination and information sharing is in place.	Coordination meeting
	(2) Substantial progress on the initial strengthening & implementation process.	<ul style="list-style-type: none"> • Implement interim watch and warning system capacities. • Support the upgrade ocean observing systems and data communications (GTS). • Undertake national needs assessments, training and study tours. • Initiate resources mobilization processes to implement fully-fledged tsunami early warning system 	<p>Interim system in place.</p> <p>Upgraded GTS and other observation system data in identified locations are in operation</p> <p>Assessment missions carried out to all countries identified, reports compiled and recommendations delivered.</p> <p>Coordinated resource mobilization efforts and funding proposals carried out.</p>	UNESCO-IOC, WMO, National Meteorological Agencies, ADRC, Pacific Tsunami Early Warning Centres
Integrated Risk Management	Promote the integration of tsunami early warning system into national disaster risk management and reduction mechanisms.	<ul style="list-style-type: none"> • Development of "A Guidance" towards the implementation of Hyogo Framework for Action 2005-2015 • Develop methodology for multi-sector vulnerability assessment. • Assessment of national frameworks, mechanisms and capacities for disaster risk management and risk reduction relevant to tsunamis. • Promote plans, project proposals and resources mobilization to build capacities of national platforms. • Support dialogue on tsunami issues with other hazard early warning entities. 	<p>A "Getting Started" guidance document based on the Hyogo Framework of Action is developed targeting governments and practitioners.</p> <p>Vulnerability assessment methodology agreed and available.</p> <p>Published assessment of national disaster risk management and risk reduction capacities with respect to integrated early warning systems.</p> <p>Tentative plans and resources mobilization are initiated towards agreed upon capacity-building of national platforms.</p> <p>Dialogue, coordination, and networking is enhanced across hazard early warning entities on tsunami issues.</p>	<p>US\$ 2 million & partners' in-kind support.</p> <p>UNDP, ISDR, UNEP, OCHA, WMO, UNESCAP, UNESCO-IOC, ADPC, ADRC</p>
Awareness & Education	(1) The availability of accessible	<ul style="list-style-type: none"> • Collate example materials from tsunami and other relevant natural hazard awareness programmes. 	Examples from tsunami and other hazards are collected and shared to raise public awareness.	US\$ 2 million

	public information material on tsunami, early warning, and risk reduction.	<ul style="list-style-type: none"> • Design, produce and disseminate publications for a range of audiences in local languages. • Conduct workshop of experts and practitioners to develop packages of information products. • In coordination with other organizations and partners, summarise and disseminate lessons learned from 26 December 2004. 	<p>Interlocutor groups including national tsunami centers and disaster risk authorities have access to basic public information products for dissemination.</p> <p>Tailored public information products are developed and disseminated targeting various levels at the community.</p> <p>Lessons learnt from the tsunami of 2004 are collected, documented and shared with the wider public.</p>	<p>partners' and national authorities in-kind support and expertise</p> <p>ISDR, IOC-ITIC, UNESCO, ASEAN, ADRC, ADPC, ABU, IFRC, UNV</p>
	(2) Targeted advocacy and media campaigns.	<ul style="list-style-type: none"> • Support information workshops and events for sector organisations. • Conduct workshops for broadcast media and warning organisations. • Develop mass media information products and promote their routine use. 	<p>Regional interaction and mechanisms for advocacy are strengthened.</p> <p>Media-focused workshops are held with broadcasters commitment asserted for collaboration on warning projects.</p> <p>Mass media products are available and partners committed to promoting their use.</p>	
Community-based Approaches	Identify means to strengthen disaster preparedness at the community level	<ul style="list-style-type: none"> • Collect, analyse, and publish data on impacts and vulnerability in selected sample locations. • Develop assessment methods for vulnerability. • Collate and publicise good practices concerning community-based tsunami early warning and preparedness. • Explore, promote and strengthen community-based mechanisms for tsunami-related risk preparedness and risk reduction. 	<p>Quality and insightful data and analysis is available and accessible for at least two locations.</p> <p>Tools for assessment of vulnerability are developed.</p> <p>Good practices on community-based early warning systems are collected and disseminated to wide networks.</p> <p>Strengthened community-based tsunami risk management at targeted locations including preparedness and contingency planning.</p>	<p>US\$ 1.5 million</p> <p>partners' and national authorities in-kind support and expertise</p> <p>ISDR, UNDP, IFRC and UNU, ADPC, ADRC, UNV, NGOs.</p>

Coordination	Establishment of mutual understandings, networks, and coordination mechanisms necessary for effective implementation of the project.	<ul style="list-style-type: none"> • Formulate and communicate strategy and overview plans including matrix of roles and responsibilities.. • Collect and publish lessons learned across all components. • Ensure systematic flow of information across partners, donors, and stakeholders. • Develop web-accessible project information database accessible to the public.. • Develop, negotiate, document and monitor agreements, work plans and budgets among partners and donors and resolve problems. • Establish project office support in Indian Ocean region. 	<p>Project plans and activities are documented and shared.</p> <p>Lessons learned are collected and published.</p> <p>Information is flowing systematically and efficiently across all parties involved in the project .</p> <p>A web-accessible project information database is developed.</p> <p>Activities are implemented in a timely manner with official agreements signed, problems identified and promptly resolved.</p> <p>Support, coordination, and follow-up services are available in the region through the ISDR regional outreach office.</p>	<p>US\$ 1.5 million</p> <p>ISDR-PPEW leads the overall coordination in close partnerships with all involved partners and donors.</p>
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