



# RISK RETURNS

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# Foreword

## **MARGARETA WAHLSTRÖM, SPECIAL REPRESENTATIVE OF THE SECRETARY-GENERAL FOR DISASTER RISK REDUCTION (SRSG)**

In recent decades, there has been a steady rise in the number of disasters and of people affected by them. Recent events in Haiti, New Zealand and Japan confirm the current trend that has seen the economic cost of disasters rising 14-fold since the 1950s.

Small countries are particularly vulnerable, as disasters have significant impacts on GDP and other macroeconomic factors. The growth of populations and assets at risk, and the projected increases in extreme events due to climate change, imply that costs will continue to climb.

There are many tools and techniques available to reduce the risk of disasters. However, most Governments and local authorities are faced with difficult decisions regarding investment in water management, infrastructure, hazard early warning systems and control of building design, construction and maintenance.

Anecdotal evidence has long suggested that projects to reduce disaster risks have a high ratio of benefits to costs. Landmark studies have confirmed this, making compelling cases for the economic rationale behind this type of investment. The recent report by the United Nations and the World Bank, 'Natural Hazards, UnNatural Disasters' substantiates the fact that, faced with complex choices and competing priorities, Governments and local authorities are not sufficiently equipped for effective spending to reduce risk from natural hazards. Cost-benefit analysis, an essential tool for prioritizing spending, also remains underused.

As a result, at the national and local levels, disaster risk reduction is often perceived as a concept rather than an investment. There remains little recognition in the ranking of priorities for governments and the effectiveness of different types of spending and regulatory mechanisms are insufficiently understood.

Fortunately, the *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters* provides a comprehensive global agenda for the reduction of disaster losses and disaster risks. It has been endorsed by the General Assembly and widely adopted by governments, organizations and civil society as the principal guide for policies and programmes to reduce disaster risks.

As a multi-stakeholder, UN-based, international mechanism, the ISDR system enables Governments, mayors and other decision makers to take action towards disaster risk reduction and to implement the Hyogo Framework. Its principal forum is the Global Platform for Disaster Risk Reduction, which brings together Governments, UN and civil society organizations to review progress, advocate actions, and guide future directions and coordination.

Other relevant activities by the ISDR system and secretariat include the preparation of the Global Assessment Report on Disaster Risk Reduction, which provides in-depth analysis of progress by countries in the implementation of the Hyogo Framework. In the latest iteration of the report, countries reviewed progress on the levels and types of national investments in disaster risk reduction. A similar process is being initiated to allow local authorities to monitor the effectiveness of their spending to reduce natural hazard risk.

The publication of *Risk Returns* is therefore a timely compilation of experiences and practices from ISDR partners. At a time when the synergies between the issues of disaster risk reduction and climate change are becoming increasingly relevant, understanding how to invest effectively to reduce disaster risk and facilitate climate change adaptation could lead to a substantial reduction in losses of the social, economic and environmental assets of communities and countries.

Margareta Wahlström  
Special Representative of the Secretary-General  
for Disaster Risk Reduction (SRSG)



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**THE HONOURABLE PRIME MINISTER OF INDIA, MANMOHAN SINGH**

'Build Back Better' was our motto for all the areas affected by the Tsunami of 2004. India is completely focused on creating the requisite infrastructure to achieve this goal, including early warning systems to mitigate the impact of any future calamities.

We have put disaster risk reduction at the top of our agenda. Enactment of disaster management legislation in 2005 has laid down institutional, financial and techno-legal arrangements in all tiers of the administrative structure.

Our country is cooperating with international agencies, especially those within the United Nations, to achieve the national objectives articulated in consecutive five-year plans as well as the global Millennium Development Goals. In future, the National Disaster Management Authority will continue to work together with these agencies towards institutional strengthening and capacity building for disaster risk reduction measures, including climate change adaptation measures.

I am happy that the United Nations International Strategy for Disaster Reduction is publishing *Risk Returns* for presentation to the Global Platform for Disaster Risk Reduction in May 2011. I hope this publication will be a significant milestone in the process of building a culture of prevention and preparedness.



Manmohan Singh  
The Honourable Prime Minister of India



**HECTOR M. TIMERMAN, MINISTER OF FOREIGN AFFAIRS,  
INTERNATIONAL TRADE AND WORSHIP OF ARGENTINA**

Argentina has strongly supported the approval by the 2005 World Conference on Disaster Reduction of the Hyogo Framework for Action 2005-2015 and has taken all necessary steps to comply with its principles. This effort was recognized by the international community when our country was chosen to preside over the Geneva-based International Strategy for Disaster Reduction Support Group from 2007 to 2009.

The White Helmets Commission of the Ministry of Foreign Affairs and the Undersecretary for Provincial Development of the Ministry of the Interior coordinate the elaboration of our multi-stakeholder Argentina National Platform for Disaster Risk Reduction with the participation of governmental agencies, academic institutions, non-governmental organizations, the private sector and representatives of civil society.

The group is devoted to promoting the improvement of legislation concerning planning and territorial development and has given support to global campaigns such as Resilient Cities. It also recognizes the links between disaster risk reduction and climate change and acknowledges the relevance of poverty and hunger as major contributing factors to vulnerability. In this regard, it underlines the key role of volunteers and community involvement for a successful response.

We understand that disaster risk reduction ought to be a priority of every state and Argentina is committed to that objective.

Hector M. Timerman,  
Minister of Foreign Affairs,  
International Trade and Worship of Argentina



**BRANKO BAČIĆ, MINISTER OF ENVIRONMENTAL PROTECTION,  
PHYSICAL PLANNING AND CONSTRUCTION OF THE REPUBLIC OF CROATIA**

Natural and industrial disasters have become almost daily phenomena, unpredictable in their occurrence, too often caused by human factors and no less frequent in developed than in developing countries. In a world burdened with continuing climate change, the greater frequency and worse consequences of accidents have made the issue of disaster risk reduction central to strategy development plans.

The 2009 Conclusion of the Government of the Republic of Croatia initiating the establishment of the National Risk Reduction Platform recognized this continuous task as a priority at both national and local levels. The Platform serves as a permanent forum for the exchange of suggestions and achievements contributing to disaster risk reduction.

It is a pleasure to report that the institutional organization of the Platform has been backed by extensive support and readiness of all relevant scientific and professional institutions, economic entities and state administration bodies whose activities contribute to disaster risk reduction, thus enhancing overall safety in the Republic.

The Ministry of Environmental Protection, Physical Planning and Construction has participated in the process from the very beginning, applying physical planning and construction regulations aiming at reducing risks and quakeproofing buildings. In addition, valuable experience has been gained through the Ministry inspection services participating in the 112 system with a view to providing expert assistance in emergencies and supervising events threatening the life and health of people and animals, as well as property and the environment. Also, integration of the European *acquis communautaire* into national environmental legislation requiring the establishment of a system for prevention, preparedness and response to industrial accidents has resulted in better efficiency while placing more importance on prevention. This includes continuous education of service providers and staff in complex industrial plants, as well as participation in European Union projects related to cross-border effects of accidents in these plants.

Development and strengthening of the economic basis of society is of the utmost importance, tailored to specific regions and fostering local diversity for proportionate development. Aware of the fact that vulnerability to natural risks poses a major threat to our social and economic development, we strive to improve our general preparedness.

This Ministry will be a reliable partner in strengthening dialogue and establishing the necessary coordination and exchange of information between different development sectors, as well as enhancing conditions for disaster risk reduction at regional and local levels. Lessons learned so far will contribute to further recognition of the obligation of all responsible stakeholders to continually invest in reasonable and sustainable disaster risk reduction, primarily to reduce the loss of life and property, as well as exposure to a wide range of natural or other types of disasters.



Branko Bačić  
Minister of Environmental Protection, Physical Planning and Construction  
Republic of Croatia

**CONSTANTIN TRAIAN IGAŞ, MINISTER OF ADMINISTRATION AND INTERIOR, GOVERNMENT OF ROMANIA**

As is the case in many countries around the globe, Romania has been stricken by natural disasters like floods, landslides or tornadoes caused by dangerous meteorological and geological phenomena. In the present situation, disasters tend to be part of life and all members must adopt the right behaviour in order to increase the resilience of the community and to reduce the negative effects of these crises.

It is essential that, besides the training of the institutions involved in disaster management, communities should involve themselves more in prevention and preparedness activities in order to create a resilience to cope with these situations and also to prepare for mitigation and response.

The Romanian Government has made disaster risk reduction a priority by intervening in the legal framework and by its specialized institutions that have tried to increase resilience at the community level by preparing their members, simultaneously with measures and programmes directed towards people's protection in emergencies.

Romania will continue to concentrate its efforts in order to create a safer environment, accomplishing its mission to protect its citizens and fulfil the commitments that have been assumed by our country.

Constantin Traian Igaş  
Minister of Administration and Interior  
Government of Romania



**AMBASSADOR MARTIN DAHINDEN, DIRECTOR-GENERAL,  
SWISS AGENCY FOR DEVELOPMENT AND COOPERATION**

Today half of the world's population is under threat from the forces of nature — one fifth of the earth's surface is regularly affected by earthquakes, volcanic eruptions, floods, drought, landslides and storms. There are indications that such events are increasingly frequent. Moreover, the effects of climate change are becoming evident.

The negative impacts of such natural events affect increasing numbers of people: 6.9 billion people live on our planet today and, according to UN estimates, this number will have grown to over 9 billion by 2050. Poor and densely populated countries are particularly vulnerable to the forces of nature. Existing structures can barely cope with minor events and are completely overwhelmed during major disasters. Thus life-saving and environment-sensitive measures such as prevention and mitigation of existing risks, preparation for possible disasters and adaptation to a changing risk environment must assume a prominent position in comprehensive development programmes in the affected countries.

Prevention and preparedness pay off, although the direct benefit is often not immediately visible. Investments in better expertise in the areas of risk and crisis management, greater awareness among the population and the protection of life, livelihoods and assets are beneficial in the long run. It is thereby important to understand that for comprehensive Disaster Risk Reduction it is not sufficient to address the issue either by humanitarian aid or development cooperation, but that Disaster Risk Reduction needs to be strongly anchored in both fields.

Enabling countries to attain a higher level of safety is a primary aim of the Swiss Agency for Development and Cooperation (SDC). As a logical consequence of emergency assistance, disaster prevention and preparedness constitute an explicit mandate for humanitarian aid provided by the Swiss Confederation. These measures allow us to assist affected populations, save lives, alleviate suffering and protect the most vulnerable victims. The SDC is committed to promoting and supporting sustainable development, which helps communities withstand the forces of nature and enhances climate change adaptation.

The SDC assessed the effectiveness of its DRR commitments in 2010. The assessment provides information about the resources invested by Switzerland for the reduction of risks from natural hazards, the areas in which these investments were made and the results that have been achieved. Cost-benefit estimations of assessed programs revealed reduced risks 4-7 times higher than initial investments. The focus on DRR is not new: Switzerland has been involved in related activities abroad since the early 1980s. It is a highly complex, long-term undertaking that demands constant advocacy and the broad-based involvement of numerous actors. The strong involvement of national, local and international partners is indispensable to the success of DRR projects and programmes.

Local and multilateral partners have a major stake in the positive outcome of DRR activities. I would like to express my profound gratitude to all our partners for their commitment and contribution to the smooth functioning of our relationships and to thank them for their ongoing work.

Ambassador Martin Dahinden  
Director-General  
Swiss Agency for Development and Cooperation





**IRINA BOKOVA, DIRECTOR-GENERAL OF UNESCO**

The first decade of the 21st century has been hit hard by natural disasters. Earthquakes in Haiti, Chile, New Zealand and Japan, floods in Pakistan, Benin and Australia, wildfires across several countries — all of these events have highlighted our rising vulnerability. They have also reminded us of the importance of investing in disaster reduction and preparedness. This must become a priority for States and the international community.

UNESCO is working in this direction by strengthening the capacities of State institutions and supporting local communities in developing risk reduction measures. We develop and bolster institutions and networks at the regional and international levels to monitor natural hazards and mitigate their impact. Our Intergovernmental Oceanographic Commission plays an especially important role here. We promote education for sustainable development as part of longer-term risk reduction and adaptation. We act also after disaster has struck — for instance, to support recovery in Haiti and Pakistan.

Working at the interface of education, science, the social sciences, culture and communication, UNESCO seeks to build a global culture of disaster preparedness and mitigation. The Hyogo Framework for Action 2005-2015 is our core platform, as is the United Nations Decade of Education for Sustainable Development 2005-2014, which UNESCO is coordinating.

*Risk Returns* is an excellent initiative that will contribute to reinforcing the priorities underlined in the Hyogo Framework.



Irina Bokova  
Director-General of UNESCO

**MICHEL JARRAUD, SECRETARY-GENERAL OF THE WORLD METEOROLOGICAL ORGANIZATION**

A unique operational system, composed of the National Meteorological and Hydrological Services (NMHSs) of WMO's 189 Members, as well as over 50 regional meteorological and climate specialized centres appropriately distributed throughout the world, enables the countries to develop and issue timely early warnings concerning extreme weather and climate events, on time scales ranging from next-hour nowcasting to week-long forecasts or even seasonal climate forecasts, depending on the kind of hazards.

These operational warning capabilities and forecasting tools, based on 24 hours a day, seven days a week observations and the outputs of the latest scientific prediction models, are currently made available to all countries, irrespective of their actual level of development, provided that they can make just the basic investment needed to access this information through their respective NMHSs.

Every year many countries experience significant human and economic losses across various sectors, in particular on account of hydrometeorological hazards which have the potential to set back their development considerably. Furthermore, the mounting frequency and severity of these hazards, which is often linked to climate variability and change, compounded with the increasing vulnerabilities associated with precarious or non-sustainable development, are presently posing significant challenges to many societies.

Scientific progress over the last decades, especially in terms of climate modelling and forecasting, provide unprecedented opportunities today for access to sector-specific decision-supportive climate information, which can considerably facilitate risk analysis and medium to long-term planning across numerous vulnerable sectors. The third World Climate Conference (WCC-3, Geneva, 2009) highlighted the relevance of climate information and predictions for decision making and agreed to establish a Global Framework for Climate Services (GFCS) to strengthen the production, availability, delivery and application of science-based climate prediction and services. These climate services will also be increasingly integrated in international disaster prevention and mitigation strategies, policies and operational plans to advance in disaster risk reduction.

WMO is collaborating with all its international partners, in the United Nations System and beyond and across all disciplines and networks, with the primary objective of saving lives and protecting property and livelihoods. The GFCS will contribute decisively to the achievement of this key mission, in particular by operationalizing the availability of science-based climate information and predictions and by supporting climate-risk management and adaptation across all socioeconomic sectors.

Michel Jarraud  
Secretary-General  
World Meteorological Organization



# Effective financing that reduces risk to natural hazards

*Margareta Wahlstrom, Special Representative of the Secretary-General for Disaster Reduction,  
United Nations International Strategy for Disaster Reduction*

**The 2011 Global Assessment Report on Disaster Risk Reduction (GAR11) highlights the political and economic imperative to reduce disaster risks, and the benefits to be gained from doing so. It offers guidance and suggestions to Governments and non-governmental actors alike on how they can work together to reduce disaster risks.**

Many countries have made commendable progress in reducing mortality risk, at least for weather-related hazards. Unfortunately, far less progress is being made on addressing other disaster risks, and the cost of disaster-related economic loss and damage is still rising.

The biennial global assessment of disaster risk reduction was prepared in the context of the United Nations International Strategy for Disaster Reduction (UNISDR). GAR11 explores the challenges for effective disaster risk reduction (DRR) investment and highlights the need for systematic accounting of disaster losses and impacts and comprehensive assessment of disaster risks. These are critical transformative steps that allow governments to visualize and assess the trade-offs.

The International Strategy for Disaster Reduction (ISDR) is a strategic framework adopted by United Nations Member States in 2000. The ISDR guides and coordinates the efforts of a wide range of partners to achieve a substantive reduction in disaster losses. It aims to build resilient nations and communities as an essential condition for sustainable development.

The Hyogo Framework for Action World Conference on Disaster Reduction, held in Japan in 2005, concluded a groundbreaking agreement that provides a clear mandate for action to reduce disaster risks, namely the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. The overriding expected outcome of the Hyogo Framework for Action (HFA) is the 'substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and states'.

Currently, 133 countries are reviewing their progress towards the objectives and goals of the HFA for 2009-2011. Governments have reviewed their progress against each of the Priority Areas of the HFA, and have also provided detailed information on challenges in critical areas such as investment and risk assessment, with much supporting evidence.

Governments have explicit responsibility for the safety of publicly owned assets and for protecting the lives, livelihoods and uninsured private assets of households and communities after disasters. Each country has its own unique risk profile of extensive, intensive and emerging risks. Ideally, Governments should adopt a mix of prospective, corrective and compensatory

risk management strategies. Without accounting for disaster losses and impacts, few countries have been able to find the political and economic incentives to invest in DRR.

As new development decisions and investments are taken, risks may not be immediately apparent and the potential losses could go unmanaged. This may cause longer-term effects such as increasing poverty, declining human development and reduced economic growth. Climate change adaptation in particular requires increased attention to underlying risk drivers, reducing vulnerability and strengthening risk governance capacities.

## Risk trends

Risks associated with disasters are complex and dynamic, therefore exposure to certain risks can increase whilst exposure to others does not. GAR 2011 indicates, for example, that while earthquake mortality risk may be increasing, particularly in countries experiencing rapid urban growth, mortality risk associated with major weather-related hazards is now declining globally. This trend includes Asia, where most of the risk is concentrated. Although the number of people exposed to tropical cyclones and floods continues to increase, countries are successfully reducing their vulnerabilities and strengthening their disaster management capacities.

However, apparent success in reducing mortality from tropical cyclone disasters has not translated into improvements in the governance of earthquake risk. The multiple feedback loops that exist among urbanization, ecosystem decline, poverty and governance allow risk to be configured while simultaneously obscuring causality. In attempting to reduce risks associated with a range of hazards, authorities must make trade-offs between them.

Countries are also faced with a range of emerging risks associated with extremely low-probability hazards such as volcanic eruptions or extreme space weather, and new patterns of vulnerability associated with the growing complexity and interdependency of the technological systems on which modern societies depend, including energy, telecommunications, finance and banking, transport, water and sanitation. These new



Image: Julio Serje

Post-Nargis flooding in Myanmar

vulnerabilities multiply disaster risks, which can exponentially magnify impacts.

#### **Trends and patterns in DRR — progress against the HFA**

The HFA is a comprehensive set of actions that countries can take to strengthen their risk governance capacities. By offering a framework for analysis, it catalyzes both strategic and action-oriented planning.

Good overall progress in disaster management is one of the HFA's major achievements, but challenges remain. In particular, low-income countries find it harder than higher-income countries to make the investments necessary to reduce urban risk.

#### **Investing today for a safer tomorrow**

The decision to invest in DRR is clearly not technical or administrative — it is fundamentally political. In the HFA Progress Review, less than half of the countries surveyed reported that they had DRR provisions in their recovery and reconstruction budgets.

When governments are unable to mobilize timely resources for recovery and reconstruction, the direct costs and impacts of a disaster can cascade into a range of other negative social and economic

outcomes.<sup>1</sup> Corrective risk management investments can be very cost-effective if they concentrate on retrofitting the most vulnerable and critical facilities, rather than being spread widely over many risk-prone assets.

Some ex ante budgetary allocation for disaster response is common. In some countries, this funding takes the form of more general contingency reserves. In their 2009-2011 HFA monitoring reports, 44 out of 76 countries reported that they maintain some form of national contingency funds for disaster response purposes.

Ideally, these resources should at least be sufficient to meet expected immediate relief needs in a 'good' year of low losses but in a number of countries, even this minimum level cannot be reached.

Most governments have no prior regular funding arrangements for post-disaster reconstruction, instead implicitly relying on reallocations (at national and local levels), future capital investment budgets and external assistance, leading to protracted reconstruction efforts with potentially adverse social and economic implications. Explicit DRR budgets are very limited and more general





Ethiopian drought

government spending on DRR is probably very low. It is impossible to be absolutely definitive on this because DRR spending is not monitored.

In the 2009-2011 HFA monitoring reports, 49 out of 79 countries indicated that they have a specific allocation for DRR in the national budget. However, of those 49, 16 included no mention of any specific DRR spending or related budgetary arrangements in their supporting narrative. A further nine indicated that DRR was financed out of specialized funds for other issues and campaigns (such as health, literacy, environmental protection and social development) or sectoral budgets, but mentioned no specific allocation for DRR in the budget. Others indicated specific structural and non-structural disaster risk management initiatives but only 14 countries made reference to some form of budgetary arrangement for DRR. Overall, 25 countries explicitly indicated that they have inadequate funding for DRR, several of them admitting that they have no financial resources at all for this purpose.

#### **Investment in DRR — Peru**

Between 1970 and 2009, a total of 105 droughts, floods, mudslides, frosts, earthquakes and volcanic eruptions caused 74,000 deaths

and affected 18 million people in Peru. Additionally, in the periods 1982-1983 and 1997-1998, the El Niño phenomenon caused estimated losses of US \$6.8 billion. In 2010, floods and mudslides caused by rains left 92 dead and 235,000 people affected, 27,000 houses destroyed or damaged, and 11,700 hectares of crops ruined.

Governance of DRR in Peru is decentralized, with responsibilities and resources delegated to lower administrative levels. Emphasis is placed on considering risk reduction measures for public infrastructure projects. This means allocating budgets for DRR, increasing capacity of local government to deal with emergency situations, developing human resources with specialized skills and providing disaster contingency loans.

The Ministry of the Economy and Finance (MEF) has made the reduction of vulnerability of public investment projects a priority, based on the understanding of the cost-benefit of such action. The MEF has developed methodology and technical tools that public institu-



Image: Elizabeth Mansilla

Information on disaster risk should inform property pricing

tions and local governments are now using to mainstream DRR into the National Public Investment System project development and approval cycle.

The planned Framework Law for Integrated Disaster Risk Management will put Peru at the cutting edge of legislation on this issue. The National Financial Management Strategy for Disaster Risks comprises emergency reserve funds, contingency credit lines and risk transfer instruments, including public infrastructure insurance.

According to a recent paper by United Nations Capital Development Fund, although there is evidence of increased international cooperation on DRR, the (relative) scarcity of national resources allocated to DRR remains a common concern.

Some of these difficulties are alluded to in Natural Hazards and UnNatural Disasters, a joint United Nations and World Bank report on DRR<sup>2</sup> The report notes that disaster prevention is possible and cost-effective and that resources for prevention are often embedded in other budget items, such as the cost of infrastructure design. The report concludes that despite this potential fiscal saving, expenditures on prevention are generally lower than those on response, which ‘rise in the aftermath of disaster and



Image: Emily Cooper / World Resources Institute

Mangroves in Belize protect the shoreline, saving US\$111-167 million / year

remain high for several subsequent years’.<sup>3</sup> However the report does not directly address the difficulty of financing DRR in its four policy recommendations, which are to:

- Make available information on disaster risk and thereby enable DRR to be reflected in land, property and insurance pricing
- Permit land and housing markets to work freely and reduce rental subsidies, thereby improving incentives for investment in DRR
- Ensure adequate infrastructure is provided and maintained by governments
- Encourage effective oversight.<sup>4</sup>

#### **Opportunities and incentives for DRR**

Public investment that is based on sound needs and risk analysis promotes growth. If public investment becomes a vehicle for DRR, not only is the quality and sustainability of public spending enhanced, but disaster-related losses and costs are also reduced and social and economic development stimulated.





Image: Julio Serje

The coastal defence system in Male', Maldives protected the island capital from the 2004 tsunami.

Climate change adaptation represents a new opportunity to advance DRR. In December 2010, for example, the United Nations Framework Convention on Climate Change (UNFCCC) Parties agreed to the Cancun Adaptation Framework, which calls for climate change-related DRR strategies and consideration of the HFA in particular.<sup>5</sup>

### **Reforming risk governance**

Over the past twenty years, many countries have adopted a decentralized approach to DRR. Most DRR functions require local level planning and implementation, and the HFA itself calls for the decentralization of authority and resources to promote community-level DRR.

DRR needs to be facilitated by appropriate risk governance arrangements and the role of a national policy cannot be overestimated. It must be clear and comprehensive, yet detailed enough to define the roles and responsibilities of different actors in development sectors as well as local governments.

Scaling up local initiatives therefore requires new capacities and skills in local and central Government institutions. It also requires a cultural shift in the attitude of municipal governments, contractors and non-governmental organizations towards working in partnership with low-income households and their representative organizations. Cities are also learning from one another about innovative approaches

to planning, financing and development, allowing a new perspective on risk governance to open up.

### **Redefining development: the way forward**

Major development investments are needed to assist countries to address the structural causes of poverty, upgrade informal settlements, build risk-reducing infrastructure, improve natural resource management, and strengthen governance at all levels. Both DRR and climate change adaptation need to be integrated into national development planning and investment, and local governance should be strengthened and partnerships with civil society facilitated.

The formulation and adoption of international standards for disaster loss accounting and risk estimation may provide additional incentives for countries to take ownership of their risks. Factoring disaster risk considerations into national planning and public investment decisions can radically scale up risk reduction.

Acknowledging and understanding risk is the responsibility of every government. The HFA provides a general roadmap to achieving substantial reductions in disaster losses, but countries now need to set their own specific goals and targets. The time for taking serious action is now.

# Education for sustainable development and education for disaster risk reduction: a winning combination

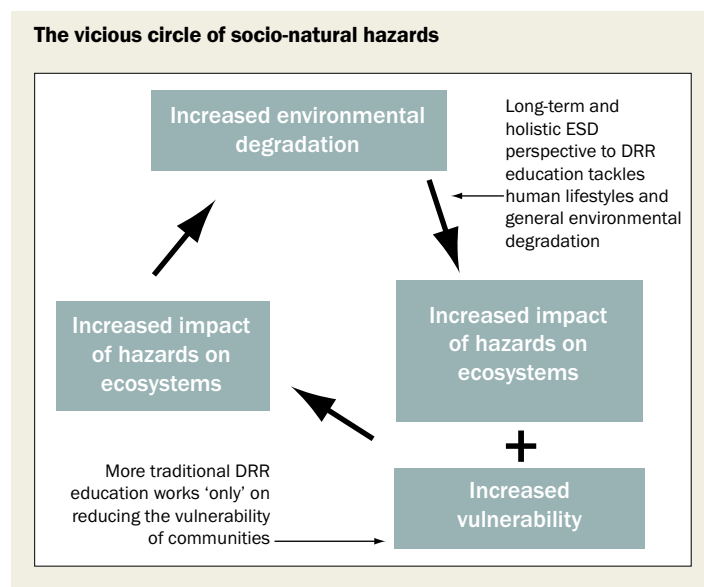
Olivier Laboulle, Assistant Programme Specialist and  
Mark Richmond, Director, Division of Education for Peace and Sustainable Development, UNESCO

**A**s long ago as the 18th century, the philosopher Jean-Jacques Rousseau pointed out in one of his letters to Voltaire that disasters were caused by the vulnerability of the population rather than by the ‘God-made’ natural hazard itself. After the earthquake that hit the capital of Portugal on 1 November 1755, Rousseau wrote: “concede, for example, that it was hardly nature who assembled there twenty-thousand houses of six or seven stories. If the residents of this large city had been more evenly dispersed and less densely housed, the losses would have been fewer or perhaps none at all. [...] How many unfortunates perished in this disaster for wanting to take – one his clothing, another his papers, a third his money?”<sup>1</sup>

Disasters are usually understood as the product of hazards and the vulnerability of a community. As Rousseau implies, the same earthquake striking an uninhabited desert would not have resulted in a disaster (or, at any rate, not the same kind of disaster). Disaster risk reduction (DRR) has therefore focused on reducing the one element of a disaster on which communities have leverage, namely their vulnerability. Vulnerability can be understood as ‘the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard’.<sup>2</sup> This approach is in stark contrast to previous views of disas-

ters as unavoidable ‘natural events’; events which needed to be responded to once they had occurred but for which no preparations would be put in place.<sup>3</sup> Hence, societies have moved from the conception of a God-made disaster (often seen as punitive in character) to distinguishing between man-made vulnerability and immutable natural hazards. The concept of vulnerability clearly links DRR (and therefore DRR education) with the social, environmental and economic dimensions of sustainable development. Today, the world is not the same as the one that Rousseau or even scholars and practitioners in the 1970s observed. Countries and their educational systems are now facing new challenges, for which UNESCO believes a more holistic approach to DRR education in the context of education for sustainable development (ESD) is needed.

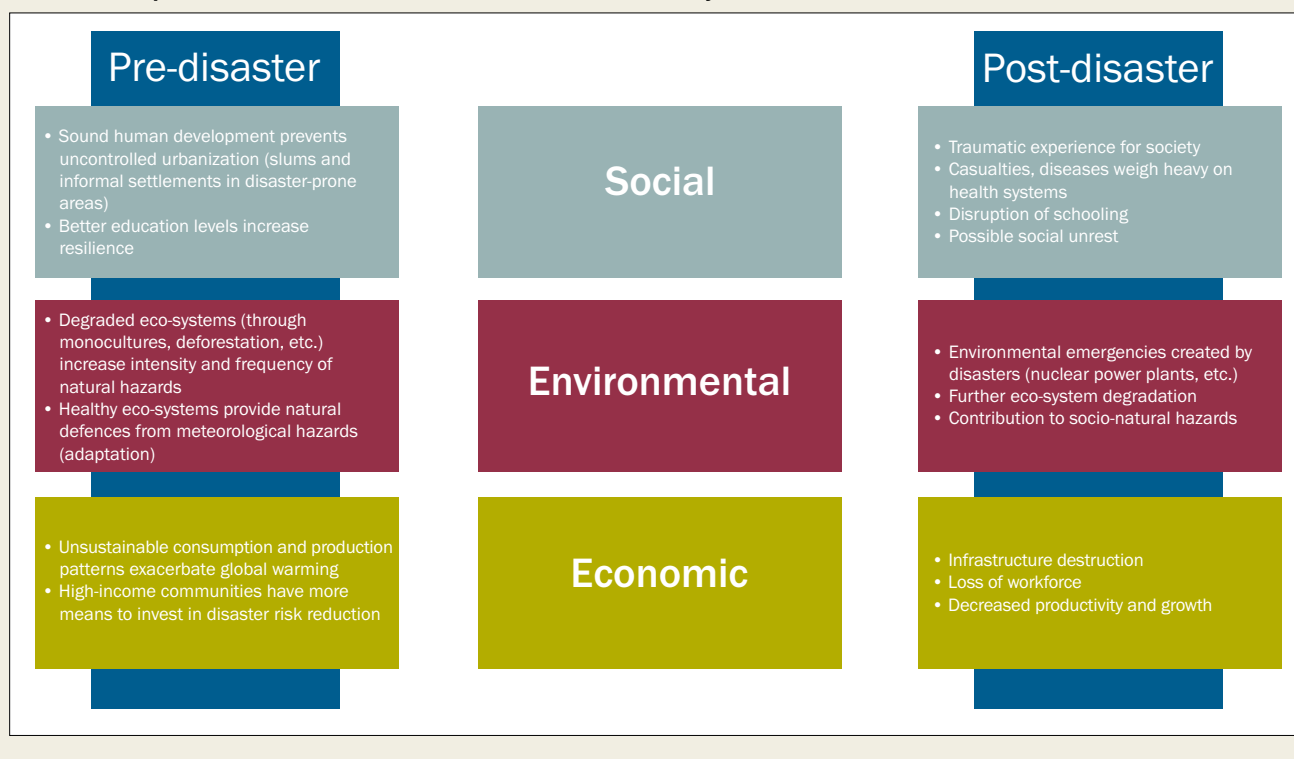
Societies increasingly have to deal with something in between an unalterable natural hazard and the condition of mutable vulnerability, namely socio-natural hazards. The latter describe the ‘increased occurrence of certain geophysical and hydro-meteorological hazard events arising from the interaction of natural hazards with overexploited or degraded land and environmental resources’.<sup>4</sup> Even though deforestation, urbanization and agriculture have long featured in human history, the rapid population growth of recent decades combined with unsustainable consumption and production patterns have contributed to global warming and thereby affected the frequency and intensity of extreme climate events such as flash floods.<sup>5</sup> On a local scale, deforestation and desertification have demonstrable effects on local rainfall patterns and are implicated in the occurrence of droughts.<sup>6</sup> It is against this background that UNESCO, especially in the context of meteorological hazards and climate change, advocates for the mainstreaming of a more holistic DRR education that addresses mitigation and adaptation to hazards, thereby tackling both aspects of disaster preparedness. This approach seeks to break the vicious circle in which environmental degradation is a major factor of increased disaster risk.



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## The relationship between DRR and the three dimensions of sustainability



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broader framework of ESD. DRR relates directly to all three dimensions of sustainability (social, environmental and economic) in terms of both causes and consequences.

Given the strong link between sustainable development and DRR, the link between ESD and DRR education needs to be further strengthened. On one hand, ESD aims to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behaviour that allow for a more sustainable and just society for all.<sup>7</sup> Education for DRR, on the other hand, is an interactive process of mutual learning among people and institutions to minimize vulnerabilities and disaster risks throughout a society and to avoid or limit the adverse impacts of hazards, within the broad context of sustainable development.<sup>8</sup> DRR education and ESD both work towards the goals and within the framework of sustainable development.

### DRR education and ESD: mutually beneficial concepts

UNESCO advocates for DRR education to be conceptualized within the framework of ESD so that both initiatives become mutually beneficial and increase the long-term sustainable development of societies. If applied in the broader perspective afforded by ESD and linked to efforts to mainstream ESD into all of education, DRR education could contribute to the two main aspects of disaster prevention (hazards frequency and intensity as well as vulnerability) by:

- *Reducing the negative impact of society on the environment, thereby reducing the frequency and intensity of hazards (mitigation).* A review on the role of education in DRR<sup>9</sup> found that in primary and secondary school teaching, there are many programmes underway in environmental education. Some of these already include material on natural hazards.

- *Increasing the capacity of society to cope with its changing environment, including hazards (adaptation).* The above-mentioned review also shows that many curricula presently dealing with hazards and risk reduction are, in fact, concerned with teaching environmental stewardship.

In this light, it is evident that there is significant potential for further mutual reinforcement of the educational objectives of ESD and DRR education.

### How ESD benefits from DRR education

*Operationalizing ESD* – DRR education has an important contribution to make to ESD in terms of operationalizing this approach that can sometimes appear rather abstract and theoretical. By showing how it concretely helps communities to reduce their vulnerability as well as the frequency and scale of natural disasters, some aspects of DRR education can serve as a tangible implementation of ESD and this in turn could help advocacy efforts for ESD and the UN Decade of Education for Sustainable Development (DESD, 2005–2014).<sup>10</sup>

*A sense of urgency* – DRR education gives a sense of urgency to some sustainability issues. Since ESD tends to work with a rather long-term perspective, it may not effectively convey the importance of immediate action and implementation. Linking DRR to ESD might help to advocate for the importance of starting ESD programmes today instead of waiting until tomorrow.



Image: © Wikimedia Commons/Justin Hobson

Tornado Elie in Manitoba, Canada, 2007

*Concrete context* – Given the fact that disaster impacts are always local, DRR education has the potential to provide a concrete context for ESD activities. DRR education could help to contextualize the rather abstract concept of climate change, for example, by addressing local urbanization patterns along coastlines, the impact of agriculture and economic development on the forest nearby or even the student's own consumption patterns.

*Empowering learners* – By providing concrete tools for action in the case of a disaster, DRR education can empower learners by enhancing their sense of efficacy and making them feel that they are in control of their lives. This feature of DRR education breaks down the abstract global issues addressed by ESD into something manageable and immediate for learners, something which they can exercise control over and can act upon.

### **How DRR education benefits from ESD**

*Orientation, vision and context* – ESD offers a broad conceptual framework to DRR education. Even though some current DRR education practices are integrative, most would benefit from being associated with and informed by an ESD approach that is more aligned with the broader picture of sustainable development. ESD can serve as the cohesive link between short-term post-disaster response, medium-term preparedness and the long-term drive towards sustainable development. ESD can thus provide the orientation, vision and context for DRR education and, through the mainstreaming of ESD, provide a vehicle for further integrating DRR education into education systems struggling to come to terms with new or more severe hazards and greater vulnerability. For example, building skills and changing behaviours in regard to heavy rainfall are an important part of DRR education in a flood-prone area, but such a response may not challenge urbanization patterns along rivers or acknowledge the ecosystem services of catchment basins upstream. Learning for DRR

in an ESD context would include a long-term perspective with regard to the root causes and consequences of flooding, thereby addressing the above-mentioned socio-natural disasters.

*Didactic and pedagogical framework* – Notwithstanding its breadth of vision, ESD can be treated narrowly, being confined to its content on sustainability and understood as education about sustainable development. ESD's real benefit to DRR should not be limited in this way. That benefit stems largely from the didactic and pedagogical framework in which ESD operates, through which it builds competencies for sustainable development: reflective learning processes; participatory learning and the development of critical thinking skills; the use of holistic approaches, interdisciplinary methods and investigatory learning such as field studies; the inclusion of local and traditional knowledge, the history of human activities and economic development in a locality or region; and so forth.

*Education for change, uncertainty and resourcefulness* – ESD can also be considered as education for change, education for uncertainty or education for resourcefulness, oriented towards building skills and competences that are useful in the context of globalization but can also be of crucial importance in the short-term perspective of a hazard. Experiences from the Kobe earthquake in 1995 show that 80 per cent of the people saved were rescued by their neighbours and not by the authorities.<sup>11</sup> This requires more than the learning of drills and life-saving techniques but extends to developing attitudes, mindsets and skills that typically are promoted by ESD, such as a sense of responsibility and solidarity, an ability to take action and the capacity to think independently and take decisions in a fast-changing environment.

### **A winning combination**

DRR relates to all three dimensions of sustainable development, both prior to and after a hazard. This is even more valid given that the frequency and intensity of meteorological hazards are increasingly related to human activities and environmental degradation. Education systems are challenged by this context and called upon to provide responses to sustainability challenges and disaster risks.

The contribution of education systems could be made more relevant if DRR education and ESD would integrate some of their respective features. Both concepts can benefit greatly from each other, both in terms of content and methodological framework. This would help DRR education to be more interdisciplinary, long-term oriented and holistic in its approach to disasters. Meanwhile, ESD could further benefit from an inclusion of DRR-related themes as they offer a tangible operationalization which could help convince ministries of education and other partners of its importance and relevance today. During the remaining years of the DESD and beyond, UNESCO will advocate further enhancing the synergies between ESD and DRR education in a more systematic and integrative way. This, we believe, will be conducive to both more sustainability at global and societal levels and better disaster preparedness of communities.

# The development of the Global Framework for Climate Services

Geoffrey B. Love, Director of the Weather and Disaster Risk Reduction Services Department of the World Meteorological Organization, Geneva, Switzerland

**A**n independent high-level Taskforce established by the World Meteorological Organization (WMO) has concluded that the widespread, global use of improved climate services, provided through the recently established Global Framework for Climate Services, would provide substantial social and economic benefits. The Taskforce argues that the Framework presents an important, cost-effective opportunity to improve well-being in all countries through contributions to development, disaster risk reduction and climate change adaptation. A global mobilization of effort and an unprecedented collaboration among institutions across political, functional and disciplinary boundaries is required and the Taskforce believes that the Framework can foster and guide this effort.

## Use and users of climate information

### *Climate and society*

The effects of climate are strongly linked to and superimposed on existing vulnerabilities, especially poverty. The poor have fewer financial and technical resources available to help them cope with climate risks and are often also heavily dependent on climate-sensitive resources. Other social, economic, cultural and political factors, such as social exclusion, inadequate social services and infrastructure and lack of access to important resources, especially natural resources such as land and water, can exacerbate the vulnerability of certain groups. For example, women are often particularly vulnerable to climate impacts due to their responsibilities in

the home and their limited access to information, resources and services. Other groups, such as farming communities, the elderly, the disabled and the geographically remote, may also be particularly vulnerable.

### *Recent advances in climate knowledge*

The Earth and its climate are now understood to be a complex system. Computers, observation and telecommunication systems, remote sensing, mathematical models and mapping software provide tools that are helping to unravel the complexity of this system and answer important practical questions concerning future risks and management responses. Climate statistics are increasingly being complemented by innovative risk management approaches. Through scientific development and high quality data sets, such phenomena as the workings and impacts of the El Niño system have been revealed, and the implications of increasing concentrations of greenhouse gases on the climate system are being realized.

### *Making decisions and adding value*

Many sectors, including agriculture, water management, energy, transportation and disaster management make strong use of climate data, both for planning and for routine operations. Cost-benefit studies indicate that significant benefits are being generated from using climate information, both at enterprise level and on the sectoral and public scales. This is underlined by the fact that some sectors and larger companies operate their own in-house services to monitor and predict climate-related impacts. It is also indicated by the growth of commercial services to meet demands for tailored products, particularly for the agriculture and energy sectors. At the same time, there is worldwide recognition that the benefits derived from climate information depend on continued public investment in national data acquisition and archiving, knowledge development and research services, as well as on open exchange of information.

## Components and structure of the Global Framework for Climate Services

The Taskforce has proposed the following components for the Framework:

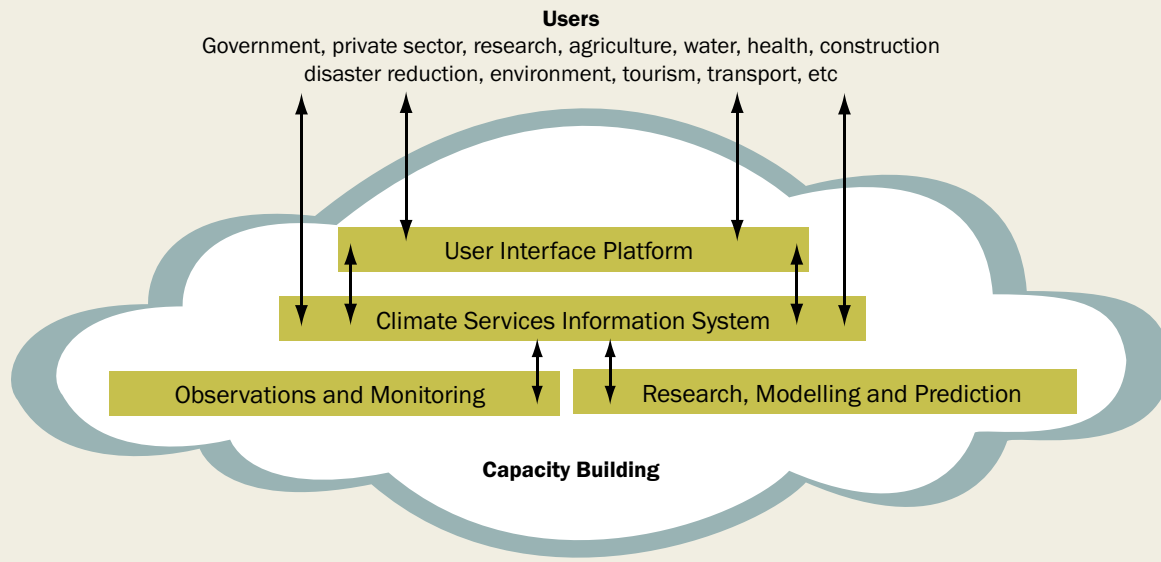
- The User Interface Platform provides a means for users, user representatives, climate researchers and

**A schematic view of some of the processes and interactions that comprise the climate system**



Source: WMO

**A schematic of the components of the Global Framework for Climate Services with capacity-building occurring within and between all components**



Source: WMO

climate service providers to interact, thereby maximizing the usefulness of climate services and helping develop new and improved applications of climate information

- The Climate Services Information System protects and distributes climate data and information according to the needs of users and the procedures agreed by governments and other data providers
- The Observations and Monitoring component will ensure that the climate observations necessary to meet the needs of climate services are generated
- The Research, Modelling and Prediction component will assess and promote the needs of climate services within research agendas
- The Capacity Building component will support systematic development of the necessary institutions, infrastructure and human resources to provide effective climate services.

Many of the foundational capabilities and infrastructure that make up these components already exist or are being established, but they require coordination and strengthened focus on user needs. The role of the Framework should therefore be to facilitate and strengthen, not to duplicate.

**Implementation of the Framework**

*The need for technical expertise*

Implementation of the Framework is a technical activity and will need the full support of a range of technical experts from both user and provider communities to sustain and advance its components (observation, research, information management and exchange and service delivery) in order to meet the objectives defined by governments. An important element of the implementation strategy will be the creation of a range of technical committees comprised of experts, drawn from national institutions, who will work together to build a sustainable Framework to provide global access to climate services.

*Coordination capability of the United Nations*

The United Nations System can be used to coordinate the response to Governments' needs for climate services and to bring together climate service users, providers and experts who maintain climate information systems, observation systems and research and development capabilities. Mobilizing this coordination capability of the United Nations will require establishing a United Nations agency-based secretariat that will be an important supporting element of the Framework.

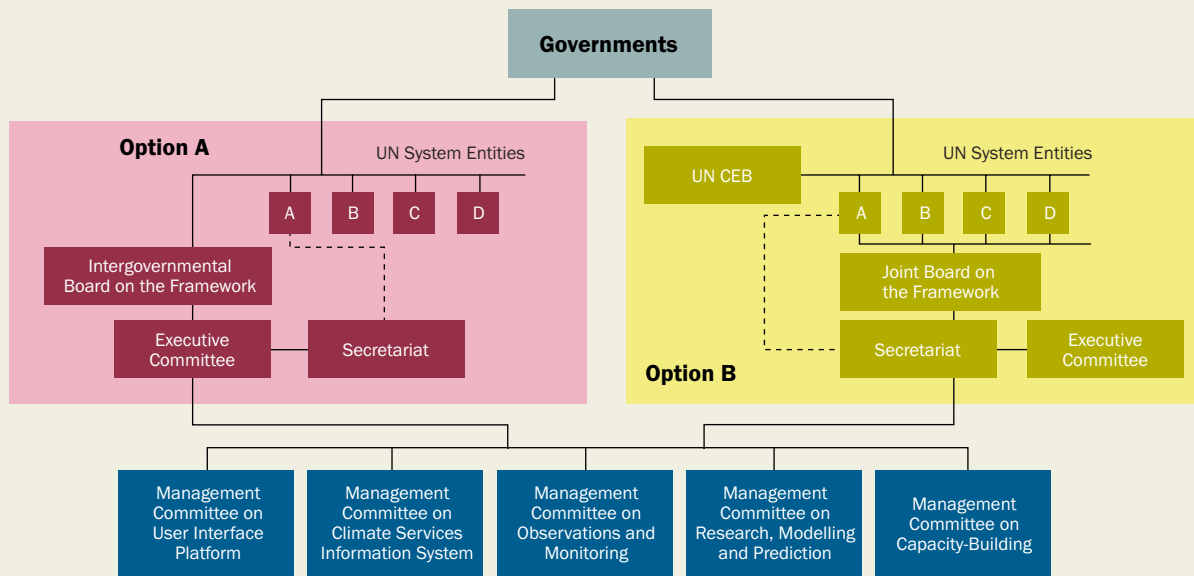
*Communications and advocacy*

Two communications objectives can be distinguished. First, to ensure that potential users and funders are alerted to its existence and role, the Framework will need a communications strategy to create global awareness of its scope and capabilities. A clear priority of the strategy will be to work with Governments to highlight the benefits that flow from investing in the Framework. Second, at a more technical level, the Framework will need a well planned strategy for informing user groups about its various services, noting that in different cultures and for different services, the optimum methods of communication will vary. An aim of this communication will be to build the capacity of user groups to derive the maximum benefit from the climate services available.

*Existing Government commitments*

At the present time, many Governments are already committing substantial resources to maintaining and developing climate service functions on a national scale. One role of the Framework is to add value to these activities through assisting in their global coordination. For a small additional contribution to

**A schematic of the two governance options for the Global Framework for Climate Services**



Source: WMO

the Framework, substantial national benefits will be accessible. Collecting data to agreed standards, building regional capacities in a range of climate-sensitive sectors and exchanging data and expertise regionally and globally are all activities that are largely sustained and enhanced by Government engagement with the Framework. Therefore, a key element of the work plan should be a sustainable, ongoing programme that engages all Governments to participate in and support the work of the Framework. A second key element should be the implementation of ‘fast track’ initiatives to address key shortcomings in the provision of climate services.

#### Implementation priorities

Implementing the Framework will require that two sets of actions be undertaken in parallel:

- Establishing leadership and management capability to take the Framework forward
- Quickly carrying out a number of high-profile capacity-building projects to enable the delivery of climate services to meet the needs of climate-vulnerable communities in the developing world.

Projects undertaken should aim to build the capacity of developing nations to sustain the provision of climate services over the long run, with funding largely derived through resources given for aid purposes.

#### Governance of the Framework

A governance mechanism is needed to provide high-level ownership and direction for implementing the Framework and for overseeing its ongoing planning and management, including monitoring and evaluation functions. It is required as a key means of motivating international cooperative action across multiple sectors and organizational interests, which is a central challenge to the success of the Framework. It is also needed to mobilize and guide resources to the Framework from multiple funding sources. The governance mechanism

will support essential normative functions such as developing technical standards, disseminating information, modelling cross-sector interaction and developing coherent advocacy messages.

#### Proposed options for governance

The Taskforce has put forward two options for governing and implementing the Framework:

- Option A: A new intergovernmental board within the United Nations System
- Option B: A joint committee linked to the working mechanisms of those United Nations System entities committed to supporting and using the Framework as a mechanism for furthering their programmes where climate sensitivity is an issue.

After detailed consideration of these options, particularly of their ability to comply broadly with the requirements outlined above, the Taskforce recommended that option A be adopted. However, at the time of preparing this article it remained for Governments to choose their preferred option.

According to option A, there would be a small secretariat based in a United Nations agency to support the work of the highest level governing body and its committees. The head of the secretariat would be accountable to the chair of the board for all strategic and work programme matters and to the hosting agency for local administrative and fiduciary matters. The Taskforce proposes that the WMO is the best equipped organization to host the secretariat and that the Secretary General of the WMO convene the first intergovernmental plenary meeting of the Global Framework for Climate Services by the end of 2011.



# International Recovery Platform: better rebuilding for resilient recovery

*Sanjaya Bhatia, Knowledge Management Officer, International Recovery Platform Secretariat, Japan*

**O**ne of the most important requirements for a resilient recovery is to allocate sufficient time for it to take place. Following the 2004 Indian Ocean tsunami, for example, some donors initially allocated less than one year, whereas for the Haiti earthquake in 2010 a recovery process of ten years was proposed.

If the timeframe is too short, the danger is that the recovery processes may build back vulnerabilities or even increase them, while risk reduction will amount to little more than a series of add-on training programmes.<sup>1</sup> Short-term planning and rapid disbursement also tend to focus on projects rather than adopt a systematic programme approach.<sup>2</sup>

One frequent problem is a conflict between donor timeframes and real timeframes. Donors are under pressure to disburse funds quickly, typically within two or three years, whereas the recovery phase for a major disaster is likely to be three to five years. The period required will depend on a number of factors, including the goals of the recovery and how far the countries in question have progressed with pre-disaster Hyogo Framework for Action (HFA) policies. Much too will depend on the capacities of communities and local government and leadership – and a number of underlying risk factors.<sup>3</sup>



A twinning project for housing has been set up between Shangdong Province and Beichuan County in China

Image: International Recovery Platform 2009

Governments in disaster-hit countries have to observe both timetables, balancing the political expediencies of short-term measures against the need for longer-term recovery. The World Bank's evaluation of its disaster assistance notes: 'It often happens that activities that might contribute greatly to the recovery effort (and to the borrower's subsequent long-term development) are not included in Emergency Recovery Loan projects because they cannot be completed in the three years allotted.'<sup>4</sup>

It takes time to build institutional capacity, to mainstream disaster risk reduction and climate change adaptation into development policies, and to align initiatives with local or national government budget cycles. It also takes time to pass the necessary laws and build the mechanisms to enforce local regulations. After the tsunami in Aceh, Indonesia, for example, most people understandably wanted to get on with their lives. However, reconstruction can take far longer than anyone would like or might imagine. The Agency for the Rehabilitation and Reconstruction of Aceh and Nias (BRR) has called for education about the challenges and the length of time required to deliver an effective post-disaster reconstruction programme. BRR was able, with time, to reduce some of the pressures to show faster progress that could have led to bigger programmatic problems.<sup>5</sup>

Local governments should therefore set the timeframe based on community capacities and communicate this to donors and other stakeholders. Recent large disasters have shown that donors are becoming more aware of such concerns. For example, during the response to the Gujarat earthquake, the UK's Disasters Emergency Committee initially increased the maximum period during which funds should be spent from six to nine months. An evaluation criticised even this period as being too short and suggested doubling it to 18 months. For the 2004 tsunami response, the DEC raised such a large sum that it increased the period of expenditure to three years. An evaluation proposed raising this to five years, though this was not accepted.<sup>6</sup>

## A window of opportunity

Before a disaster, progress on the HFA is often constrained by poor governance, weak policy and regulatory frameworks, and low political and administrative will and capacity — as well as by nonchalant attitudes towards disasters. After a disaster, however, attitudes change from 'it will not happen to us' to 'what can we do about it?'





Image: © Muhammad Natsir, Kanthil Foundation 2006

Community-driven livelihood recovery in Kotagede, Yogyakarta

This creates a window of opportunity to remove barriers and create new and enforceable regulations.

For example, following a major cyclone in 1991, the Bangladesh authorities reassessed their risk reduction strategies. They redesigned cyclone shelters, enlarging them and relocating them closer to current population centres, taking into account cultural traditions and behaviour with accommodation for economically important domestic livestock. Shelters and all new official buildings were in future to have two elevated stories to protect families displaced by floods. Shelters also primarily took the form of schools, health dispensaries or other public facilities to ensure that they were well maintained and, more importantly, that the public associated them with disaster preparedness. Over the years, these community cyclone and flood shelters have become an integral part of an overall local risk reduction strategy that has further developmental benefits.<sup>7</sup>

The recovery process can also be used to accelerate pre-existing development initiatives and incorporate stronger elements of disaster risk reduction. Again, Bangladesh provides an example. The largest non-governmental organization (NGO) is the Bangladesh Rural Advancement Committee (BRAC), which works with some three million poor individuals, mainly women. Following flooding in 1998, BRAC was able to use its presence in 55 districts to assist 850,000 flood-affected women from landless and marginal farming households. The strategy was to help people get back to their own homes with regular income-generating activities, so most of the activities also fed into longer-term development programmes that BRAC was already running.<sup>8</sup>

### Planning for recovery

Countries can achieve more sustainable recovery if they have effective pre-disaster planning. National and international actors can make efforts to predict disasters while having in place recovery policies and strategies.

Planning should also involve preparing for ex-post recovery. In Latin America, the Organization of American States Unit for Sustainable Development and Environment has undertaken ex-ante planning for housing reconstruction to ensure adequate materials are available following a disaster and that builders, homeowners and Government agencies are aware of damage reduction measures and construction techniques that can result in more hazard-resistant housing. This

includes guidance for Governments, the construction sector, the finance and insurance sectors and homeowners, with in-depth information on construction techniques, standards and materials.<sup>9</sup>

Post-disaster planning should aim to ensure efficiency and public safety and take place swiftly so as to preserve social and economic networks. From the outset, authorities should be concerned with equity, since those with the fewest resources generally get less attention from aid organizations, and get it later. People who are better integrated into economic and social networks will recover faster.

In China, following the Wenchuan earthquake, planning for restoration and reconstruction started soon after the event. Starting early allowed both development and disaster managers to identify the problems and enable decision makers to allocate the resources to meet short-, medium- and long-term needs. The process was led by the National Development and Reform Committee, which worked with 45 ministries, provincial governments and state institutes to prepare a recovery plan, while also seeking good practices and advice from the international community. When the consultations were completed, the authorities started to implement overall planning for restoration and reconstruction.

### Financing recovery

The scale of financial resources available for recovery, especially from non-governmental sources, generally depends less on need and more on media attention. High-profile disasters such as the 2004 Indian Ocean tsunami will attract much more funding than small or medium-sized disasters. Governments need mechanisms to allocate financial, human and material resources and they should focus on the activities most likely to reduce poverty and vulnerability.

It is, however, possible for Governments to offer more resources of their own by rearranging their



Image: © Junichi Hosobuchi, International Recovery Forum 2011

Pre-disaster recovery planning exercise at community level promoted by the Tokyo Metropolitan Government

national development priorities. They should also be able to rely on funds from local government and communities. For example, after the 2006 Yogyakarta and Central Java earthquake, the first housing reconstruction programme for the people of Kasongan village came from the government of the province of Bengkulu. Since these funds were not sufficient to meet the housing needs, the community met to determine a fair way to distribute them. They decided to use the funds to purchase construction materials and rebuild the houses themselves, organizing neighbours into self-help labour groups. Members of each group worked together to rebuild each other's houses, one at a time, giving priority to houses that were in poor condition and to those with elderly family members or children under five. As a result, funding initially intended for 40 houses was used to build 70.<sup>10</sup>

Another option for financing recovery is to twin provinces or municipalities. This involves pairing an economically strong local government with a less developed one. China, for example, has introduced a twinning programme that involves allocating one per cent of the annual income and technical capacity from an economically strong province to fund recovery projects in a less developed one for three years. For example, after the 2010 earthquake, Shandong Province and Shanghai Municipality provided assistance to Beichuan County and Dujiangyan City. They supplied funds to rebuild schools and hospitals to higher standards and upgrade their management and professional capacity, deploying some of their own staff to the newly built institutes to provide on-the-job guidance and bringing teachers, doctors and managers to receive training. Twinning projects like this one are best established before disasters, however, so as to be part of ongoing development programmes.

**Building on cultural and social resilience**

People and communities make decisions every day that influence the inherent risks they face. Their choices are influenced by their available livelihood opportunities, their living arrangements, their treatment of social inequities, and the type of buildings they live in. Some people will be more vulnerable as a result of social exclusion or marginalization — or of cultural attitudes and a lack of capacity to interact with government and the outside world.

Fatalistic thinking can also hamper preparation efforts — but a disaster may offer an opportunity for people to change the way

they think if they are offered sufficient information and options. In Indonesia, for example, up to two-thirds of people living in earthquake zones considered this and other major disasters to be 'takdir Tuhan' ('pre-ordained by God'). Government and NGO representatives from faith-based and secular organizations have concluded, however, that such beliefs are not lasting constraints, but rather coping strategies. And even if a disaster is considered pre-ordained, this does not imply that mitigation is impossible. When religious leaders take responsibility for explaining this, and governments perform their proper duties to the community in a transparent and accountable manner, perceptions can soon start to shift.<sup>11</sup>

Recovery thus provides an opportunity not just to reconstruct physical infrastructure but also to build on communities' inherent cultural and social resilience. For this to happen, however, those affected need to be involved very early in the recovery process. Governments therefore should develop standards and strategies for community participation and input, based on social mapping and a close understanding of community strengths and weaknesses, so that programmes can capitalize on local leadership and latent capacities, especially of women. This community-driven approach to post-disaster recovery requires significant investments of time and human resources but results in greater client satisfaction, quicker disbursement and local empowerment.<sup>12</sup>

**Recovery for resilient development**

Resilient recovery means compressing decades of development into a few years while reducing future risks. But disasters themselves also offer opportunities — driven by (albeit often short-lived) changes in attitude, technical and financial resources and political support. For this reason, despite the stresses after a disaster it is still important to step back and plan a resilient recovery based on local capacity and the needs of the affected population. Recovery offers the opportunity to address the underlying risk factors from multiple hazards and 'build back better.'

# Strengthening the Asian system for disaster risk reduction

*Atsushi Koresawa, Asian Disaster Reduction Center*

**D**isaster risks have been increasing around the globe, as has been most starkly demonstrated by the unprecedented scope and scale of such recent events as the Haiti earthquake, extensive flooding in Pakistan, Australia, Sri Lanka and elsewhere, and heatwaves and wildfires in Russia. Many factors are driving the increase in disaster risks, including a rise in the frequency and intensity of extreme climate events in nearly every part of the world, the continued concentration of people and economic assets in areas prone to severe natural hazards as a result of economic growth and concomitant rapid urbanization, and a level of coping capacity in societies that is not commensurate with growing disaster risks. This is precisely what is happening in the Asia-Pacific region today.

## **Asia-Pacific: a disaster hotspot**

Disaster risks are known to be geographically concentrated in certain countries and specific localities. The Asia-Pacific region is susceptible to natural hazards of almost every kind, from earthquakes to droughts, floods and tsunamis. Moreover, the region accounts for nearly 40 per cent of all natural disasters reported in the last three decades and about 60 per cent of disaster-related deaths. Almost 90 per cent of the total population has been affected by natural disasters in recent decades. In more concrete terms, four of the six largest natural mega-disasters in the past decade have occurred in Asia: the 1994 Indian Ocean tsunami, the 2005 Kashmir earthquake, and Cyclone Nargis and the Sichuan earthquake, both in May 2008. Although this picture may change after the Haiti earthquake figures are taken into account, Asia-Pacific is still the region most vulnerable to natural disasters.

## **Emergence of the Asian system of natural disaster response**

Having long been affected by natural disasters, the Asia-Pacific region has been extremely active and innovative in its endeavours to respond to such events. Indeed, regional collaboration has been driven by the need to deal with recurring catastrophes. During this process, two major natural disasters added their own bursts of momentum to these efforts and are therefore worth mentioning here.

First, in January 1995, the city of Kobe and surrounding parts of Hyogo Prefecture in Japan were hit by a 7.3 magnitude earthquake, resulting in more than 6,400 deaths. The Great Hanshin-Awaji earthquake, also known as the Kobe earthquake, was the first quake to severely damage a megacity in an industrialized nation.

This earthquake led to a number of significant changes in the ways that the international community views and addresses risk. The concept of a 'culture of safety' emerged, requiring that people have a greater awareness of the disaster risks facing them in their

everyday lives. The lessons learned from the Kobe earthquake were so diverse and invaluable that the Japanese government and Hyogo prefectural government joined hands to develop a hub of disaster reduction activities to make good use of those lessons for future generations of Japanese citizens, as well as the citizens of other countries. Since then, the Kobe-Hyogo region has become a venue for many subsequent disaster-related activities and events, culminating in its role as host of the UN World Conference on Disaster Reduction, held in Kobe in January 2005, only three weeks after the Indian Ocean tsunami.

At that conference, 168 governments adopted the Hyogo Framework for Action 2005-2015 (HFA), a ten-year plan to make the world safer from natural hazards. While the HFA continues to change in many ways as countries and people address ever growing disaster risks, it caused a paradigm shift by turning attention from post-disaster operations to pre-disaster activities. More importantly, the HFA has adopted the concept of Total Disaster Risk Management (TDRM), which was developed and promoted by two Kobe-based organizations, the former United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) Kobe Asia Unit and the Asian Disaster Reduction Center (ADRC).

The Indian Ocean tsunami added to the momentum of Asian cooperation systems on different scales. The ASEAN countries initiated a process of negotiation leading to the creation of the ASEAN Agreement on Disaster Management and Emergency Response (ADDMER), which is frequently cited as the world's only HFA-related binding instrument. Similarly in South Asia, the SAARC Comprehensive Framework on Disaster Management for South Asia was developed, based on the HFA.

The UN system also responded proactively. The United Nations International Strategy for Disaster Reduction (UNISDR) established an Asia-Pacific regional unit in June 2005. This unit set up the UNISDR Asian Partnership on Disaster Reduction (IAP) in cooperation with other UN bodies and other regional organizations, including the Asian Disaster Preparedness Center (ADPC) in Thailand and the Asian Disaster Reduction Center (ADRC) in Japan. Since then, the IAP has been functioning as a forum where national Governments, regional intergovern-





Image: ADPC

Padang earthquake, Indonesia, September 2009

mental organizations and international organizations can review the progress made toward the implementation of the HFA and can follow up on and prepare for the Asian Ministerial Conferences on Disaster Reduction.

### **The Asian Ministerial Conferences as regional platforms**

In addition to various regional and sub-regional schemes, the countries of the Asia-Pacific region started a series of biennial conferences of their own. The first in this series was held in Beijing, China in September 2005. The second was held in Delhi, India in November 2007, renamed as the Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) and expanded as a regional platform. The third conference was held in Kuala Lumpur, Malaysia in December 2008, highlighting such emerging issues as public-private partnerships, advanced technology and scientific applications, and approaches to engaging the media.

Most recently, the fourth AMCDRR was held in Incheon, Republic of Korea in October 2010 highlighting the theme of 'Disaster Risk Reduction through Climate Change Adaptation.' The Incheon Declaration on Disaster Risk Reduction called for actions to be taken to raise awareness and build capacity for disaster risk reduction (DRR) and climate change adaptation (CCA); develop and share information, technology, sound practices and lessons learned in climate and disaster risk management; and promote integration of DRR and CCA into development for green growth.

The first theme was based on the recognition that the number of disasters can be considerably reduced if people are well informed and Government and technical agencies pay high attention to capacity-building at all levels. The second theme underscored the importance of sharing information on past experiences, knowledge, tools and good practices to help policy makers and local communities and improve their capacity and resilience in the disasters.

The third theme is most challenging as it tries to bridge current gaps existing between different policy sectors within a broad context

of sustainable development. This entails the integration of DRR and CCA policy options in urban development, land use planning and physical planning, the decoupling of the increase of hazard exposure from economic growth, and the incorporation of risk reduction considerations in planning, zoning and building regulations.

Currently, Governments and international/regional organizations have been engaged in deliberation on how to keep all the promises made in the Incheon Regional Road Map on DRR through CCA in Asia and the Pacific (REMAP) and its associated action plan.

### **HFA implementation in the Asia-Pacific region**

More than six years have passed since the adoption of the HFA in January 2005, but 'the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries' as envisaged in the HFA has not been achieved so far. Countries have been pursuing the goals of the HFA in their own ways with rather mixed results, showing a remarkable contrast between priority areas.

HFA Priority 1 (ensuring that DRR is a national and local priority with a strong instructional basis for implementation) has shown good progress, most notably in the development of new policies and legislations, and in strengthening multi-sector institutional systems. However, HFA Priority 4 (reducing the underlying risk factors) seems to be the most challenging. Progress on other priority areas indicates mixed results.

A closer look at areas where progress across HFA priorities is reported reveals that there are still many gaps and challenges causing stagnation. Various syntheses and country reports show some of the reasons behind this.

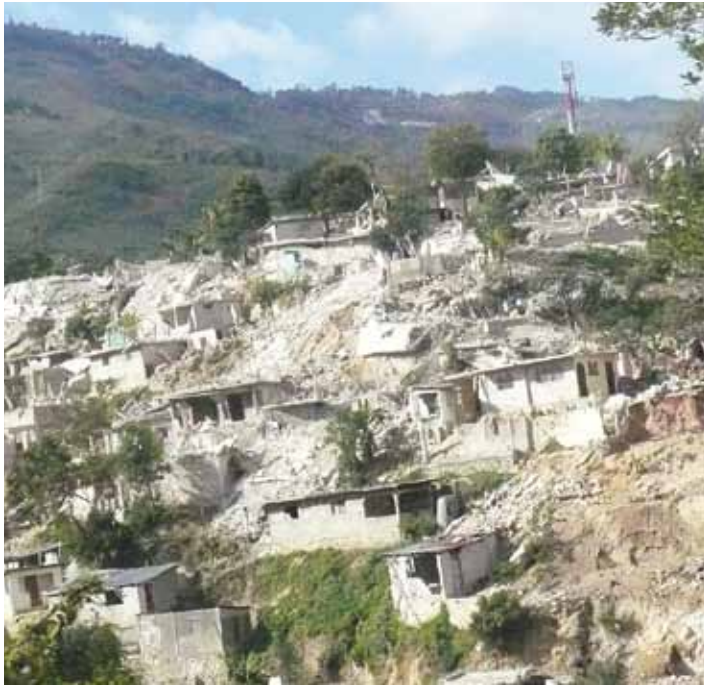


Image: ADFC

Haiti earthquake, January 2010



Image: ADFC

Disaster education, Jakarta Indonesia, March 2010

First and foremost, there is still a lack of political or institutional commitment to DRR efforts under normal circumstances. Often, it is only after large-scale disaster that countries are motivated to improve DRR measures. This has been observed in many recent incidents, most notably the Indian Ocean tsunami of 2004, the Kashmir earthquake of 2005, and cyclone Nargis in 2008.

Secondly, there is also a lack of dedicated or adequate resources, including human and technical capacities for disaster risk reduction. These constraints are especially reported in low-income countries as well as at lower levels of government and community levels within them. In those circumstances, disaster risk reduction efforts often depend on external funds and partners, both bilateral and multilateral. Furthermore, they tend to be seen as ad hoc initiatives rather than continuous practices, with insufficient transfer of skills and competency.

Finally, while new institutional and legislative frameworks have been established in line with HFA Priority 1, the link between national policies on disaster risk reduction and sector policies is often weak or not explicit. DRR organizations often do not have the political authority or technical capacity to intervene in development planning, environmental planning and other relevant fields. In this context, the creation of an integrated multi-sector institutional system for disaster risk reduction that could bring greater cohesion and synergy to ongoing sector-based approaches remains difficult.

Despite many gaps and challenges, the HFA has already produced tangible results on many fronts, most notably, a change in the ways people understand and respond to imminent disaster risks. However, in view of growing losses from natural disasters, further efforts to accelerate the implementation of the HFA are crucial. Therefore, it is necessary to enhance the effectiveness of HFA policy guidelines across countries, both high-income and low-income, and at different levels of government. In this respect, the HFA still lacks consistency among its priority areas in terms of how concrete and how useful these areas might be. HFA Priority 4 is a case in point, where

there are difficulties in integrating disaster risk reduction, climate change adaptation and development due to its cross-cutting nature, involving a wide spectrum of policy sectors. More pragmatic guidelines, together with appropriate technical support, are necessary for all levels of government. Less than four years remain to achieve the planned objectives of HFA. To attain more meaningful results, countries should set strategies based on their own analysis of strengths and weaknesses and by prioritizing their activities.

### **Challenges and future perspectives**

Regional cooperation on DRR in the Asia-Pacific region has stemmed from the overwhelming need to respond to recurring catastrophic events, as mentioned above. Particularly since the 2004 Indian Ocean tsunami, regional and sub-regional initiatives have proliferated. Questions have been raised as to whether this proliferation reflects enhanced regional or national capacities to withstand disasters.

Nevertheless, the entire picture should be seen as a reflection of the diversity and dynamism of the Asia-Pacific region, and as an indicator that a mere streamlining of existing mechanisms and institutions will neither work nor provide a viable solution. Instead, measures should be taken to ensure that all these efforts continue to enhance, not impair, the relevant countries' ownership of current and emerging activities. Measures should also be taken to maintain or strengthen the coherence between these initiatives, and to establish clear links between them, thereby delivering practical gains at all levels, including the community level, and further enhancing the 'culture of safety' in this region.



# Humanitarian response and disaster risk reduction in New Zealand and the Pacific

*Dr. Richard Smith, Ministry of Civil Defence and Emergency Management, New Zealand*

**N**ew Zealand is an island nation astride a vigorously active tectonic plate boundary in the southwest Pacific Ocean. Its geographic location means the country's 4.3 million inhabitants are subject to a wide range of potentially destructive hazards including frequent earthquakes, local and distant-source tsunamis, volcanic eruptions, landslides, flooding, and extreme weather.<sup>1</sup> As a developed country, New Zealand is also highly reliant on its networked infrastructure, which is particularly vulnerable to the range of natural hazards as well as other man-made disruptions.

Many communities are located in areas likely to be affected by extreme events. For example, Auckland city, home to one-third of the country's total population, and its major commercial hub, sits on a widespread dormant volcanic field. The capital city, Wellington, and many other communities in the North and South islands, are located close to major active faults capable of very large magnitude earthquakes.

Despite this high exposure, the country had been spared a major disaster for several decades, with the lull broken by two large earthquakes within a six-month period. The first on 4 September 2010, was a magnitude 7.1 earthquake near the city of Christchurch in the South Island, directly affecting more than 480,000 people. Fortunately, no deaths and only a few serious injuries were reported. New Zealand was not so fortunate when a magnitude 6.3 earthquake struck on 22 February 2011, under the city of Christchurch. At the time of writing this article, New Zealand remains in a state of national emergency with a current estimate of 182 deaths from this earthquake. The proximity and shallow depth of the 22 February event resulted in violent ground shaking estimated to be three to four times more intense in the city than that which occurred during the 4 September event. The result is a higher degree of destruction to buildings within the city. Of the 70,000 buildings across the city assessed by structural engineers, 4050 (5.8 per cent) have been assessed as seriously damaged and unsafe. This figure rises to 852 or 23.1 per cent of central business district buildings, and 844 or 50.7 per cent of heritage buildings. The event is set to become the most costly disaster so far in New Zealand history, with extensive losses to older buildings, unexpected failures of concrete multi-story structures, damaged infrastructure and impacts on the local communities that are still being tallied. Notably, the largely light-framed timber structures favoured for residential buildings in New Zealand performed very well under extremely violent ground shaking.

New Zealand has always had a high awareness of the need to construct buildings to withstand earthquakes, with four revisions to

the building code since 1970, including a 1992 revision that specifically outlined how a building must perform to withstand the forces expected in an earthquake. The building code may be reviewed again following the Royal Commission on the Canterbury Earthquake to ensure the latest seismological, geotechnical and engineering science resulting from this event is incorporated into future construction and to strengthen existing buildings. A commitment to thorough science and research, good engineering, strong and well-enforced regulation, and comprehensive reduction and readiness activities will continue to be needed to reduce the risks to New Zealand from future earthquakes.

## **Disaster risk reduction and emergency management in New Zealand**

The Christchurch earthquake has served to underscore for New Zealand society the importance of investment in disaster risk reduction (DRR), planning and preparedness.

The contemporary approach to DRR and emergency management in New Zealand advocates collaboration and coordination across agencies and sectors (public and private), between different levels of Government, and between Government and citizens.<sup>2</sup> The framework aims to address all hazard risks through the 'Four Rs' — reduction, readiness, response, and recovery.

The approach recognizes that not all hazard risks can be reduced to zero; however, their impacts can be reduced through the process of risk reduction, prevent planning, effective response arrangements, and a better recovery process that seeks opportunities to reduce the impact of future disasters.

Important principles of the New Zealand approach include: (1) individual community participation in decision making; (2) comprehensive and integrated hazard risk management; (3) planning based on consequences; and (4) making best use of expertise, structures and information.

## **Disaster risk reduction: local**

Most disasters occur at the local level. Even large events consist of many small incidents that together give the event its scale. Hence, New Zealand's hazard risk management and planning frameworks place a strong emphasis on local action. Individuals, communities and local government are best placed to decide





Image: Anita Komen

Ground shaking in the 22 February 2011 event was the largest ever recorded for a New Zealand earthquake and resulted in significant damage to buildings

on the management options suited to their specific situations, for example through land-use planning and building control activities. The ‘bottom-up’ approach aims to build a resilient and safer New Zealand with communities understanding and managing their hazards and risks.<sup>3</sup>

Central to DRR at the local level are Civil Defence Emergency Management (CDEM) Groups.<sup>4</sup> These are consortia of local authorities based on regional council boundaries, working in partnership with emergency services (police, fire, health), infrastructure providers, science providers, government departments, non-governmental organisations, and others.

Sixteen of these groups across New Zealand are primarily responsible for assessing and managing local risks, consulting and communicating about risk management with their communities, developing and implementing plans, managing the consequences of emergencies in their area, and assisting other groups in planning and response. Funding for local risk reduction, readiness, response, and recovery activities comes from a local property-based rating system. Central Government funding (from general income tax) is limited and aims to provide the minimum level of assistance required to restore community capacity for self-help and to support development of sustainable solutions.

### **Disaster risk reduction: national**

New Zealand risk reduction policies, programmes and services across central government aim to support local government, businesses and individuals to reduce risk at the community and personal level. One of the key ways it achieves this is developing and administering a broad framework of legislation that underpins sustainable hazard risk management and resource planning. Key legislation that addresses hazard risk reduction includes the Civil Defence Emergency

Management Act 2002; the Resource Management Act; the Building Act 2004 and the Local Government Act 2002.<sup>5,6,7,8</sup> These, and other legislation, underpin a wide range of national strategies, plans, policies, regulatory codes and practices supporting risk reduction at central and local government levels. Specific examples include the Building Code and compliance regime (with its emphasis on earthquake and storm resistance), resource consent processes, and the New Zealand Coastal Policy Statement.

Government agencies also contribute to disaster risk reduction outcomes through the services they deliver locally on a daily basis, including providing social welfare, education and health services that aim to build capability and lessen individuals’ and communities vulnerability to disaster risks.

In recognition of the critical role that network ‘life-line’ utilities (water, energy, telecommunications, transport etc.) play in supporting economic activity and social wellbeing, and the strong dependence of community disaster resilience on infrastructure, the CDEM Act 2002 requires network providers to ‘function to the fullest possible extent’ in a disaster. Network providers are therefore strongly encouraged to undertake their own business continuity management, and to work collaboratively at a national and local level to reduce disaster risk.<sup>9</sup>

Another important contribution of central Government to risk reduction is through establishing priorities and funding national research into hazards, risks, vulnerabilities and disaster resilience, to



Image: GNS Science

The New Zealand Police Headquarters, Wellington, an example of seismic design for a critical facility

support informed decision making. Developing a comprehensive understanding of New Zealand’s hazardscape is an essential step in identifying and prioritising risk reduction activities, alongside readiness, response and recovery planning.

A current initiative is the government funding of the Natural Hazards Research Platform, which brings together researchers from across a range of physical science, social science and engineering disciplines from the public and private sector, to work collaboratively, in partnership with research users.<sup>10</sup>

New Zealand also has a national natural disaster insurance scheme, managed by the Earthquake Commission, designed as provision for the financial costs of repairs to disaster-impacted residential properties. All residential property owners who purchase fire insurance from a commercial provider automatically acquire the Earthquake Commission’s insurance cover.<sup>11</sup>

The central decision making body of executive government that addresses emergency management is the Cabinet Committee for Domestic and External Security Coordination.<sup>12</sup> This committee is chaired by the prime minister and includes ministers responsible

for departments that play essential roles in such situations. To support that process, there is a committee of government department chief executives charged with providing strategic policy advice and working together to ensure coordinated action across Government.

The lead agency for managing planning and response to a national crisis will vary depending on the type of emergency. For example, the Ministry of Civil Defence and Emergency Management (MCDEM) is the lead agency for responding to a civil defence emergency resulting from an earthquake, flooding or other (mostly) natural hazard events. The Ministry of Health is the lead for a human pandemic, and the Ministry of Agriculture and Forestry for bio-security risks.

### Community-based action: a case study

The ability of a community to cope with a disaster is based to a large extent on the risk reduction or readiness measures it takes. However, getting communities to participate in actions that reduce risk or enhance preparedness and create resilience to disasters has proven to be a significant challenge to the New Zealand civil defence emergency management sector.<sup>13</sup> Engaging the community, so that it becomes an integral part of decision-making, and development of arrangements for disaster risk reduction, is an essential part of generating resilience. An engaged community will be more likely to participate actively in managing its own risks, creating the capability to successfully manage a crisis when it occurs, absorb and reduce disaster impacts, and aid recovery.

An example of an engaged community is Taupo Bay in Northland, in the upper North Island.<sup>14</sup> Residents recognised a significant tsunami risk to their community and with a large influx of holiday makers over the summer period understood their community would be vulnerable. With the support of their local district council emergency management officer, volunteers from Taupo Bay developed their own community response plan. This plan included hazard information, contact information and evacuation information.

The volunteers decided an important part of their planning process was to raise the awareness of the hazard within the community, and especially for the significant population of summer visitors. One awareness-raising action was to produce a one-page summary of the community response plan, which was displayed in each household in the bay. The community developed its coping strategies through articulating roles for volunteers in an emergency.

### The Pacific riskscape

New Zealand’s Pacific neighbours are also vulnerable to an array of natural hazards including cyclones, floods, earthquakes, tsunami and volcanic activity. Pacific Island Countries (PICs) are straddled by the Ring of Fire, a zone of high earthquake and volcanic activity that encircles the Pacific basin, and these hazards, along with weather-related events, can devastate lives and livelihoods, destroy environmental assets, wipe out years of hard-won development gains and severely impact struggling





Image: Diamuid Toman

Student volunteers assisting in the removal of liquefaction silt from a residential property

economies.<sup>15</sup> Small land areas separated by a vast ocean, coupled with often tiny populations and the growing impact of climate change, and increased urbanization, exacerbate these problems. As a result, planning for, and implementing, DRR and response interventions can be logistically and financially challenging.

The Pacific region has witnessed an escalation in efforts at a regional, national and local level to reduce risk and to ensure that countries are better prepared for, and able to respond to, natural disasters. These include high-level Government commitments to principles as well as practical activities implemented at the regional, national, provincial and village level.<sup>16</sup>

### Disaster risk reduction

As in New Zealand, there is mounting appreciation in the Pacific of the critical role that disaster risk reduction (DRR) plays in reducing levels of vulnerability and contributing to sustainable development. Investing in DRR also makes strong economic sense. For example the UN estimates that every dollar spent on risk reduction saves between US\$5 and US\$10 in economic losses from disasters.<sup>17</sup>

Relative isolation, tiny populations, a lack of strong legislative frameworks, struggling institutions with limited budgets, incomplete hazard information and at times uncoordinated approaches, has meant that the effectiveness of some of these efforts across the region has been mixed.<sup>18</sup>

Donor Governments in the Pacific, for example New Zealand; regional institutions, such as the Secretariat of the Pacific community; multilateral agencies, like the UNOCHA and UNDP; the Red Cross and international and local NGO's; are all engaged in funding or implementing DRR activities in PICs. Regional forums, such as regular meetings of the Pacific Platform for Disaster Risk Management, provide opportunities for these stakeholders to share ideas, exchange information and improve coordination of various interventions.

In supporting countries and communities to reduce levels of vulnerability, and to more effectively manage disasters when they do

happen, the New Zealand government provides funding support to MCDEM to work closely and collaboratively with National Disaster Management Offices (NDMOs) in Polynesia to strengthen their capacity and ability to prepare for and respond to natural disasters. For example technical and mentoring expertise is provided to ensure that emergency plans are relevant and regularly exercised, which in turn will help to strengthen local community-based actions.

Tsunami readiness in the southwest Pacific is another priority for the New Zealand government and a significant scaling in the level of funding reflects this. While the southwest Pacific is a region of intense tectonic activity, some countries, for example Samoa and Tonga, are more at risk of tsunami, due to their proximity to active fault zones, seafloor topography and the orientation of their coastlines, than others. Capitalizing on New Zealand's experience and internationally recognized technical expertise, inundation maps, evacuation routes and community awareness programmes are currently being designed and supported in Samoa.

### Disaster response

New Zealand stands ready to assist its Pacific neighbours immediately following a natural disaster. Upon receiving a request for international assistance and once immediate needs have been assessed and identified, New Zealand can help by providing emergency funding to Governments, multilateral agencies or NGOs, sending relief items, or by providing technical assistance or support.

To ensure a joined-up approach that minimizes the risk of duplication of effort, a New Zealand response in the Pacific is managed via a task force facilitated by the Ministry of Foreign Affairs and Trade (MFAT). This task force includes representation from Government agencies, the New Zealand Defence Force, the Red Cross and NGOs. One of the key response mechanisms is the Government-to-Government arrangement with France and Australia (FRANZ), where the three partners share information and resources to ensure coordinated emergency aid delivery.

In any response, New Zealand supports the reaction mechanisms of national Governments, which have primary responsibility for the well-being of their citizens, local partners and other international actors operational on the ground.

### Building for the future

The enabling and cooperative approach to disaster risk reduction in New Zealand has its advantages and clear progress has been made since enacting the new framework in 2002.<sup>19</sup> However, in both New Zealand and PICs, not all potential partners are actively involved. Building a strong and broad constituency to promote and implement risk reduction and preparedness remains a challenge. Creating meaningful and enduring partnerships between local authorities, the community, and other stakeholders is therefore a clear pathway to higher levels of disaster resilience and better outcomes for all.

# Capacity-development and DRR: an Indian experience

*Professor Santosh Kumar, National Institute of Disaster Management, Ministry of Home Affairs, Government of India*

**I**ndia's vulnerability to frequent catastrophic disasters has forced a reorganization of people and systems. Several 'loud' natural disasters — such as the Orissa super-cyclone in 1999, the Gujarat earthquake in 2001, the Indian Ocean tsunami in 2004 and the Kashmir earthquake in 2005 — happened suddenly and in quick succession, and shocked the country by killing more than 100,000 people and making millions homeless. Silent disasters have also hit the country in recent years — for example, there were three consecutive years of drought in 2001-2003, while floods hit Assam, Bihar, Mumbai Karnataka and Andhra Pradesh in 2006, 2007 and 2008.

Sixty per cent of India's land mass area is exposed to earthquake, 16 per cent is affected by drought, 12 per cent is flood-prone, 8 per

cent is cyclone-prone and 3 per cent is at risk from landslides, while 7,600 kilometres of coastal area is exposed to tsunamis (although the tsunami of 2004 was the only one India has faced in recorded history). A high-powered committee constituted by the Government of India has identified 32 types of hazard, including natural and human-induced disasters.

## **Paradigm shift and institutional development**

All these events and spatial geographical realities have emphasized the need among the Government and the public for radical transformation in the field of disaster management. India became one of the first countries to declare a national commitment to set up an appropriate institutional mechanism for more effective disaster



Image: Mr. Chandni Prasad Bhatt

Women pledged to change the environment and helped lead the development scheme



management at the national, state and district levels. The Disaster Management Bill, unanimously adopted by both houses of parliament, and the Disaster Management Act 2005, demonstrated the national vision of a paradigm shift from post-disaster response to improving pre-disaster preparedness, initiating disaster management projects and strengthening the capacity of the people both for response and mitigation. This strengthened the paradigm shift approach for governing disasters — from relief-based to a disaster risk management approach.

The Disaster Management Act 2005 stipulated the establishment of requisite institutional mechanisms for drawing up and monitoring the implementation of disaster management plans and capacity development, ensuring measures by various wings of the government for prevention and mitigating the effects of disasters, and for undertaking a holistic, coordinated and prompt response to any disaster situation. In the new approach, drawing experience from the International Decade of Natural Disaster Reduction (IDNDR) and the Hyogo Framework for Action 2005-2015 (HFA), capacity-building, training, public awareness and institutional development became the key focus areas of Government initiatives in ex-ante risk reduction. The National Institute of Disaster Management (NIDM) has been established as the apex training and capacity development institute for disaster management in India. NIDM, in consultation with the National Disaster Management Authority (NDMA) and Ministry of Home Affairs (a nodal ministry for disaster management), has developed a capacity development framework which determines various short — medium — and long-term capacity development components. (NIDM also hosts

the South Asian Association for Regional Cooperation Centre for Disaster Management.)

### **Disaster risk reduction in development**

In keeping with dominant global thinking, the Government of India introduced for the first time a chapter on 'Disaster Management: The Development Perspective' in the document of the planning commission. The document categorically reinforced that "the compounded costs of disasters relating to loss of life, loss of assets, economic activities, and cost of reconstruction not only of assets but of lives, can scarcely be conceived. Therefore, all development schemes in vulnerable areas should include a disaster risk mitigation analysis, whereby the feasibility of a project with respect to vulnerability of the areas and the mitigation measures required for sustainability should be built in."

Thus, having continually focused on mainstreaming in the subsequent plans, the Government of India is operationalizing the mainstreaming of disaster risk reduction (DRR) in development plans, as envisaged in the HFA.

### **Capacity development framework**

The capacity development framework focuses on a multi-hazard, multi-sectoral and multi-level approach in addressing all phases of the disaster management



Image: Dashhoi Gram Swaraj Mandal, Chamoli

Men, women and children participate in community-led initiatives

cycle (mitigation, preparedness, response, relief, reconstruction and recovery). In addition to the Government, civil society, the private sector and the community have also changed their focus, joining with the Government to start their own initiatives for risk reduction.

### **Training and knowledge management**

In 1993, the Government of India, acknowledging the IDNDR commitment to DRR, started its first organized, dedicated initiative for training government officials and other stakeholders. To do that, the Government created dedicated institutions at the federal and state levels. Training and capacity development, which started initially in project mode, subsequently became a regular phenomenon in the country. In these government-owned institutions — federal and state levels together — nearly 1,000 training programmes, workshops and seminars are conducted every year. These programmes cover different thematic areas which train almost 35,000 stakeholders every year. Training related to disaster management has also been mainstreamed in various sectors such as education, health, rural development, urban planning, police and agriculture. These institutions are working in close collaboration with national and international training, research and educational institutions. Today, the country is also providing bilateral support in capacity development and training.

### **Public awareness**

Public awareness is one of the most cost-effective solutions for creating a culture of preparedness. It is people who can make the difference in risk mitigation. The Indian Government took a conscious decision to create awareness among various stakeholders and developed a long-term strategy. This was drafted in collaboration with institutions dealing with mass media education, and disaster management training, and representatives from print and electronic media and civil society. Accordingly, an organized mass awareness programme — pre, during and post-disaster — started with print, electronic and folk media in the country. Mock drills for the public and officials, simulating disaster scenarios, became an important component. Disaster management was mainstreamed by incorporating the subject in the curriculum of mass media education, primary and secondary schools, adding a paper on disaster management in professional and technical institutions to strengthen the campaign, and institutionalizing DRR. This is helping to make people more aware and better prepared.

### **Institutional development**

The Government of India continued its initiative to strengthen its institutions for DRR, with the creation of NDMA and NIDM. NDMA was formed to give direction and bring policy change for DRR at the federal level. On a similar pattern, the State Disaster Management Authority and District Disaster Management Authority were established at state and district levels. National policy on disaster management was also established in 2007. Legislation and policy are helping to strengthen new institutional arrangements created for DRR.

Legislation is now helping to make provincial and district-level institutional reforms. These reforms could help by ensuring specific ex-ante budgetary allocation for mitigation projects and programmes. The National Act on Disaster Management has made a special provision for the creation of national, state and district

disaster mitigation funds to support pre-disaster risk mitigation measures. Special risk mitigation projects started with a central focus on training and capacity development components. Scientific, technical and professional institutions came together on one platform and scattered efforts were synergized in a new form of knowledge management. The India Disaster Knowledge Network online portal for DRR is a unique output of the recent efforts. This has started helping all the stakeholders in designing their own capacity development programmes leading to risk reduction.

### **Mainstreaming DRR and development**

At the community level, several good practices can be seen which not only focus on disaster management, but also have a deep impact on mainstreaming DRR in the development process. There is no development activity in a village which does not address DRR. Several success stories have been reported from the field, which are very encouraging for the people as well as for the new system.

Dasholi village, in the Chamoli district of the undivided state of Uttar Pradesh, was severely hit by floods and subsequently by severe landslide, creating large-scale devastation. The area now falls in Uttarakhand, the hill state carved out in the year 2000. A DRR and capacity-building initiative, with the primary goal of mainstreaming DRR, was started in the village. The initiative later spread to other districts in the region, including Uttarkashi, Tehri Garhwal and Pauri Gahrwal. The entire movement is replete with valuable insights into the dynamics of people-led DRR action and community resilience-building.

### **A community-led initiative**

The initiative started in 1976 as a spontaneous response in the form of a non-violent protest against indiscriminate deforestation resulting in frequent floods and landslides. This was not a project-driven initiative, but a people-led movement, which transformed the way the state and local government looked at the issues related to forests and the use of forest resources such as trees.

DRR has been inherent in the entire initiative, with the core concern of survival of life and livelihood. The national and federal governments have recognized it as a major community-led environmental conservation movement, but for a long time it was not seen as a DRR initiative. Later, the initiative was recognized by the local government and the people, and actions were introduced which would lead to DRR. This is an ongoing capacity building process, now organized by the non-governmental organization Dasholi Gram Samaj Mandal and the Government together.

### **Mainstreaming DRR by the community**

This initiative led to risk reduction, enabling risk-free development and sustainable livelihoods. Both women and men have been active participants in the process. Women led the initiative as development activists.





Image: Santosh Kumar, NIDM

Completely changed scenario: from disaster to sustainable development

This success story is about how risk-free development can be achieved by addressing environmental issues with DRR perspective. The women organized themselves as an activist group, made people aware and committed themselves to saving trees from being cut and protecting the natural environment. Broader community appreciation led to the inclusion of men in a women-led initiative.

Some innovative elements of the DRR process include the emergence of environmental conservation as a livelihood issue, men joining a movement led by women, community action forcing the Government to revisit policy and practice on environmental matters, collective local action against corruption, participatory analysis and action as a collective group, and disaster risk mitigation as a way of life rather than as a project activity. These initiatives have had ripple effects in neighbouring villages and districts, making this an unprecedented model of people-led DRR and development.

### Outcomes

An independent assessment conducted by the Space Application Center using satellite data showed the following.

The project area of DGSM has shown remarkable improvement in land use/landcover. Out of 6,224 hectares of forest loss between 1959 and 1969, nearly 50 per cent (2,664 hectares) has been regained through a community forestation drive. Overall, forest statistics indicate that the project area has forest cover of more than 60 per cent, which is fairly good considering the state

of forest in other areas. The watersheds, which were reeling under biomass scarcity before the initiation of eco-development camps, now have surplus biomass, which has significantly contributed to the economic prosperity of the project villages.

To conclude, in order to initiate any capacity-building programme we first need to agree on a common framework and its components. India agreed on the four pillars of training, public awareness, institutional development and bringing about structural and non-structural interventions, and these priorities are working well. The challenge is to continue this initiative on a long-term basis. A projects-and programmes-based approach must be converted to form part of a regular development agenda. Japan's great earthquake of 11 March 2011, coupled with the tsunami, fire and nuclear radiation leading to a complex emergency situation, and the coping mechanisms employed, is a living example of how people and institutions should behave and work together in minimizing the misery of the people. Hence, we need to shift our focus from visible (ex-post response centric approach) to invisible (ex-ante mitigation, and capacity development) as the key approach for DRR, with ongoing activities in mainstreaming DRR as a key focus in the development agenda.

# Challenges in the implementation of HFA in South Asia

*Dr. Sheel Kant Sharma, Secretary General, South Asia Association for Regional Cooperation*

**M**ultiple layers of geological, hydrological and biological hazards, and a complex range of physical, social and economic vulnerabilities have all combined to make South Asia one of the most disaster prone regions in the world today. According to the global database, which has recorded disasters over the last forty years, South Asia, comprising Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka faced as many as 1,333 disasters that killed 980,000 and affected 2.4 billion people and damaged assets worth \$USD 105 billion. These totals are by far the highest among the recorded disasters in any region of the world.<sup>1</sup>

The hazards, vulnerabilities and risk of disasters in South Asia have been further compounded in recent years by the changing climate. The Climate Change Vulnerability Index (CCVI), released in October 2010 by Maplecroft, identifies South Asia as “most at risk from climate change” over the next 30 years, with five countries from the region — Bangladesh (1), India (2), Nepal (4), Afghanistan (8) and Pakistan (16) — figuring among the top twenty countries of the 170 that were surveyed.<sup>2</sup>

In recent years the countries of South Asia, largely through the efforts of communities, and the national and local governments, have been able to significantly reduce the deaths and damages caused by natural disasters. There has been a paradigm shift in the approach to disaster management, from one of post-disaster relief and rehabilitation to pre-disaster prevention and preparedness. All the countries of the region are signatories of the Hyogo Framework for Action, and have developed laws and institutions and comprehensive disaster management frameworks which include early warning of disasters, structural and non-structural measures for mitigation, education, awareness and training and preparedness measures through contingency planning, mock drills and exercises.

Most of the medium scale and large disasters in South Asia have regional dimensions. So regional cooperation for sharing early warning information, knowledge, good practices, capacity-building, research and joint projects for mitigation can serve to reduce the impact of disasters in the region. Although an institutional mechanism for cooperation was created through the South Asian Association for Regional Cooperation (SAARC) in 1985, it was not until 2007 that a concrete step was taken in the shape of setting up a SAARC Disaster Management Centre in New Delhi.<sup>3</sup>

Within a short period of time, the centre has been able to develop a comprehensive regional framework on disaster management and as many as ten road maps covering a wide range of areas, such as risk management of earthquakes, landslides, droughts and urban risks, development of protocols for sharing early warning of disasters,

knowledge networking, risk mapping through unique digital vulnerability atlas, training, capacity building research and documentation, and development of tools and methodologies for community based disaster management and mainstreaming disaster risk reduction in development.

The process of regional cooperation has been painstakingly slow, often blocked rather than facilitated by rules and procedures, hindered by lack of resources and capacities and reluctance of SAARC to accept assistance from donors and international organizations.

Despite the problems of poverty, infrastructure and resources, every South Asian country is on a high trajectory of economic growth and the region as a whole has the potential to be an economic powerhouse in the coming decades. This demographic expansion and unplanned growth might create new disasters, particularly in urban areas which are growing at a rate unparalleled anywhere else. The region is extremely vulnerable to multiple effects of climate change, which will surely increase the frequency, and intensity, of disasters. The emerging scenarios call for enhanced and diversified regional cooperation for disaster reduction.

Unlike the ASEAN agreement on disaster management and emergency response of July 2005, the SAARC comprehensive framework on disaster management, and the SAARC road maps on disaster risk reduction, are not legally binding instruments, although they have been unanimously adopted by the Member States. This has since constrained implementation, and enforcement, and there have since been many instances when countries have not agreed to implement projects that were agreed on in the framework and road maps.

Realizing the importance of developing a legal framework on disaster management, the heads of participating nations decided at a 2008 summit in Colombo that a natural disaster rapid response mechanism should be developed under the auspices of the SAARC Disaster Management Centre. Accordingly, the centre developed a consultative process with the relevant ministries and organizations, which concluded in the drafting of the SAARC agreement on rapid response to natural disasters. Although the motion went through the process at both the official and ministerial level discussions, it could not be signed during the summit meeting in Thimphu in April 2010.





Image: Mishra et al., 2005

Community and population vulnerability of Hutbay, Andaman due to 2004 Sumatra – Andaman tsunamis

Constraints of resources have been another limiting factor in the implementation of the agreed framework and road maps. SAARC has been hidebound in receiving assistance from external sources. Almost all the initiatives of SAARC have been funded by contributions from the Member States, as per the sharing formula worked out on the basis of the size and the population of respective state. Reluctance persists among members to enhance their contributions, which constrains the implementation of regional projects.

Member states have also been reluctant to share critical data on transborder hazards and vulnerabilities, particularly on issues like discharge and withdrawal of water from rivers and reservoirs and rainfall in upper catchment which are necessary for developing regional flood early warning systems.

South Asia is an extremely data scarce region. The observational networks for collection of hazard data are low, with the result that comprehensive data on natural hazards at a micro level are scarce. Secondly, real time transmission of data is mostly non-existent. Historical and time series data on hazards, vulnerabilities and risks are scattered in multiple agencies and very little effort has been made to digitize the data. The Member States and their specialized agencies have also been very conservative in sharing data with outside agencies including the regional organizations. For example, micro level seismic and hydrological data are invariably not shared which makes it extremely difficult to conduct detailed trans-boundary risk assessments of floods, earthquakes and landslides.

A number of different scientific, technical and research organizations are involved with risk assessments. These in turn are under the administrative control of different ministries and authorities of the member states. Even the national focal points on disaster

management have been finding it difficult to coordinate with these agencies for conducting studies or facilitating the SDMC in such studies. Visits to field locations, accessing of reports and documents and meetings with concerned authorities have been beset with multiple challenges that have hindered the process of trans-boundary risk assessments. SDMC finds it extremely difficult to network with such a complex web of institutions.

Lack of trained manpower and adequate financial resources within the regional organizations have further constrained the recording of trans-boundary risk assessment. The SAARC Disaster Management Centre does not always have in-house professionals to conduct such studies and outsourcing has not been easy as requisite financial resources are not always available for funding them.

Despite these challenges, the regional cooperation on disaster management in South Asia has not been insignificant considering the fact that the process of such cooperation started less than five years ago. In this context, reference may be made to three interesting initiatives of regional cooperation in the recent past. First is the South Asia Disaster Knowledge Network (SADKN), which is one of the flagship projects of the SAARC Disaster Management Centre. It is a virtual network involving eight member countries of SAARC and hundreds of organizations and institutions within, and outside, the governments in the region that are





Image: Mishra et al., 2005

Vulnerability of Car-Nicobar Air Force Colony with its damage scenario during the 2004 Sumatra – Andaman Tsunamis

engaged in the collection, creation, dissemination and applications of different aspects of knowledge on disaster management.

The objectives of the SADKN are to:

- Create a one stop source of information on disaster management in SAARC
- Create a network of government, research/ academic institutions and non-government organizations in SAARC Asia on disaster management
- Provide immediate access to documented and published information contributed by the networking organizations in the field of disaster management
- Provide an organized collaborative knowledge base (K-base) to organize and locate information easily
- Establish an environment, which will encourage people of SAARC to create, learn, organize, share and reuse knowledge.

The detailed technical and operational guidelines of SADKN have been developed and agreements have been signed with the member countries for development of the portal. When fully operational, the SADKN will connect the Governments, research institutions, universities, community-based organizations and individuals of the member countries in a common blackboard to share and exchange knowledge, information and data on various aspects of natural and man-made hazards, risks and disasters. The first beta-version of the portal has now been launched for testing and the final version is likely to be hosted in the public domain in the near future.

Secondly, the preparation of a Digital Vulnerability Atlas of South Asia, integrating spatial data on physical, demographic and socio-economic features of different regions for each country is

underway. The atlas will be prepared by the SAARC Disaster Management Centre on a WebGIS platform using the latest remote sensing data showing geo-physical and climatic hazard zone classification on a specific scale and integrating available data on demography, socio-economic conditions, housing types etc. A feasibility study on the project was done through a reputed agency and, based on the recommendations of the study, the implementation of the project has been taken up in collaboration with the specialized agencies of the member states. The first version of the atlas is likely to be launched soon.

The third initiative in the pipeline is the SAARC Climate-related Disasters Initiative on the integration of disaster risk reduction with climate change adaptation. This is one of the four separate, but inter-related, climate change initiatives on mountain, marine, monsoon and climate-related disasters that figure in the *Thimphu Statement on Climate Change* which was adopted at the 16th SAARC Summit in Thimphu on 28-29 April 2010. An expert group will be consulted to give a final shape to the initiative, which would essentially look into how the diverse policy and institutional framework of DRR and CAA in South Asia can be effectively integrated for reducing the risks of disasters in the region. This would be a pioneering project of its kind which would inform the current global debates and initiatives on adapting to climate change in a manner that would also reduce the risks of disasters.

# Disaster resilience: a national goal in Australia

*The Australian Attorney-General's Department, Canberra*

**N**atural disasters are a feature of the Australian climate and landscape. Though Australia is the smallest continent, it is the world's sixth largest country with an area of around 7.7 million sq km. This means the country is vulnerable to a wide range of sometimes extreme weather conditions, impacted by the tropics in the north and by Antarctic influences in the south, and the Indian and Pacific Oceans. The shift to La Niña weather patterns has meant a change from long periods of drought to record levels of rain.

Such events can have personal, social, economic and environmental impacts that may take many years to dissipate. Australia has coped well with natural disasters and continues to do so, through well established and cooperative emergency management arrangements, effective capabilities, and dedicated professional and volunteer personnel. Australians are resourceful and community-minded when faced with disasters. The people of this continent are also renowned for their resilience to hardship, including the ability to innovate and adapt, with a strong community spirit that supports those in need and with the self-reliance to withstand and recover from disasters.

Despite existing strengths, every year Australian communities are subjected to the damaging impacts of disasters on individuals, the economy, infrastructure and the environment.

The country has recently experienced a number of large scale and devastating natural disasters, including catastrophic bush-

fires, the highest level of tropical cyclone, far reaching floods and damaging storms.

The devastating 2009 Victorian bushfires of never-before-seen ferocity that destroyed dozens of communities, took 173 lives, and destroyed more than 400,000 hectares of forest and farmland, tested all elements of response and recovery services to the extreme. Bushfires are nothing new to Australians. After all, the indigenous peoples have recorded them over millennia. But this one shocked the whole nation with its intensity.

The severe weather season of late 2010 and early 2011 has left an indelible mark on the Australian psyche. Not only did extreme rainfall inundate huge swathes of Queensland with flash floods resulting in deaths and community destruction to coastal and inland communities, but within days the coast was struck by severe Category 5 Tropical cyclone Yasi. The same weather pattern resulted in massive rain falls across two other states, eventually causing flooding in Victoria in the south to communities that had seldom seen such floods.

The predicted economic impacts of this year's floods and cyclone Yasi are the largest in Australia's recent history. Together, they are expected to reduce



Image: EMQ

Queenslanders are renowned for their willingness to help each other in times of crisis



economic growth by around half a percentage point in the 2010-11 financial year.

The supply chains for coal exports were severely hampered and production at several big mines has been seriously disrupted. On top of this the disasters destroyed a significant part of the country's food crops. Production will be reduced by around A\$8 billion and may take months, and in some cases years, to recover.

The Australian tourism sector suffered seriously, and other industries — such as manufacturing, retail and transport — have been put under enormous pressure. This is a cruel blow for export sectors already struggling to cope with an unfavourable exchange rate.

The loss of production has also translated into higher prices for families — especially for fruit and vegetables. The region affected by cyclone Yasi produces 90 per cent of Australia's bananas and around one third of sugar cane. The estimated cost of this year's disasters to the Australian Government alone is expected to exceed A\$5.6 billion. The total cost to the Australian economy may be billions more again.

### Developments in disaster resilience

The size, severity, timing, location and impact of disasters are difficult to predict, and a changing climate is increasing the uncertainty about future risks. With international scientific modelling suggesting that climate change will likely result in more frequent and severe weather events, Australia's mostly coastal communities are realizing that rising sea levels are increasing the likelihood of coastal erosion and severe inundation. A potential escalation in the frequency and magnitude of hazards may also present Governments with unprecedented calls on their resources and expertise.

Against this background, Australian governments — commonwealth, state and local — have recognized that a nationally coordinated and cooperative effort is required to enhance the nation's capacity to withstand and recover from emergencies and disasters. In some cases this may require governments and busi-



Members of the community spontaneously volunteer to help the emergency services clean up the city of Brisbane

Image: EMQ

nesses to spend more up front to make long-term savings — to rebuild our infrastructure not just the way it was before but in a different way so that it is able to better withstand future disasters.

As a nation, Australia is now working to increase the collective investment — in dollars, time and effort — in disaster resilience and mitigation initiatives. Such activities will lead not only to long-term savings for recovery and reconstruction but they will lessen the overall impact of damage to communities in psychological and social terms.

In early 2011, a National Strategy for Disaster Resilience was adopted by the Council of Australian Governments (COAG) — the intergovernmental body involving State Premiers and Territory Chief Ministers under the chairmanship of the Prime Minister. The

### Learning through the eyes of children



Raising children's awareness of a wide range of natural hazards is a priority across Australia. The Australian Government has funded a series of projects to achieve this, especially where the projects relate to the use of television or can be digitally interactive.

The peak national fire fighting body, the Australasian Fire and Emergency Service Authorities Council, which also embraces the national collective of state emergency service agencies, has used Australian Government funding to commission the production of a programme of hazard education for 5-10 year olds in such natural disasters as storms and floods, tsunamis, bushfires and cyclones. Using the attraction of a group of cartoon characters, replicating country children and bush animals calling themselves Li'l Larikkins, specific safety messages for such emergencies as electrical storms, flash flooding and riverine flooding, fires and high tides are projected directly to the children. They learn to clean up before bad weather and why they need to stay inside. A complimentary teacher support package of DVD and teaching materials on the cartoon series has been delivered directly to some 14,000 primary schools across Australia.

For older children an interactive online game has been developed, which involves children in solving safety scenarios that threaten the imaginary town of Dingo Creek. Once again teacher support materials are made available to schools.

Teenagers have not been ignored. A series of digital stories using the direct interview methodology, have been compiled involving young people who have actually been personally affected by bushfires and floods. DVDs of this series are made available online and distributed through non-government agencies such as Red Cross, to youth groups and family recovery agencies.

Further information on these initiatives is available from the Australian Emergency Management Institute Website - [www.ema.gov.au](http://www.ema.gov.au)

strategy aims to develop and embed new ways of doing things that enhance existing arrangements across and within governments, businesses and the community.

### A collective responsibility for resilience

The National Strategy for Disaster Resilience recognizes that a disaster resilient community is one that works together to understand and manage the risks that it confronts.

Disaster resilience is the collective responsibility of all sectors of society, including governments, businesses large and small, the non-government sector and community organizations, and individuals. It has been acknowledged at the highest level that if all these sectors work together with a united focus and a shared sense of responsibility to improve disaster resilience, they will be far more effective than the individual efforts of any one sector.

*Role of government:* Under Australia's constitutional arrangements, primary responsibility for the protection of life, property and the environment rests with the eight states and territories who are the first responders to incidents within their jurisdictions. The Australian Government assists the states and territories by providing national leadership in supporting and developing their capacity to deal with emergencies and disasters.



Brisbane city under water

Image: EMQ

Governments at all levels have a significant role in strengthening the nation's resilience to disasters, by:

- developing and implementing effective, risk-based land management and planning arrangements and other mitigation activities
- having effective arrangements in place to inform people about how to assess risks and reduce their exposure and vulnerability to hazards
- having clear and effective education systems so people understand what options are available and what the best course of action is in responding to a hazard as it approaches
- supporting individuals and communities to prepare for extreme events
- ensuring the most effective, well-coordinated response from emergency services and volunteers when disaster hits; and
- working in a swift, compassionate and pragmatic way to help communities recover from devastation and to learn, innovate and adapt in the aftermath of disastrous events.

Emergency management agencies within Australian governments are working collectively to incorporate the principle of disaster resilience into aspects of disaster management, including preventing, preparing for, responding to, and recovering from disasters (PPRR).

This PPRR disaster management methodology has become ingrained into planning arrangements for all state and territory emergency service response and combat agencies over the past two to three decades in Australia.

*Role of business:* There has been strong acknowledgement by Australia's Governments that private enterprise businesses can and do play a fundamental role in supporting a community's resilience to disasters.



Image: EMQ

The Queensland floods caused unprecedented destruction of property



It is the goal of every disaster management strategy to encourage the provision of resources, expertise and many essential services on which the community depends. Businesses, including critical infrastructure providers in such areas as water, power, medical and transport, make a contribution by understanding the risks that they face and ensuring that they are able to continue providing such services during or soon after a disaster.

This continuity of business, alongside the continuity of government services, can be the leadership strength a community needs to draw on to create confidence in recovering from a devastating event.

*Role of non-government organizations:* Non-government and community organizations are at the forefront of strengthening disaster resilience in Australia. It is to them that Australians often turn to for support or advice, and the dedicated work of these agencies and organizations is critical to helping communities to cope with, and recover from, a disaster. Red Cross and St John Ambulance are held in high regard for their long association with response agencies and for taking a primary role during a disaster recovery phase. Some agencies are faith-based such as Anglicare, the Salvation Army, St Vincent de Paul Society and the Adventist Disaster Relief Agency. Many are linked to government services such as the Lifeline counselling service, which often share their contribution beyond the immediate requirements of post-disaster service.

Australian governments will continue to partner with these agencies and organizations to spread the disaster resilience message and to find practical ways to strengthen disaster resilience in the communities they serve.

*Role of individuals:* Community disaster resilience also requires individuals to take their share of responsibility for preventing, preparing for, responding to and recovering from events, the severity of which is not often under their control. They can do this by drawing on guidance, resources and policies of Government, and other valid sources such as community organizations.

The disaster resilience of people and households is significantly increased by active planning and preparation for protecting life and property, based on an awareness of the risks relevant to their local-

ity. It is also increased by knowing about and being involved in local community disaster or emergency management arrangements. In Australia, many are involved as volunteers in emergency services related groups such as the State Emergency Services and Rural Fire Services which have literally thousands of ‘vollies’ as they are colloquially called. Then there are the Coastal Sea Patrol units, Surf Life Saving teams and Volunteer Rescue Associations. It has been estimated that some 500,000 Australians give freely of their time and energy. Some organizations are a mix of paid staff and volunteer operators — such as helicopter rescue groups and a flying doctor service, which flies to very remote rural and indigenous communities.

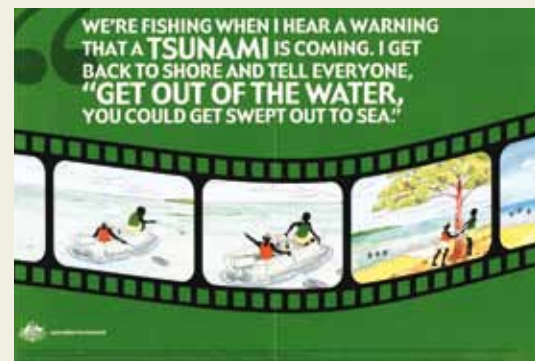
### Understanding and communicating risks

The National Strategy for Disaster Resilience also recognizes that a disaster resilient community is underpinned by a sound knowledge and understanding of local disaster risks. Communities and individuals share responsibility to understand these risks, and how they might affect



Flood boat rescue in a northern New South Wales coastal community

### Indigenous youth tsunami awareness



The potential for a major earthquake-driven tsunami to impact coastal Australia is significant considering the fact that tectonic plates throughout the region are currently showing much activity. Recent undersea earthquake movement near Indonesia and in the Pacific Ocean adjacent to the island nations of Vanuatu and Timor as well as near Chile triggered the activation of the Joint Australian Tsunami Warning Centre in Canberra. Such activation puts a number of Australian emergency agencies on alert for that potential coastal impact — whether it is simply a marine and harbours alert or a full-blown land inundation prediction — with response agencies fully prepared to evacuate scores of residents in anticipation of severe flooding.

Indigenous youth in Aboriginal and Torres Strait Islander communities have been identified at risk during a tsunami event, particularly in northern and north-eastern coastal regions.

This vulnerability was addressed as one of several activities of the national tsunami working group with the development of the Tsunami Community Education Kit for Aboriginal Australians in Remote Coastal Communities in 2009 and the Tsunami Community Education Kit for Torres Strait Islanders in 2010.

With some remote indigenous communities experiencing literacy issues the strategy identified a visual story-book method of explaining what to do when a tsunami warning is issued by the authorities. These visual tools are utilized by schools and community groups with much success.

## Emergency Alert

One of the most significant collaborative projects between the Australian Government and States and Territories in recent years has been the development of a national telephone-based emergency warning capability. The Australian Government has committed in excess of \$26 million for the development of this capability.

In April 2009, the Council of Australian Governments (COAG) agreed to take immediate steps to enhance Australia's natural disaster arrangements through the development of a telephone-based emergency warning system. This system, Emergency Alert, enables participating States and Territories to deliver warnings to landline and mobile telephones based on the subscriber's address. The COAG further resolved that research be undertaken into the feasibility of developing the capability to issue warnings to mobile telephones based on the location of the handset at the time of an emergency.

COAG's decision to prioritize the development of a telephone-based warning capability recognised that most Australians use and have access to landline and mobile telephones and that the percentage of the population who use a mobile telephone continues to increase. The telephone-based emergency warning capability is a useful addition to the existing suite of warning mechanisms because it can deliver intrusive warnings, 24/7. Emergency Alert can deliver messages quickly, accurately and to mass numbers; and to more people than existing mechanisms. It can also provide warnings to the vast majority of individuals in a specifically targeted location (removing over-warning to those not at risk - which results in complacency).

Central to this capability is the Location Based Number Store (LBNS), a central data source that provides the geo-coded telephone number and address information that the alert systems rely upon. The Australian Government manages the contract for this system.

In September 2010, the Australian Government announced that it would fund the establishment costs associated with enhancing the system to enable it to deliver warnings to mobile telephone handsets based on the location of the handset at the time of an emergency, across each of Australia's three mobile carriers.

Emergency Alert was used widely in the catastrophic disaster events of the summer of 2010 11. During cyclone Yasi and the related storm surge, it was used to send over 2.5 million messages to the residents of the affected areas of Queensland.

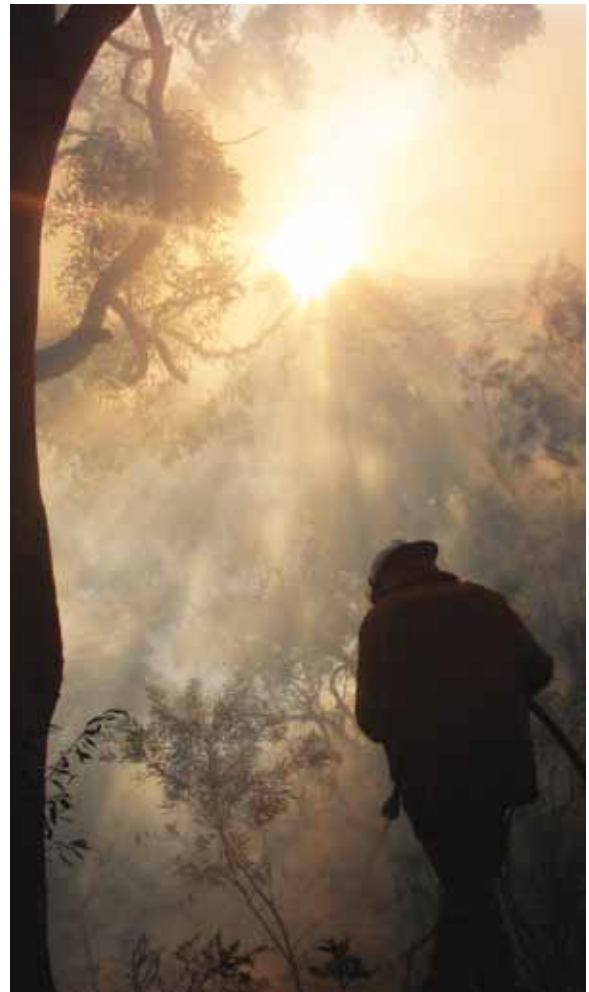


Image: AEMI

Sun and smoke – a rural Fire Service volunteer

society. Understanding the nature and extent of risks, is necessary to inform disaster preparations and mitigate their impact on society.

Significant progress has been made through the introduction of new technologies to communicate risk information, and a broad willingness to understand and use available information to inform appropriate action. Existing collaborative relationships between governments and other organisations are improving the tools and methodologies needed to support enhanced understanding of hazards and risks.

The challenge is to communicate meaningful information about risks to the community. Further work is needed to improve information and data sharing, and more will be done to determine what hazard and risk information could most usefully be communicated to communities. When providing information on hazards and risks, it is important to consider how people might react. Disasters can be inherently unpredictable, as can the responses to them.

Similarly, more consistent information on the costs and benefits associated with risk management and disaster impacts is required to build the evidence base for prioritising and targeting interventions, as well as risk reduction and risk mitigation measures. Such information must go beyond examination of life and property and simple economic assessments to cover the full scope of the social, built, economic and natural environments.

For Australia to become more resilient to disasters, a clearer understanding of its risks and what to do about them is needed, particularly

at the community level. Information on disaster risk should be communicated in a manner appropriate to the audience, and should consider the different needs, interests and technologies used within communities. Knowledge, innovation and education can enhance a culture of resilience at all levels of the community and should contribute to a continual cycle of learning.

Knowledge is fundamental to enabling everyone in the community to determine their hazards and risks, and to inform preparation and mitigation measures. It is also crucial to communicate all relevant and available information during the response and recovery phases of a disaster. Sharing knowledge, including lessons learned from previous events, is also important in promoting innovation and best practice.

Australia's vast and diverse regions, landscapes and climatic variations mean the country will continue to be at risk from the damaging impacts of disasters.

Strengthening Australia's disaster resilience is not a stand-alone activity that can be achieved in a set time-frame, nor can it be achieved without a joint commitment and concerted effort by all sectors of society. But it is an effort that is worth making, because building a more disaster resilient nation is an investment in the future.

# Indonesia: improving investment in communities for risk reduction

*Sugeng Triutomo, Deputy Chief for Prevention and Preparedness, National Agency for Disaster Management, Indonesia*

**O**n Tuesday 26 October 2010 at 5.02 p.m. local time, Merapi Volcano in Yogyakarta, Indonesia spewed out clouds of pyroclastic materials (fluidized rocks and gases). This marked the beginning of a series of eruptions of varying intensities that lasted until mid-November and constituted the biggest volcanic event in 140 years. The 2010 eruption differed from earlier ones in that it featured a vertical explosion that ejected pyroclastic materials up to 7.5km high. Also, although pyroclastic flow from Merapi usually only covers areas around 4-5km from the peak, this time it travelled more than 14km downstream. The eruption was estimated to have a volcanic explosivity index (VEI) of 4.

Fortunately, the Center for Vulcanology and Mitigation of Geological Hazards (PVMBG), the national institution tasked with managing volcanic and other geological hazards, had ordered evacuation for all people living in areas under 10km from the peak, starting from 25 October at 6 a.m. local time. Although the majority of people living close to the mountain could be evacuated in time, thanks to an existing early warning system and the courageous and tireless efforts of emergency volunteers, the eruption claimed 386 lives and made hundreds of people homeless. The damage and loss caused amounted to around Rp4.23 trillion (about US\$470 million).<sup>1</sup>

With more than 300,000 people living in sub-districts directly on its borders, Merapi is the most densely populated volcano in the country. It is not surprising therefore that it has attracted much attention from the central and regional governments, and from scientists as well as non-governmental organizations (NGOs) and community-based organizations (CBOs). Merapi is the first volcano in Indonesia to benefit from a multi-stakeholder management group, Forum Merapi, which brings together regional and local governments, academics, NGOs and CBOs to jointly implement disaster risk reduction (DRR) programmes and activities. Merapi is also the most researched volcano in Indonesia since the Dutch colonial era. Still, after all these scientific endeavours and DRR initiatives, the impact of the 2010 eruption cannot be considered as insignificant.

## Grappling with lost development gains

Indonesia is a country struggling with the effects of many disasters. The damage and loss caused by the Indian Ocean Aceh tsunami of 2004 amounted to around Rp48 trillion. The Central Java and Yogyakarta Earthquake of 2006 caused damage and loss costing Rp29.1 trillion. Subsequent disasters include the Pangandaran tsunami of 2006 (Rp1.3 trillion); the Jakarta Flood of 2007 (Rp5.2 trillion); the West Sumatra earthquake of 2009 (Rp21.6 trillion); the Wasior flood of 2010 (Rp0.28 trillion); and the Mentawai tsunami

of 2010 (Rp0.35 trillion). The combined damage and loss suffered by the country between the Aceh tsunami and the latest Merapi eruption will amount to more than Rp110 trillion (equivalent to US\$12.2 billion).<sup>2</sup> Together with other smaller scale disasters in the same period that were not so well documented, the total may exceed Rp150 trillion (around US\$16.6 billion). This is a substantial sum of money for a developing country like Indonesia.

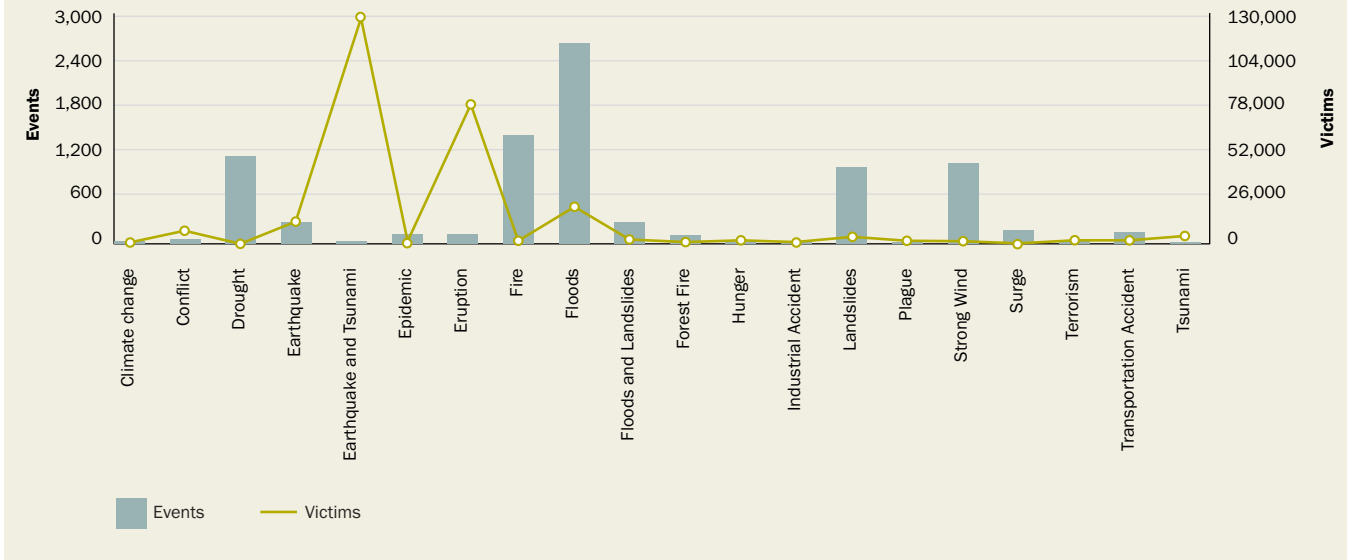
Disasters have deprived Indonesia of many hard-won development gains. With global climate change, increased hydrometeorological-related hazards will further exacerbate the situation. Figure 1 shows the distribution of disasters and victims per type of incident from 1815 to 2011.<sup>3</sup> It can be seen that in Indonesia, hydrometeorological disasters predominate. Also, the economic damage caused by climate-related events is worse than that caused by geological and biological disasters, particularly if we consider that wildfire disasters are closely related to climate change. Data from the United Nations International Strategy for Disaster Reduction (UNISDR) show that from 1980 to 2008, Indonesia suffered a total economic loss of US\$21,219,450,000. The biggest cause was wildfire (US\$9,329,000), followed by earthquake and tsunami (US\$8,962,726), flood (US\$2,372,789) and volcano (US\$344,190).<sup>4</sup>

Besides the large number of lives already lost and properties damaged by disasters, Indonesian people still face risks from multiple hazards. UNISDR statistics show that in terms of human exposure, for tsunami Indonesia ranks first out of 265 countries, with 5,402,239 people exposed; for landslide it ranks first out of 162 countries, with 197,372 people exposed; for earthquake it ranks third out of 153 countries, with 11,056,806 people exposed; for flood it ranks sixth out of 162 countries, with 1,101,507 people exposed; and for drought it ranks thirty-sixth out of 184 countries, with 2,029,350 people exposed.<sup>5</sup>

In terms of economic exposure, for tsunami, Indonesia ranks fifth out of 265 countries, with US\$3.46 billion in GDP potentially lost to tsunami-related disaster events; for earthquake, it ranks eleventh out of 153 countries, at US\$79.13 billion; for landslide, it ranks eleventh out of 162 countries, at US\$0.84 billion; and for flood, it ranks twentieth out of 162 countries, with US\$1.05 billion in GDP potentially lost.<sup>6</sup>



**Figure 1: Disaster events and victims, 1815-2011**



Source: BNPB/DIBI

Since Indonesia is highly exposed to mortality risk and economic loss due to disaster, it is imperative for the country to make efforts to reduce the risks faced by communities and enhance their resilience. Such efforts are particularly relevant if we consider that climate change has increased disaster events and heightened the intensity of meteorologically influenced events in the country. A recent World Bank and UN Publication, *Natural Hazards, Un Natural Disasters: the Economics of Effective Prevention (2010)* suggested that to avoid future loss of GDP due to disaster, Indonesia needs to increase Government spending

on prevention, which until now has been less than post-disaster spending.

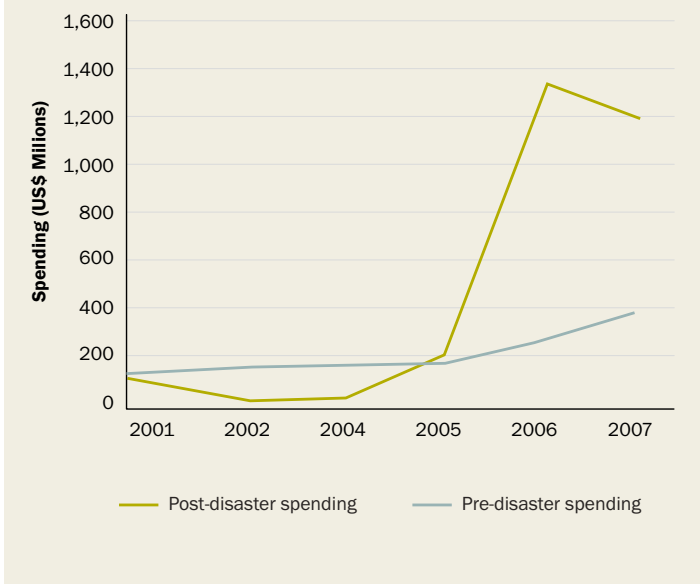
**Investing in people**

Although the Indonesian government has realized the economic value of DRR, funding must compete with many other potential development investment opportunities for limited public budgets. There is a need for information to demonstrate the economic and financial case for DRR investments as a basis for informed financial decision making. It is unfortunate that to date such information, for instance cost-benefit analysis of DRR, has been very limited.

Two studies in particular address the issue of DRR investment in Indonesia. The first is an ex-ante appraisal by Mechler (2004) of an integrated water management and flood protection scheme for Semarang, Indonesia. The appraisal concluded that the proposed scheme would significantly reduce the direct and indirect economic impacts of potential disasters, with a cost/benefit ratio of 2.5, internal rate of return of 23 per cent and net present value of US\$45.5 million.<sup>8</sup> The second is a research report by Saut Sagala on disaster risk reduction investments in West Java and West Sumatra, Indonesia, which discusses the types of DRR investments in the two provinces.<sup>9</sup>

In 2007 the Disaster Management Bill was passed, marking a paradigm shift from response-oriented disaster management to disaster risk reduction. The following year saw the establishment of the National Agency for Disaster Management (BNPB), a ministerial level independent body that is far more powerful than its predecessor, the disaster management (DM) coordinating body. This was followed by the establishment of agencies at the provincial and district/city levels.

**Figure 2: Disaster-related expenditure**



Source: de la Fuente 2009<sup>7</sup>



Image: Dr. Eko Teguh Paripurno, PSMB UPN Veteran, Yogyakarta

More than 900 people have participated in Forum Merapi's obligatory disaster management training

Indonesia has also launched its National Platform for DRR (*Planas PRB*) in 2009, a multi-stakeholder forum to promote DRR and mobilize relevant stakeholders to implement risk reduction measures based on the Hyogo Framework for Action.

### Training for villagers

Starting from 2008, Forum Merapi has conducted obligatory disaster management training (ODMT) for residents of villages close to the volcano. The training programme was initially promoted by Pusat Studi Manajemen Bencana Universitas Pembangunan Nasional, the Center for the Study of Disaster Management at National Veteran University Yogyakarta, Merapi Disaster Prepared Communities, and the Bureau for the Study and Development of Volcanic Technology, with support from UNICEF.

The three-day ODMT programme has been implemented in 28 villages in the most hazardous areas in four districts bordering Merapi Volcano. To date, 29 training programmes have been organized at the village level, nine at the sub-district level and four at the district level. Participants studied the characteristics of Merapi hazards and risks, risk mapping and formulation of village-level DM plans, risk reduction and disaster preparedness, and emergency response drills. ODMT has trained 941 people, 147 women and 794 men.

As part of efforts to build an integrated DM system, a National DM Plan for 2010-2014 has been formulated. At the operational level, BNPB has coordinated the implementation of risk reduction measures based on this plan and the Hyogo Framework for Action, including the formation of two Disaster Rapid Response Teams that can be mobilized in hours to respond to major disasters. The agency, in cooperation with other ministries and agencies, has facilitated the

setting up of early warning systems, produced contingency and preparedness plans, and organized disaster simulations and other initiatives to build resilience at all levels. Many other ministries and agencies have also implemented DRR programmes in line with their key duties and responsibilities.

In terms of DRR investment, Indonesia has received substantial technical cooperation from its international development partners. UNDP has supported the country through an umbrella DRR programme, Safer Communities through Disaster Risk Reduction (SCDRR). The initiative engages ministries and local government agencies to develop comprehensive disaster management systems in several target areas. The World Bank has introduced structural as well as non-structural risk mitigation measures into the post-disaster reconstruction of Yogyakarta and Central Java through its Java Reconstruction Fund. With its Global Facility for Disaster Reduction and Recovery, the Bank also supports the national Government in developing DRR frameworks and standards. Substantial assistance has also been received from the Australian Government through its Australia-Indonesia Facility for Disaster Reduction that supports DRR policies and practices at the national and regional levels.

It is communities that directly face disaster risks, and in recognition of this fact, in future the Government of Indonesia will invest more in DRR at the village level. The Ministry of Health has developed a *Desa Siaga* ('Prepared Village') programme in around 74 per cent of the country's 70,611 villages. Although the focus is on equipping communities for disease outbreak, the programme also addresses disaster preparedness and risk reduction. The Ministry of Agriculture has developed 2,700 villages that can maintain a certain level of food security. Similarly, the Ministry of Marine Affairs and Fisheries has developed resilient villages in coastal areas and small islands throughout Indonesia. The Ministry of Education, supported by UNDP SCDRR, has developed disaster-prepared schools in several target districts/cities, in addition to the programme to mainstream DRR into school curricula.

Currently efforts are underway by BNPB to enhance villages in hazard prone areas through a programme called *Desa Tangguh Bencana* ('Disaster-Resilient Villages'). BNPB has piloted the programme with UNDP in 15 villages in two provinces. The World Bank has also piloted similar initiatives with the Ministry of Public Works in 43 villages. Results from these pilot initiatives will be used to develop *Desa Tangguh Bencana* programmes at villages in hazard-prone areas in all 33 provinces throughout the country. Through this programme and similar initiatives, it is expected that village communities will develop the capacity to identify risks, build structural mitigation infrastructure and facilities as appropriate, disseminate warning messages, and engage in self-sustaining risk reduction measures to minimize future damage and loss from disaster impacts.

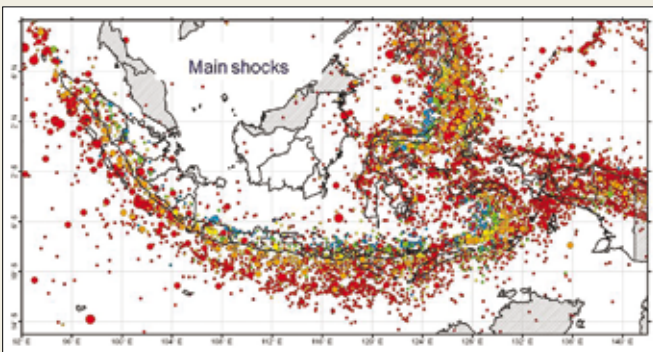
# Earthquake risk reduction in Indonesia

Krishna S. Pribadi and Wayan Sengara, Center for Disaster Mitigation, Institut Teknologi Bandung, Indonesia

**I**ndonesia, an archipelago of more than 13,000 islands spreading 5,000 kilometres from its western to its eastern tips along the equator, is located where three global tectonic plates (Indo-Australian, Eurasian and Pacific) meet. Accordingly, high seismic and volcanic activity can be found along the plates' boundaries. Strong earthquakes are generated along the subduction zones which are located in the sea trenches west of Sumatra, south of Java, Bali and Nusa Tenggara islands, as well as north of Sulawesi and Papua, exemplified by the recent devastating earthquakes (Aceh Mw 9.2 in 2004, Nias Mw 8.6 in 2005, West Java Mw 7.0 and West Sumatra Mw 7.6, both in 2009). Sumatra island is divided into two parts by the Great Sumatra strike-slip fault, which consists of 19 segments. Other inland faults can also be found on Java (which was responsible for the killer Mw 6.3 Yogyakarta earthquake in 2006), Sulawesi (the Palu-Koro fault) and Papua. Indonesian seismicity is well represented in a map of main shocks (M>5.0), collected from 1900 to 2009 by the Indonesian Team for Revision of Indonesian Seismic Hazard Maps.<sup>1</sup>

Due to its high earthquake hazard potential and its physical and socio-economical vulnerabilities, Indonesia is categorized among countries with the highest risk from earthquake. In terms of mortality due to earthquake, Indonesia shares with China and India the highest earthquake mortality index out of the top ten countries (8.5 on a scale of 1 to 10).<sup>2</sup> Earthquake risk in Indonesia is increased significantly by its collateral hazards, in particular tsunamis and landslides. Data from the OFDA/CRED International Disaster Database (EMDAT-CRED)<sup>3</sup> shows that almost 200,000 people were killed by earthquakes and tsunamis from 1900-2011.

Indonesian seismicity (main-shock)



Map showing that Indonesia is located in a highly seismic active zone

Source: Irsyam et al., 2010

Earthquake damage to buildings in Indonesia commonly results from problems with building quality, regardless of the types of the buildings. Poor design of buildings, caused by non-compliance to building codes, often contributes to poor performance under earthquake loading. Lack of detailing in the structural drawing and building specifications leads to improvisation by construction workers, resulting in structural irregularities which may cause force concentrations and disruptions in load transfer elements.

A 2005 study in Aceh shows that much building and infrastructure damage was caused by strong seismic motion causing soil liquefactions, lateral spreads, slope failures, and settlements.<sup>4</sup> Soil erosion and foundation failures which caused the damage to most single- and two-storey buildings close to shorelines were due to high tsunami wave force. Another study, on the reconnaissance survey and preliminary assessment of building and infrastructure damage related to geotechnical earthquake engineering aspects, was conducted after the West Java and West Sumatra earthquakes in 2006 and 2009.<sup>5</sup> Many instances of building and infrastructure damage in both provinces were caused by relatively strong shaking causing liquefactions and lateral spreads in some areas, ground settlements and slope failures.

Traditionally, earthquake mitigation measures in the form of local knowledge have been practised by many indigenous people in the different islands in the earthquake and tsunami-prone areas, such as the traditional construction of communal houses in areas of West Sumatra,<sup>6</sup> the traditional architecture of the local people in Nias island, the tsunami legends of the local people in Simeulue island (which prompt them to move to high ground when a strong earthquake occurs), and the traditional rituals which serve to keep alive collective awareness of earthquake risk when the people of Siberut island in West Sumatra build a new house.<sup>7</sup>

However, the formal policy related to structural mitigation of earthquake risk began to appear only when the Government of Indonesia established its first seismic building code in 1970. In the years that followed, new codes were developed and implemented.

## Seismic monitoring system

Earthquake activities in Indonesia have been scientifically monitored since 1898 when the Dutch Colonial administration installed a Ewing mechanical seismograph for the first time. Since then, various types of





Image: Krishna S Pribadi

Tsunami damaged area in Meulaboh Aceh, 2004

seismometers have been installed in different periods (for example, three and six components, short-period Z components, long-period 3 components, broadband type, strong motion). The great Indian Ocean tsunami of 26 December 2004 has prompted various institutions from different countries to develop the Indian Ocean Tsunami Early Warning System, which depends on a dense seismic monitoring network supported by the installation of more telemetric-based equipment including accelerometers, which are connected to communication satellite systems. The whole system is operated by the national Meteorological, Climatological and Geophysical Agency (BMKG). Presently, the virtual seismic network for the Indian Ocean available at BMKG consists of about 230 stations.<sup>8</sup>

#### **Development of the Indonesian seismic hazard map and seismic building codes**

The 1970 loading code was based on a zoning map developed in 1962.<sup>9</sup> The loading code was updated in 1981, based on a 1978 study.<sup>10</sup> It was subsequently updated in 1987 and 1989 as a national standard for seismic design of buildings, based on a 10 per cent probability of exceedance (PE) in 25 years (200-year earthquake return period). The current Indonesian seismic hazard map for buildings, released in 2002, adopted a 10 per cent PE in 50 years (475-year earthquake return period).

Considering the seismo-tectonics of the current map, it is understood that many earthquake source zones (subduction and shallow crustal faults) need to be considered with more up-to-date maximum magnitude potential based on recent research findings. In addition, more recent ground motion models must be adopted. Following a series of strong earthquake occurrences, revision of the current building codes is now in progress and it is proposed that new Indonesian seismic building codes will adopt a two per cent PE in 50 years hazard map. In addition, a performance-based concept

referring to IBC 2009 will be incorporated. These efforts are part of the disaster risk reduction (DRR) process in Indonesia following recent major earthquake disasters.

#### **Engineering practice**

Except in large cities, compliance with the building code is currently a big issue. Theoretically, this code should be enforced through the enactment of local building regulations by local government authorities in Indonesia. Local building authorities are responsible for overseeing the implementation of building regulations, including the building code, through a building permit system, but lack of capacity of local governments has hampered the effective implementation of the code. Only Jakarta, the capital city of Indonesia, is considered to have good practice in enforcing the building permit system, with relatively good earthquake-resistance engineering construction practice for high-rise buildings through an independent building authority committee reporting directly to the Governor. Many other big cities critically need better building design and construction enforcement and practices, and better building administration and monitoring systems.

For engineered constructions (structures built with engineers' intervention) such as public and private high-rise buildings, compliance is not generally a problem as engineering consultants are always involved as a standard procedure. On the other hand, for non-engineered structures (those built without the intervention of engineers) such as houses and low-storey residential and public buildings (schools, local health centres, worship facilities), there are





Image: Wayan Sengara

A four story engineered building damaged by earthquake in Banda Aceh, 2004



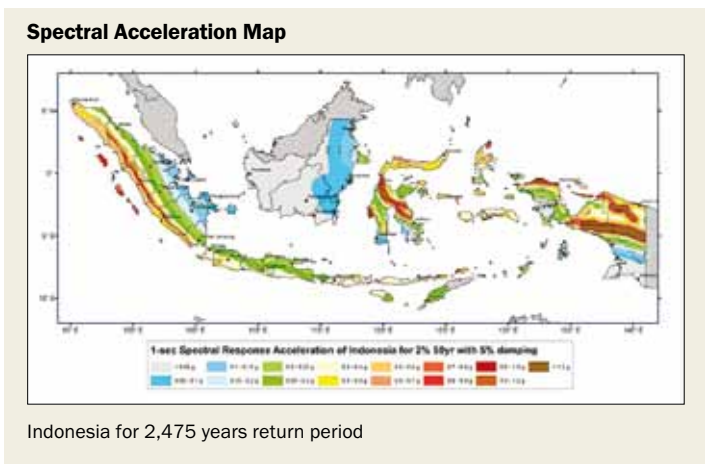
Image: Wayan Sengara

Damage of an engineered building caused by soft story, Yogyakarta 2006



Image: Krishna S Pribadi

Tsunami damaged area in Meulaboh Aceh, 2004



Source: Irsyam et al., 2010

critical issues related to safety, where proper earthquake-resistance construction practices are not yet well followed. Many unconfined masonry residential houses with low lateral strength are still found in high seismic-hazard urban areas and exposed to very high risk of earthquake disasters. Confined masonry residential houses in Indonesian urban areas are considered to be more earthquake resistant than unconfined masonry structures, but many are still vulnerable due to lack of proper reinforcement detailing and good quality materials.

Many earthquake-resistance construction guidelines for residential houses, albeit not supported by effective local bylaws, have been available for a long time in Indonesia. However, dissemination of the guidelines to the community has been lacking. Only after the 2006 Yogyakarta earthquake did the Government produce a set of 'Technical Guidelines for Seismic Resistant Homes and Buildings' for non-engineered structures, enforced by a Ministerial Decree as a requirement for the disbursement of relief funds to support the rehabilitation and reconstruction of houses.

Retrofitting practices are rarely conducted in Indonesia, except for a few demonstration projects<sup>11</sup> and post-disaster reconstruction projects. There are currently no regulations or building codes available that deal with the retrofit of buildings, except for some practical manuals developed by some non-government organizations and individual consultants.

### Urban earthquake risk reduction programmes

There are some (albeit very limited) demonstration projects aimed at reducing earthquake risk in urban settings, exemplified by the implementation of the Indonesian Urban Disaster Mitigation Project initiative as part of the Asian Urban Disaster Mitigation Program (supported by USAID/OFDA)<sup>12</sup> for earthquake risk in Bandung city (1997-2003),



Image: Krishna S Pribadi

Retrofitting can reduce risk from future disasters

and by the RADIUS case study in Bandung city (1999-2000)<sup>13</sup>, supported by the UN International Decade for Natural Disaster Reduction. The projects' components include earthquake risk assessment and risk mapping of the city, which also entails an earthquake scenario-based impact assessment, development of an earthquake risk reduction action plan and implementation of selected urban earthquake risk reduction activities. These include the development of emergency procedures for the city, improvement of local building regulations, capacity-building for related local government agencies, and earthquake risk awareness programmes through the media and schools. Some limited replications of the programme have followed in Bengkulu, Palu, Denpasar, Padang and Pesisir Selatan in West Sumatra, between 2001 and 2003. All the programmes were implemented by the Bandung Institute of Technology, collaborating with the relevant local and national government agencies.

Sustainability is a critical issue for the implementation of the programmes, as illustrated by the fact that the local governments involved in the projects did not carry the action plan and the earthquake risk reduction initiatives further in their development programmes. Ownership of the programmes seemed not to be transferred to the local governments involved for various reasons, such as lack of capacity, competition with other priorities, and in particular major changes in the political structure of local governments as Indonesia was going through a turbulent, major political transition in the period 1998-2005. However, the establishment of the Center for Disaster Mitigation at the Bandung Institute of Technology in 2003 can be attributed as a sustainable by-product of the initiatives and the accumulated knowledge developed during the project implementation. The Center for Disaster Mitigation has since contributed to many DRR initiatives in the country.

#### **Future challenges and necessary action plans**

The current Indonesian seismic hazard maps and national-level vulnerability data indicate that many Indonesian regions have a very high potential for catastrophic seismic disasters, as recently seen in many regions in Indonesia. A strategic long term earthquake and tsunami national risk mitigation plan should be made available for a more concerted approach in reducing the earthquake risk. The National



Image: Krishna S Pribadi

School retrofitting demonstration project, during retrofitting

Action Plan for Disaster Risk Reduction 2010-2012 and the National Disaster Management Plan 2010-2014 launched by the Indonesian National Disaster Management Agency in 2010 should serve as an integrated DRR management plan that need to be implemented, monitored and reviewed for improvement in the future. Disaster risk assessment processes in different level of government administration need to be conducted to formulate appropriate DRR policies and action plans and investment in earthquake disaster mitigation needs to be prioritized. The investment could consist of research in hazard mapping, vulnerability model development, earthquake engineering research to improve and enhance building codes and develop techniques for earthquake-resistant buildings, and infrastructure design and construction. Enhancement of good quality graduate programmes in earthquake engineering and disaster mitigation in universities is also of great importance. Dissemination of building codes to government officials and professionals is crucial. There is an urgent need to strengthen the building authority committees for building regulation enforcement. Dissemination of guidelines for good practice in residential housing must be improved, and training provided in good earthquake engineering practice for government officials, consultants, contractors and masons across the country.



# Disaster risk reduction in Turkey

*I. Ejder Kaya, Disaster and Emergency Management Presidency, Turkey*

**Two devastating earthquakes in the Marmara Region of Turkey in 1999 affected 15 million people over a total area of 100,000 km<sup>2</sup> and caused a total loss of property of US\$12 billion. They became the turning point for the national disaster and emergency management system in Turkey.**

Prior to these earthquakes, the national disaster and emergency management system of Turkey had been mainly focused on post-disaster response and recovery, and there were few incentives and legislative arrangements to encourage disaster risk analysis or risk reduction approaches.

Following the quakes, the academic community and technical authorities agreed on the need to review the system and revise the related legislation and administrative structures. As a result, pre-disaster measures began to play a larger role in Government plans.

During this period, the General Directorate (GD) of Emergency Management was established under the auspices of the Prime Minister's Office, and the urban search and rescue structure was changed with the establishment of Civil Defence Units in 11 provinces employing up to 150 staff each. Military Search and Rescue Teams were set up, along with numerous non-governmental search and rescue organizations. Regional centres for relief and emergency operations were organized under the Ministry of the Interior and local authorities were given extended responsibilities for disaster mitigation. The Government also founded the Obligatory Earthquake Insurance System, the Construction Inspection Process and the Proficiency in Constructional Professions System.

In addition to these developments, the main change was the establishment of the Disaster and Emergency Management Presidency (AFAD), according to which three core governmental institutions dealing with disaster and emergency management issues (GD of Disaster Affairs under the Ministry of Public Works and Settlement, GD of Civil Defense under the Ministry of Interior and GD of Emergency Management) were merged in December 2009 under a new institution called AFAD, attached to the Prime Minister's office.

Within the new administrative structure and legislation, as seen in Figure 1, AFAD works on disaster risk reduction (DRR) directly with the Planning and Mitigation Department and the Earthquake Department. It also conducts indirect disaster risk mitigation work through its Civil Defense, Response and Recovery Departments.

With the rise of global interest in the concept of DRR, Turkey is well aware of the importance of risk reduction strategies. To this end, the country has adopted the document Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters as a key guidance text for national progress in DRR.

## Strategy for disaster risk reduction

An important initiative, the Assessment of Principles of Risk Management Project, was launched with the approval of the State Planning Organization at the beginning of 2011. This project, which will be finalized by 2013, covers methodology and procedures for risk assessment and risk analysis

studies to be held in the provinces. For this project, support will be received from the academic community, including disaster management centres in Turkish universities.

Turkey has also recently established a National Platform for Disaster Risk Reduction, in accordance with the first priority of the Hyogo Framework for Action (HFA) and in close cooperation with the United Nations International Strategy for Disaster Reduction (UNISDR). The first meeting of the Platform will be held in May 2011 with the participation of all stakeholders.

AFAD is also working on the preparation of the National Disaster Management Strategy and Action Plan. The document contains the short-, medium- and long-term DRR objectives in line with the HFA. All Government institutions dealing with disaster and emergency management, as well as the academic community and non-governmental institutions, are involved in the preparation of this document, which will be finalized by the end of 2011.

One of the main national projects in which AFAD is taking part is the assessment and evaluation of the Strategy and Action Plan for Urban Development. As members of specific working groups established under the auspices of the Ministry of Public Works and Settlement, AFAD is dealing with the preparation of legislative arrangements by:

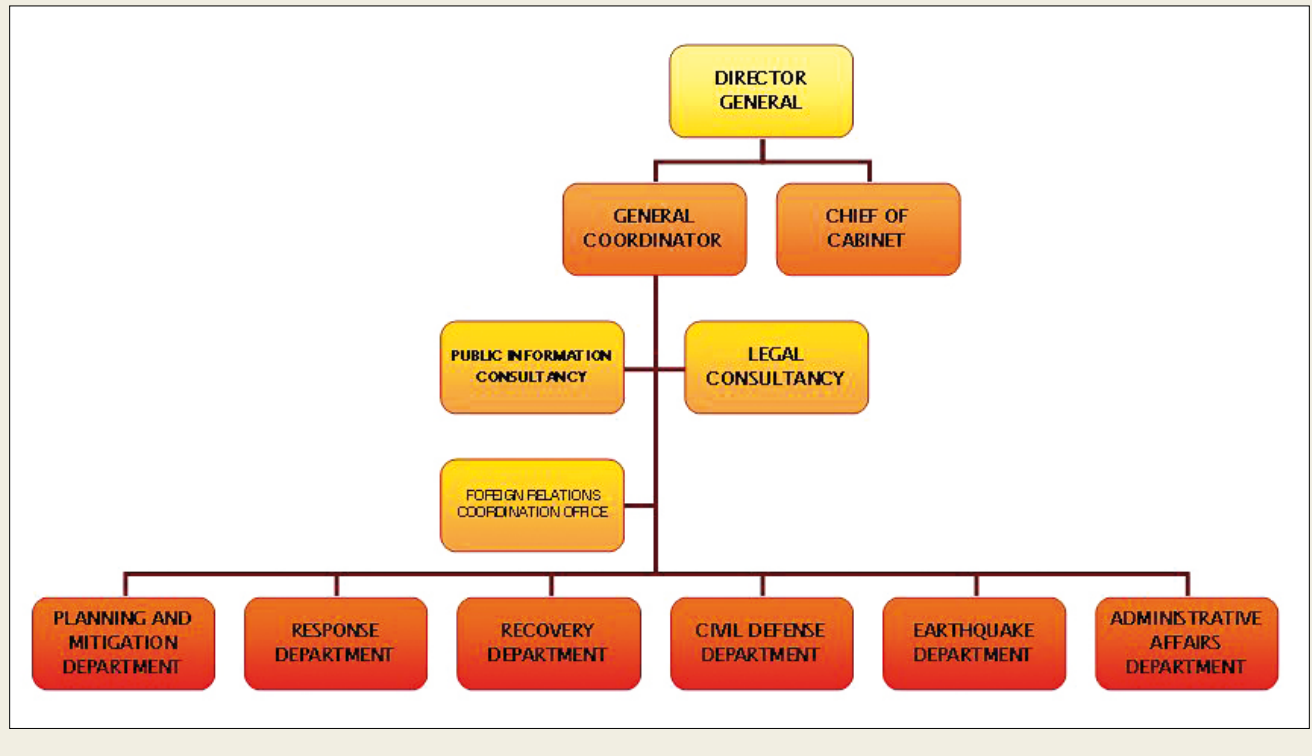
- Formulating the regulations related to disaster and emergency management
- Assessing principles for multi-hazard mapping and mitigation plans
- Preparing a handbook on the implementation of plans
- Prioritizing buildings for earthquake risk
- Providing safe transportation routes in case of disasters.

## *Preparing for hydrometeorological disasters*

Hydrometeorological disaster experts in AFAD are conducting a Flood Forecasting and Early Warning System Feasibility Project, the protocol for which was signed in September in 2010 by AFAD, the State Meteorological Service (DMI) and the Directorate General of State Hydraulic Works (DSI), with a donation by the US Trade and Development Agency. This project covers analysis of area and hydro-meteorological data for flood models, review of current data collection methods and capabilities, comparative analysis of the flood forecasting systems of developed countries, comparative analysis of commonly used flood forecasting and early warning models, technical assessment of flood prevention alternatives and network developments, designation of projects and specifications, financial and economic analysis, impacts on the environment, and economic progress. At the end of the project, the



**Figure 1: Organizational structure of Disaster and Emergency Management Presidency**



Disaster and Emergency Management Presidency (AFAD)

results obtained will be submitted as a final report to the Government authorities in order to proceed to the next step.

AFAD will participate in the process of expanding the Mitigation of Flood Risk in the Flooded Areas in South Eastern Anatolia Project (GAPSEL), focused on hazard mapping, structural measures against disasters and education activities. This is being carried out in cooperation with the Prime Minister's Office and South Eastern Anatolia Project Regional Development Administration. The project proposal, which follows the framework of the European Union Floods Directive, also aims to establish a monitoring, forecasting and early warning system, using flood hazard maps in a pilot region in order to prevent and mitigate flood risks in the long term.

Another project to be conducted on hydrometeorological disasters is the 2012-2013 Capacity Building on Flash Flood Forecasting and Early Warning System Project. The proposal has been prepared by AFAD within the framework of the European Union Floods Directive and within the scope of the EU Instruments for Pre-Accession Assistance Programme, in cooperation with DMI, DSI and the Directorate General of Electrical Power Resources Survey and Development Administration (EIEI). It was submitted to the Prime Minister's Office, Secretariat-General for European Union Affairs (ABGS) in February in 2011, in order to enhance the capacity of the country in this specific area. The project proposal is awaiting approval.

#### *DRR and geographic information systems*

Integrated hazard mapping by using geographic information systems (GIS) is an important topic in DRR, both locally and internationally. In this context, a pilot project has been implemented by AFAD and its predecessor institutions.

After the 1999 Marmara Region earthquakes, the Integrated Multi-Hazard Assessment for North Western Anatolia Region Project

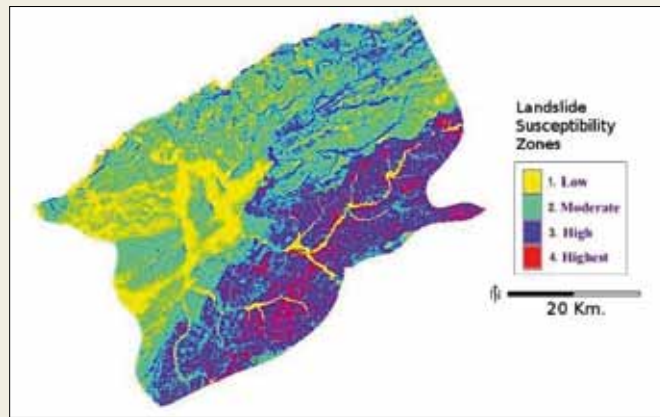
commenced under the GD of Disaster Affairs. The project consists of integrated multi-hazard mapping for three provinces, Kastamonu, Karabuk and Bartın (Figure 2). The region has been subjected to various kinds of natural hazards, including earthquake, landslide, rock fall, flood and wildfire. The main goals of the project are to assess the hazard levels of the pilot provinces and to prepare multi-hazard maps in GIS environments. The project will also guide the rapid response plans of the provinces, supplying information to city planners for land use planning and decision making. Earthquake, landslide, rock fall and flood have been studied and hazard maps have been prepared. Disaster management has also been included in the project. In cooperation with General Mapping Command and the GD of Mineral Research and Exploration, integrated hazard maps of three pilot provinces have been accomplished and there are plans to expand the project to the rest of the country.

Various Government institutions are using these multi-hazard maps for planning purposes and engineering designs. The Prime Minister has ordered hazard assessment and multi-hazard mapping studies for the future.

#### *DRR and earthquakes*

Since Turkey pays special attention to earthquakes due to its location, AFAD has a dedicated Earthquake Department, which contributes to DRR by operating and developing observation network systems such as Weak Motion Seismic Observation Network and Strong Motion Seismic Observation Network, which operate on a 24/7 basis with 473 observation stations. Data collected from these

**Figure 2: Landslide susceptibility map of Bartın Province**



Disaster and Emergency Management Presidency (AFAD)

networks are shared with the public through the web site of the department and stored in the National Seismic Data Center. Other studies conducted by the Earthquake Department include:

- Earthquake hazard mapping on a local, regional and national level
- Assessment of active faults that may produce earthquakes
- Paleoseismicity
- Development of an earthquake early damage assessment system
- Province-based modelling of seismic behavior of the ground for safe and secure settlements
- Development of building codes for implementation in earthquake-prone regions.

A multi-stakeholder consultancy mechanism, the Earthquake Advisory Board, has been established under AFAD. With its support, the Earthquake Department is preparing the National Earthquake Strategy and Action Plan, which will be finalized and launched by August 2011. The AFAD Earthquake Department is a member of several international seismological organizations such as the European Seismology Commission and the Euro-Mediterranean Seismological Center.

#### *Education*

AFAD is responsible for education, training and awareness raising activities in the field of DRR. The target groups of these activities are decision makers, national and local officials from directors-general to experts working on disaster and emergency management, non-governmental institutions and the public.

Starting from the assumption that well-informed populations can protect themselves better against risks and can cope more efficiently with danger in emergencies, AFAD pays special attention to publishing and distributing informative texts and visual materials on disasters and emergencies in order to raise public awareness.

There is always a need to review and update technical information of this kind. For this reason, AFAD organizes theoretical and practical education and training programmes for specific topics in the field of disaster and emergency management with a continuously updated curriculum, to improve the skills of managerial and technical staff working in this field.

#### *International relations*

AFAD, with the assistance of the Foreign Relations Coordination Office, is cooperating with South East European countries through the Disaster

Preparedness and Prevention Initiative for South Eastern Europe (DPPI-SEE) and South East European Cooperation Process (SEECPP). It is working with Mediterranean countries through the Euromed Programme for the Prevention, Preparedness and Response to Natural and Man-Made Disasters (PPRD South); with European countries through the Council of Europe EUR-OPA Agreement and the European Union; with Black Sea region countries through the Organization of the Black Sea Economic Cooperation (BSEC) and also the UN, NATO-the Euro-Atlantic Disaster Response Coordination Center (EADRCC) and the Economic Cooperation Organization (ECO).

AFAD is collaborating with several United Nations (UN) organizations such as the UN Development Programme, the UN International Strategy for Disaster Reduction (UNISDR) and the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). AFAD is also an authorized user of the International Charter for Space and Major Disasters, which supports post-disaster activities by providing satellite images.

AFAD is also collaborating bilaterally with Albania, Azerbaijan, Bosnia and Herzegovina, Macedonia and Romania and trilaterally with Afghanistan and Pakistan on DRR as well as other disaster and emergency management subjects in the framework of the bilateral and trilateral agreements and/or memorandum of understanding signed mutually.

#### **Targets**

Disaster and emergency management systems in Turkey have evolved from a post-disaster approach to pre-disaster planning from the political, institutional, academic and practical points of view. The country has adopted the HFA as a key guidance document during this transition period and has been paying particular attention to DRR progress in accordance with HFA priorities.

The objectives of Turkey, and institutionally of AFAD, are as follows:

- To work in harmony with national and international stakeholders
- To finalise the National Disaster Management Strategy and Action Plan
- To prepare multi-hazard and multi-risk maps for the entire country
- To establish information, monitoring, early warning and communication systems and preparation of operation standards for these systems
- To complete urban risk analyses and mitigation plans
- To create databases for collecting, analysing and synthesizing data related to disasters and emergencies.

Other goals on which Turkey and AFAD are making good progress are the popularization of a culture of risk mitigation and reduction through education, information and awareness raising activities, and the establishment of accreditation standards for voluntary institutions, organizations and people involved in the disaster and emergency management system.

# Preventive risk reduction through space technology

Dr. Anond Snidvongs, Acting Executive Director,  
Geo-Informatics and Space Technology Development Agency, GISTDA, Thailand

**D**espite having a geographic location that renders it relatively less exposed to extreme weather and geological events than many other countries, Thailand is still vulnerable to various types of natural disasters. However, due to lack of awareness, coupled with development processes that have not appropriately taken into consideration climate and geomorphological settings, some systems and sectors have frequently been placed at unnecessarily high risk, lowering their capacities to cope with events when they occurred. Floods, droughts, landslides, forest fires and tsunamis are examples of natural disasters that have taken place in Thailand over the past decade, claiming thousands of lives, displacing hundreds of thousands of people and costing tens of billions of dollars in damages.

## Satellite monitoring

Satellite-based images, both from optical and radar sensors, have been used for the monitoring and assessment of disaster events in Thailand for more than 20 years through the efforts of the Geo-Informatics and Space Technology Development Agency and its precursor, the Remote Sensing Division of the National Research Council of Thailand.

An operational system was set up in 2010 to provide satellite images and other geo-information in support of national efforts to cope with one of the worst floods ever to hit Thailand. More than 50 out of the country's 76 provinces were affected by flash and prolonged flooding that lasted more than two months. About 10 million people and one million households were directly hit, with almost 200 fatalities. Public infrastructure and vast agricultural areas were severely damaged. Regularly updated assessments of inundated areas, taking into account the conditions of roads, bridges, etc., were made available to national and local agencies in both online and offline mode to assist their response and relief efforts. Geospatial information also enabled the national *ad hoc* committee on floods to monitor and evaluate the effectiveness of rehabilitation and compensation for flood victims countrywide.

## Tracking water sources

Drought is another disaster that occurs annually during the dry season from December to April in Thailand. Images from high resolution satellites, including our own Thailand Earth Observing Satellite (THEOS), have been used to monitor water sources of various sizes, from reservoirs measuring hundreds of square kilometres to community ponds. The information gathered enables responsible line agencies to plan and manage water allocation and distribution to communities affected by drought.

As part of preventive preparation for flood- and drought-prone areas, satellite-derived land classification and terrain models of the

areas have been made available to the general public and concerned agencies. Areas that were frequently flooded have been analysed to determine the frequency and return periods so that flood risks can be estimated and appropriate measures taken to minimize the vulnerability of human lives and societies. In addition, our web-based disaster information portal will soon feature a hydrological forecasting system that, coupled with a downscaled numerical weather prediction model, can be assimilated with space-based rainfall estimation technology such as TRMM (Tropical Rainfall Measuring Mission).

## Coordinating the response

Lessons have been learnt from disaster cases in Thailand, both during the events and from post-disaster preventive measures. It is clear that in the immediate response phase, relief efforts have been *ad hoc* and coordination poorly organized. Centralized coordinating bodies in the capital city of Bangkok usually have good access to satellite images and other GIS data necessary to evaluate the overall situation. However, the communication and distribution of such information to provincial levels and to relief teams in the field through the existing communication channels remains inefficient. Geospatial information needs to be processed, bundled and repackaged to match with users' requirements, capacity and urgency.

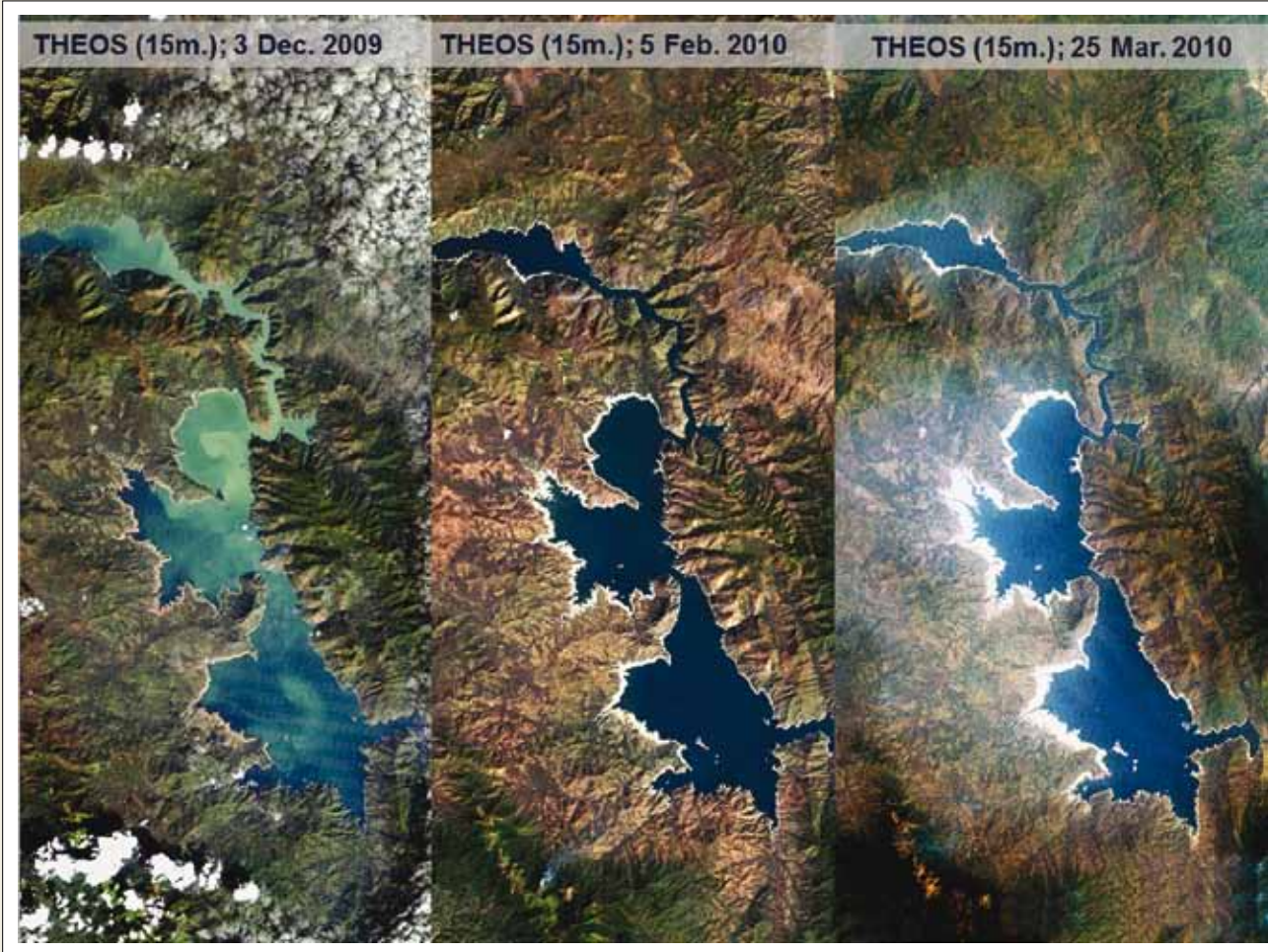
Information with inappropriate time and space characteristics could also confuse operators in the field and delay relief efforts. The Internet and cellular phones are usually not the best option for communication because the transponder cells could be damaged or the cellular networks could be jammed by heavy communication load during a disaster.

## Educating communities

Long-term preparation for disasters in Thailand has been overwhelmingly focused on reducing the exposure of systems and sectors to threats posed by extreme natural events such as heavy rainfall, storm surge, tsunami, etc. by building engineering structures such as dykes and seawalls to protect or isolate certain areas from natural phenomena. Although risks could be reduced this way, frequently new issues or conflicts have been raised regarding their



Water surface monitoring using THEOS multi-date image over Bhumipol Dam, Tak province



Source: GISTDA

impacts on the environment and livelihoods, or on the ethics and transparency of the projects.

At the national level, the concept of community based disaster risk management (CBDRM) through reducing the sensitivity of systems and sectors to extreme weather and geological hazards has been widely adopted and mentioned in several policy documents. However, actual implementation at the desired community level could not be easily done due to the lack of confidence among community members regarding the preventive risk reduction approach. Yet changes are slowly on the way, thanks to the efforts and initiatives of many Government and non-governmental organizations devoted to this approach to promoting and educating communities on the long-term sustainability and co-benefits of CBDRM, not only in reducing disaster risk but also in increasing well-being and providing other social advantages to communities.

It is also worth noting from a number of cases that although the risks from natural hazards could have been reduced through exposure and/or sensitivity reductions, communities might still be vulnerable to disasters at the same or even a higher degree. This could occur in situations where the decision to change the risk profiles of the communities exposed them to new types of risks, especially policy-related risks that they are not able to control or

manage. Examples include rain-fed farming villages that switch to irrigation, thus eliminating their exposure to natural droughts. However, those communities could be subjected to policies and rules set by the irrigation systems which they might not be able to control or know of in advance.

#### **Shared information via satellite systems**

Earth observing systems have played a major role in disaster management, mitigation and preparedness in Thailand, using information collected over vast geographic areas at regular intervals, and based on comparable measurement and classification standards. The satellite platforms are not directly affected by events on the ground or in the atmospheric column, therefore they can be effectively used to monitor relief and rehabilitation actions to ensure that those in need receive appropriate assistance. In addition, the system has also clearly demonstrated value propagation when data from multiple sources and agencies have been shared and bundled into packages that serve the demands of users in the field as well as at the policy level.

# Disaster risk reduction in Gracias a Dios, Honduras

GOAL Honduras

**The United Nations Development Programme (UNDP) global report on Disaster Risk Reduction (DRR) identified Honduras as one of the world's most vulnerable countries to natural disasters and highlighted the risk of disasters as a primary obstacle to the sustainable development of the country. The Global Climate Risk Index assessment completed in 2009 ranked Honduras as the country most affected by weather-related events in the decade from 1997 to 2007. The World Bank ranks Honduras among the countries most vulnerable to natural disasters in the world.**

Within Honduras, the territory of Gracias a Dios is one of the most vulnerable regions affected by natural disasters. Among the many factors that determine the high social, economic, environmental, cultural and political vulnerability of the department are:

- Its physical isolation from the rest of the country
- Its geographic exposure to the Atlantic Hurricane Corridor
- The high indices of human poverty of its population (Gracias a Dios has the highest indices of human poverty in Honduras, at 52.98 per cent)
- The high degree of illiteracy
- The extent of environmental degradation in the upper catchments of the rivers flowing through the department.

Neither the Government of Honduras National Emergency Response Committee (COPECO) nor the Honduran Red Cross has offices or representatives in Gracias a Dios. The Ministries of Health and Education, the National Fire Department, the Police and Armed Forces have limited presence and even more limited resources for disaster response activities. With the exception of the Ministries of Health and Education, government administration offices are primarily concentrated in Puerto Lempira, the capital of Gracias a Dios.

The most frequent hazards in the department are flooding (due to major storm events and environmental degradation) and hurricane winds. Several major hurricanes and tropical storms have significantly impacted the territory of Gracias a Dios in the last 40 years alone, including Fifi, Mitch, Stan, Wilma, Beta and Gamma and, more recently, Hurricane Felix (2007) and Tropical Storm No. 16 (2008). The typical hurricane track images shown in the image opposite were published by the US National Oceanic and Atmospheric Administration (NOAA), and are based on recorded data from over 1,325 tropical storm and hurricane tracks over the last 150 years in the Gulf of Mexico.

Because of the vulnerability of the region, when major storms occur, the impact and damage caused are significant. The situation is even more complex considering the ethnic diversity in the

region (i.e. Miskitos, Garifunas, Tawahkas, Pech and Mestizos). This ethnic diversity can be considered a strength in the sense that the populations have developed experience over the years in adapting to disaster risks. However, because of the dramatic rate of deterioration of natural resources on which these communities depend, the loss of knowledge of traditional practices of DRR and the impact of climate change, these communities are extremely at risk from natural disasters, and they need to develop new capacities and increased resilience to confront these challenges.

GOAL began working in Honduras in 1998, in the aftermath of Hurricane Mitch when more than 10,000 Hondurans lost their lives in the landslides and flooding caused by the storm. In 2002 GOAL began to work in the remote communities of Gracias a Dios. Due to the prevalence of natural disasters in Gracias a Dios, much of GOAL's work focuses on equipping and training communities for DRR. Since 2005 GOAL has been involved in community-based disaster preparedness through the DIPECHO programme (Disaster Preparedness Programme of the Humanitarian Aid Department of the European Commission). In total over 30,000 people have benefited from various interventions and capacity-building initiatives to increase communities' resilience to natural disasters, including:

- The installation of radio equipment and early warning systems
- Training and equipping local search and rescue and first aid brigades
- Provision of emergency stock
- Improvements to stores
- Health centres and emergency operation centres
- Community infrastructure.

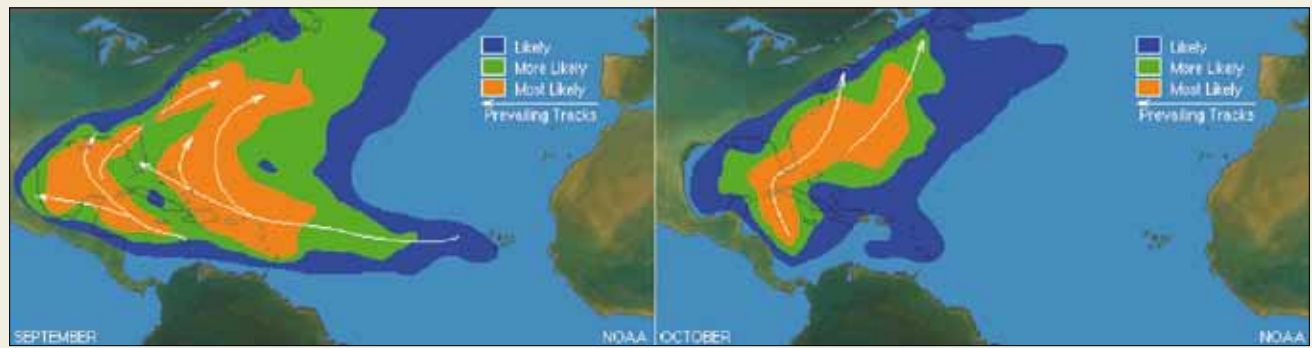
Training and equipping communities to respond quickly and effectively to disasters is a key objective of the programme. Some key elements of the programme are described below.

## Cultural sensitivity

Gracias a Dios is part of the wider region of La Mosquitia which includes the north-west tip of Nicaragua. This isolated region is inhabited primarily by the Misquito native Indian community. GOAL focuses on building on traditional indigenous DRR practices and working



Typical hurricane track images published by NOAA



Source: NOAA

in partnership with tribal federations. In 2008 GOAL, together with COPECO and the US Office of Foreign Disaster Assistance (OFDA), completed a study of 'Indigenous Knowledge in Risk Management in Gracias a Dios'. This study includes many traditional practices in DRR and makes a number of recommendations for future interventions. A key aspect of GOAL's strategy for disaster preparedness in Gracias a Dios is to re-establish and build on traditional coping mechanisms.

#### Protection of vulnerable groups

GOAL's DRR programme focuses on vulnerable groups with particular emphasis on meeting the needs of people with disabilities in emergencies. GOAL has identified a number of practical ways to address the needs of this particularly vulnerable group, and these have been documented in a manual titled *The Inclusion of Persons with Disability in Situations of Emergency in Honduras*, developed by GOAL and HandiCAP under the DIPECHO programme. Measures

described include recommendations for emergency stock items for people with disabilities; awareness-raising among communities of the needs of people with disabilities, especially during emergencies; and recommendations for important roles that people with disabilities can play in preparing for and managing emergency situations.

#### Building DRR into local development

GOAL's experience in Gracias a Dios over recent years has taught an important lesson: while significant progress has been made, it is not sustainable to train communities in disaster preparedness as a standalone activity. This training needs to be integrated into the community over the long term. It must demonstrate visibly effective measures regarding disasters, their prevention and mitigation, in order to change the fatal-



Image: GOAL

Communities in Gracias a Dios need to develop new capacities and increased resistance to confront disaster risks





Image: GOAL

In Honduras, GOAL has supported an initiative to incorporate DRR within the national curriculum

istic outlook currently prevalent within the communities. To this end, GOAL continues to form alliances with Government agencies and other complementary funding programmes to continue to integrate the results of the DIPECHO programme into sustainable development programmes in the region.

For many vulnerable communities, initiatives in disaster preparedness are often their first introduction to the basic concepts of DRR. Activities completed in disaster preparedness need to be incorporated into the way of life of vulnerable communities. For example, communities living in high-risk areas need to carry out regular evacuation exercises, in many cases for the rest of their lives. First aid and search and rescue brigades need to put these skills into practice regularly if these skills are to be available when needed. In addition, there is a need to support the reintroduction of best practices and the rescue of traditional coping strategies.

A key role for GOAL and other agencies in the future will be facilitating a mechanism to fully hand over DRR initiatives to communities with adequate support from local and national government structures. This will involve strengthening capacities primarily at local government level and at national level. In this regard, many demonstrative models have been developed within the DIPECHO programme, and in many cases minimal support is required to maintain and replicate these models until a critical mass is developed to ensure sustainability. For example, in Gracias a Dios the technical unit of the Mancomunidad of Gracias a Dios (Association of Municipalities of Gracias a Dios) is being strengthened to provide ongoing support to the department's local and municipal emergency committees. This will be financed through a fixed percentage of the budget of each municipality. However, GOAL would recommend that this initiative should be maintained for a strategic period of 3-5 years in order to make sure it is fully established and operational. This would include a minimal budget to support simulation exercises and training events. This model is

based on a similar model developed by DIPECHO in the Department of Colon in Honduras.

GOAL, in partnership with the EU Strengthening of Local Natural Resource Management (FORCUENCAs) programme, is supporting initiatives for Local Emergency Committees (CODELs) in Gracias a Dios, to be used as a vehicle to consolidate leaders in the community by establishing Local Development Committees. These committees will be active at all times and not just in the case of emergencies. CODELs are generally formed based on the natural leadership in the community and ensuring the representation of various sectors and vulnerable groups. This same group of leaders is best placed to lead sustainable local development. Activities of the Local Development Committee will centre on sustainable local development, including DRR as a transversal theme. For example, the group could organize sports and cultural events and include a simulation exercise as part of the event. The group would also be responsible for leading the community in the completion of other community projects.

#### **Planning local sustainable development**

Municipal development plans are available in many municipalities in Honduras, but there is often minimal participation of marginalized poor communities. Through DIPECHO Disaster Preparedness programmes in Gracias a Dios, prevention and response plans have been prepared by many communities. These plans contain many of the elements that would be expected to be included in a local development plan. GOAL, in partnership with the EU FORCUENCAs programme and

**Summary of damage reports relating to recent storms affecting Gracias a Dios**

Year	Storm Event	Zone Affected	Damage in Department of Gracias a Dios <sup>1</sup>
1998	Hurricane Mitch (Category 5 Hurricane)	Communities in low-lying river basins throughout department of Gracias a Dios	638 dead or missing <sup>2</sup> ; major damage to agriculture lands, livestock and infrastructure
2005	Tropical Storms Beta-Gamma	Communities in low-lying areas of Juan Francisco Bulnes, Puerto Lempira, Ramón Villeda Morales	5 dead or missing, 1,000 people evacuated to temporary shelters; loss of agriculture and livestock; loss of critical infrastructure including 1 health centre, 2 schools, 1 church, 1 municipal building, 150 houses, damage to public water supply
2007	Hurricane Felix (Category 5 Hurricane)	Ramón Villeda Morales and part of Puerto Lempira	15 dead or missing in La Mosquitia, Nicaragua; wind damage to roofs of buildings and flooding of farmlands
2008	Tropical Storm No. 16	Communities in low-lying river basins throughout department	2 dead or missing, 1,439 people evacuated; significant damage to farmland and livestock, damage to 352 houses

Source: GOAL



GOAL began working in the remote communities of Gracias a Dios in 2002

Image: GOAL

the Secretary of Planning in Honduras, is enhancing these plans to function as local development plans that will be used as the building blocks for future municipal and department development planning. These plans include DRR as a transversal theme.

**Learn by doing**

GOAL believes strongly in practical training methods such as those based on a ‘Learn by Doing’ approach. The key is that the learning is practical and involves an element whereby the community applies the learning with minimal supervision to learn from its own mistakes. The same process is applied when one is learning to drive a car, or learning any new skill. This methodology has additional advantages in remote vulnerable communities where formal educational levels are low and people adapt more quickly to practical learning methods.

**Education**

The backbone of any development solution has to be the education system. This should be clear from the local and municipal development plans, which should include an analysis of the available education system. In Honduras, GOAL has supported an initiative to incorporate DRR within the national curriculum. This initiative has produced the *Teachers’ Guide for Including Risk Management in the Social and Natural Sciences Curricula*. Monitoring the implementation and effectiveness of this model requires investment over a longer period to monitor the development and learning of students through each stage of the school system. In addition, many of the schools need support such as infrastructure improvements, copies of the basic curriculum etc. In order for the initiatives in DRR to be sustainable, additional support is required for the education system which will also serve to consolidate the prospects for future development.



# Hazardscape: community preparedness in Brunei Darussalam

*Yahya Haji Abdul Rahman, National Disaster Management Centre, Brunei Darussalam*

**T**he climate in Brunei Darussalam is generally hot and wet throughout the year. The wettest months are between December and March, when the north-east monsoon winds bring torrential rains. There is also rain from May to July, when lowland regions, especially in flood plain areas, are regularly inundated with water for several days. Brunei Darussalam also experiences dry spells between the monsoons, during which time bush and forest fires and regional trans-boundary haze are common.

Because of climate change, the country is experiencing more frequent and intense rainfall that leads to floods in areas normally not affected. This has also triggered more landslides and other secondary hazards, which have an adverse impact on Government and public infrastructure and socioeconomic activities.

## Government-led initiatives

In response to these threats, the government of Brunei Darussalam has increased its efforts to ensure the safety and wellbeing of its popu-

lation. Since the establishment of the National Disaster Management Centre (NDMC) Brunei Darussalam in 2006, serious measures have been implemented to ensure that all aspects of disaster management — mitigation and prevention, preparedness, response and recovery — are considered.

The NDMC has developed strategies for response and preparedness with the main objective of building disaster-resilient communities. In parallel to enhancing the disaster response mechanism by using an Incident Command System, the NDMC has embarked on a campaign to increase public awareness through Community-Based Disaster Risk Management (CBDRM). This shift from reactive to proactive strategies is part of the NDMC's efforts to build the nation's disaster resilience.

The CBDRM approach encourages active community engagement in the identification, analysis, treatment, monitoring and evaluation of risks in order to reduce vulnerabilities and enhance capacity. Basic life saving



Minister of Home Affairs leads multi-agency coordination with communities to build resilience

Image: NDMC



Trainers from Government agencies use historical data to conduct risk assessments

Image: NDMC



skills are also taught to ensure that the community is ready to face emergencies and disasters. The objective is to enable people to help themselves and those caught in emergency situations prior to emergency services arriving at the scene.

The NDMC's engagement with communities is a bottom-up approach from the grassroots to management level in every district. It is aimed at helping people to realize that preparation for disaster is not the sole responsibility of the Government and that self-help is important in tackling local issues during every phase of disaster management. It has established a sense of ownership within communities, so that they are involved in planning and implementing disaster risk reduction activities.

Since the introduction of the programme in 2010, the community has studied three modules: Town Watching and Hazard Mapping; First Aid and Cardio-Pulmonary Resuscitation; and Fire Safety. Each module comprises theoretical and practical lessons.

### Hazard mapping in flood-prone areas

Trainers from relevant government agencies use historical data to conduct risk identification assessment in the selected area, with special attention to the types of disasters for which the community is at risk. The trainers also conduct interviews with communities and their leaders to enhance understanding of the situation.

Hazard mapping is used as an effective tool to engage and improve awareness of hazard risk as well as to manage risk during an emergency. Prior to producing this map, the community, assisted by the trainers, conducts its own 'town-watching' activity. In this type of exercise, the community members identify risks, hazards and other potential danger zones. They also identify alternative routes to safer and higher ground suitable for evacuation areas and temporary car parks. The creation of the map requires the collaboration of trainers and the community.



Hazard mapping is used as an effective tool to improve awareness

Image: NDMC

The community's local knowledge is crucial to validate the relevant risks and hazards. In the process of producing the map, discussion is encouraged to promote awareness of underlying risks and how to reduce them as well as how to plan actions for before, during and immediately after emergencies and disasters.

CBDRM trainers take this opportunity to identify locations for helipads, drop points for food distribution and other important aspects in planning for response during a disaster.

The hazard map also contains photos and notes that are taken from the town-watching activity as references. The map is a guide to help the local community with disaster preparedness and response.

### Contingency plans

The CBDRM training also prepares individuals to carry out certain critical actions before the wet season, such as monitoring media notifications of weather patterns, clearing away rubbish and maintaining drainage, checking 'survival packs', clearing furniture from the ground floors of houses, moving livestock to safety, and stockpiling crops while carrying on with life as normal.

### Follow-up actions

As a follow-up to the CBDRM, grassroots leaders, residents and district authorities also create well-planned strategies and actions based on the hazard maps produced. Action plans include placing warning signs regarding water levels; maintenance of alter-



Strategic locations are pinpointed for response coordination

Image: NDMC



Image: NDMC

A multi-sector approach allows for quick action during and after disasters

native evacuation routes; and producing self-help contingency plans. This platform empowers grassroots leaders and residents to start taking charge of safety and security issues within their neighborhoods.

Firefighters and paramedics are vital actors in disaster operations. The CBDRM also includes basic firefighting and lifesaving skills to prepare communities to take appropriate action before help from these services arrives.

### Incident Command System

While it is crucial to strengthen preparedness at grassroots level, enhancement of the response mechanism is equally important. Under the ASEAN-US Programme on Disaster Management, Brunei Darussalam is one of the two original pilot countries to adopt the Incident Command System (ICS) in its national incident management system. This collaboration with the US has provided a framework as the basis for adaptation of appropriate models for on-scene incident management. This two-year programme includes a 'training for trainers' programme and on-scene disaster response system using the ICS.

The ICS has increased capacity building by promoting interoperability among multi-sector responders. In strengthening the existing disaster response management system by standardizing coordination amongst different agencies, the system also ensures that designated responders at different levels are capable of handling different types of emergencies and disasters.

The system has proven its effectiveness as it was used as the incident management system during flooding and strong winds in 2010. It has enabled efficient and timely responses whilst minimizing the impact of disaster losses.



Image: NDMC

The Incident Command System has helped communities survive major floods and strong winds

A multi-sector approach has always been the strongest asset of the NDMC and this has proven to be an effective mechanism in managing disasters in Brunei Darussalam. With this body as the coordinating agency, there has been excellent cooperation with the Fire and Rescue Department, District Offices, Royal Brunei Armed Forces, Royal Brunei Police Force, Welfare Department, Ministry of Health and other relevant agencies. This has contributed to ensuring the safety and wellbeing of communities and their return to normal life in the shortest possible period.

### Ready for emerging risks

Brunei Darussalam acknowledges that climate change may affect the country and new risks may emerge from time to time. In this regard, the government has taken many initiatives to prepare for and respond to disaster. This involves taking into account worst-case scenarios of both natural and man-made disasters such as oil spills and gas explosions. Support for both the grassroots level and the responders is vital and this can be achieved by conducting regular training and exercises to ensure all involved are ready and able to respond.

While it is not possible to prevent disasters altogether, it is worthwhile and cost-effective to mitigate and reduce disaster risk. Every community has to live with some risks and be prepared to reduce them. The government will continue to ensure the safety and wellbeing of the nation, thus strengthening capacity and coordination between agencies.



# Argentina: working together for disaster risk reduction

*Gabriel M. Fuks and Carlos E. Zaballa, White Helmets Argentina*

**E**ven though Argentina has been active in the risk reduction field since the beginning of the International Decade for Natural Disaster Reduction (IDNDR) 1990-1999, it was only in 2005, after the approval of the Hyogo Framework for Action (HFA), that our involvement became a true State policy.

The clearest indication of this commitment to date was the decision by Argentina to accept the Presidency of the International Strategy for Disaster Reduction (ISDR) support group for the 2007-2009 period. The task required the assembly of a special team, as well as an additional financial effort to cover all the travelling involved and the cost in professional personnel. This effort was recognized by the ISDR authorities during the meeting of the Global Platform for Disaster Risk Reduction in 2009, stressing the fact that it was made by a developing country.

## Argentina National Platform for Disaster Risk Reduction

One of the key mandates of the HFA was the elaboration of National Platforms for Disaster Risk Reduction. Argentina's platform began to take shape in 2007 and is evolving satisfactorily. All levels of the public sector (national, provincial and municipal) are participating. The

private sector is also represented, in particular the insurance industry, academia and organizations of civil society.

The platform is coordinated by the White Helmets Commission of the Ministry of Foreign Affairs, and by the undersecretary for provincial development of the Ministry of the Interior.

White Helmets is an initiative that has received international recognition for its role in humanitarian assistance and has close links with the Office for the Coordination of Humanitarian Affairs (OCHA), United Nations Volunteers (UNV) and ISDR. The other coordinator of the platform is in charge of civil protection as well as harbouring the formal relations of the federal government with the provinces.

The platform meets twice a year in plenary sessions. It also holds meetings of specialized working groups all year round, following the priorities of the HFA. What we have accomplished grants us the right to be optimistic, even though we are aware that there is still a long way to go.

Argentina has also participated in meetings held in Geneva, Mexico, New York and Panama. The



White Helmets – post Hurricane Katrina



White Helmets prevention training



recommendations arising from these meetings have allowed us to address the links between disasters and climate change, while supporting the concept that risk reduction should be a part of the social development agenda.

For this reason a substantial effort is devoted to the discussion of legislation for emergency prevention, and response, to the integration of special groups that provide primary information useful for alerting, to territorial development projects to public investment that include a risk reduction perspective.

We also encourage the involvement of academic institutions, and several universities (public and private) already offer degrees in risk management and risk reduction. Others include the subjects in their regular courses on urban planning.

Argentina pays special attention to the struggle against hunger and poverty, which we are convinced are major components of vulnerability and should be eradicated in order for resilience to become a reality. With this in mind, we emphasize the key role that capable and organized volunteers can play and we also support the active involvement of each community in the design of local risk maps.

We believe that communities should be actors in searching for proactive solutions, not bystanders. In this way, their voices can be heard and their capabilities acknowledged. With adequate legislation, effective coordination among the public and private sectors and the help of civil and academic society, risk reduction may have a chance.

### **Coordination between Government and non-governmental organizations**

The work of our platform has been strengthened with the active and coordinated, participation of its members, from the Government as well as from non-governmental organizations (NGOs) and multilateral agencies. There has been a successful project by the Argentinean Red Cross, the International Federation of Red Cross and Red Crescent Societies and the European Union, reinforced by the White Helmets Commission, the office for Civil Protection, the Ministry for Health and the Secretary for the Environment, and also by the Universities of Buenos Aires and Litoral, Caritas, Scouts of Argentina, Save the Children, 'Acción Sur' and 'Acción contra el Hambre' (Action against Hunger). The Pan American Health Organization (PAHO), the United Nations Development Programme (UNDP), the Organization of American States (OAS), the International Organization for Migration (IOM) and the Spanish Agency for International Cooperation also contributed to the project.

In order to advance the project, we established a strategy giving priority to local and community participation. The local production of risk maps was encouraged, along with the involvement of public and private representatives from local networks for risk management. Activities took into consideration the presence in the scene of those involved, especially the Red Cross, Caritas and the Scouts.

The design of a 'map of risk' with local participation at community level was the main goal, which was achieved by the organization of a workshop and several meetings aimed at strengthening local networks. A special work module for children and teenagers was developed as part of the project framework, taking advantage of institutions working at local level.

A publication will be edited as a tool for the project members and as a possible model for other organizations involved in disaster risk management.

Three guidelines were followed in the project:

- Participation of government agencies and private sector (companies and social) in designing a local map of risk
- Building of local networks and mechanisms for prevention, preparation and response, with coordination between them being a priority for the project
- Strengthening of networks at national level, including coordination and support for institutions working in networks.

### **REHU-MERCOSUR**

Argentina is making similar efforts within the *Mercado Común del Sur* (MERCOSUR) by coordinating with Brazil, Paraguay and Uruguay. These efforts have led to the creation of the Specialized Meeting for Disaster Risk Reduction, Civil Defense, Civil Protection and Humanitarian Assistance (REHU). Venezuela and Chile will soon join this initiative.

We also consider that it will be necessary that the most developed countries and the organisms of the United Nations system strongly support developing countries.

In order to improve the coordination among our countries to fulfil the objectives, it is essential to support the work of the focal points and the platform. Likewise, listening to their requests, understanding their issues and focusing on their proposals will be also extremely useful to strengthen the work. An equal distribution of the resources among the regions and sub-regions will contribute to this purpose.

We believe that the institutional strengthening of the national and sub-regional platforms might be one of the key points to highlight and provide continuity to the international strategy in America. We are willing to work towards the reduction of risk, taking into account that those who are more vulnerable are the most affected. We should all cooperate to reduce disaster risk, which is so counterproductive to the development of our nations.

### **Project beneficiaries**

"We have lived in the forest and the forest was our supply. Unfortunately the forest was destroyed and nowadays our home is affected by floods. In this meeting we can tell you about our reality."  
Barrio Nala de Roque Sáenz Peña, Chaco

"This teenager meeting allowed us to share with you how we can organize to face the floods in our neighborhoods. It is very important to have coordination with other organizations at local level for successful prevention."  
Rosario de la Frontera, Salta

"Thanks to the project we are working locally to improve existing emergency prevention to reduce danger and vulnerability, working together with NGOs, institutions and the community and with a new element – children's and teenagers' opinions."  
Henry Chiroque, Save the Children Argentina.

# Disasters — a part of life

*Eugen Visan, Romanian Ministry of Administration and Interior, General Inspectorate for Emergency Situations*

**G**enerally speaking, disaster represents a great misfortune that strikes a community — a catastrophe of enormous proportions. Disaster also means an abnormal situation, hard to bear by the community, or a serious disturbance in society's normal existence.

These community disturbances, which determine a series of major negative effects, are mainly generated by natural and technological hazards. The risk of such events relates to the probability of negative phenomena occurring, combined with the vulnerability of the communities affected: in other words their capacity to cope with disasters.

## Facing escalating risks

Lately, at a global level, there has been an important increase in risk occurrence, generating disasters that tend to be part of communities lives. The intensity and frequency of disasters is influenced mainly by climate changes and the effects of industrialization.

Man-made disasters can be prevented by human actions, while dangerous meteorological and geological phenomena like earth-

quakes and tornadoes that cause natural disasters cannot be stopped by human actions. On the other hand, in the case of landslides, for example, the risk can be amplified by human action — as in the case of massive deforestation — or reduced (by reforestation and soil stabilization works). Natural risks are generated by dangerous meteorological and geological phenomena that recur over a period of time. It is in our power to learn to live with disasters and increase communities' resilience.

In Romania, natural risks generate disasters every year. New natural risks, caused by the dangerous meteorological phenomenon of the tornado that has not historically been prevalent in this area, struck many communities for the first time in 2002 in Făcăieni, Ialomița County, and in 2005 many communities were affected by this hazard. From 2005-2010, Romania experienced major floods caused by heavy rains and by the Danube River and internal rivers overflowing, these floods affecting the nearby communities. In June and July of 2010, following heavy rains, a large part of Romanian territory was affected by floods. As a consequence of early warning systems, 19,997 people were evacuated from the danger area, while 23 people died. The floods affected 3,936 houses, 443 kilometres of dams, 5,257 kilometres of roads, 707 large bridges and 2,729 small bridges, public utility networks in the area and 147 public buildings. The total estimated financial value of losses was €867,958 million. Most of these losses were a consequence of poor preparation of communities, ignorance regarding self-protection measures, reluctance to apply protection measures ordered by state institutions, bad management of rivers and dams, houses built in flood-prone areas and lack of involvement of local communities in activities that could prevent significant losses.

Another serious situation arose in the town of Ocnele Mari, in Vâlcea County, where in 1961 a salt reservoir began to operate near the town. The method used for salt extraction was water pumped from the reservoir, followed by extraction of a saline solution for processing, each well being designed to work individually. As a consequence of a massive extraction of salt from this area and because of water infiltration, after 1991, when the process of extraction had been stopped, the remaining salt deposit melted. This resulted in landslides in 2001 when many houses from that area were affected and people evacuated. The danger has not passed



Image: General Inspectorate for Emergency Situations

A general store affected by the collapse of land in Ocna Mureș, Romania, in 2010



Image: General Inspectorate for Emergency Situations

A house in risk of collapse because of landslides in Ocna Mureş, 2010

because there are other salt reservoirs in the same situation and other people and houses could be affected by further landslides. The Romanian authorities have evacuated people from this danger area, but many of them refused to leave their houses. The authorities have started soil stabilization works to reduce the risk.

A similar case occurred in Ocna Mureş, Alba County, where, as a consequence of salt extraction and water infiltration, the salt deposit melted, resulting in a landslide in 2010 that affected public buildings, a general store and a street. The other buildings nearby that could have been affected have been evacuated. The more recently constructed general store is an example of poor construction, because of the lack of soil analysis that could have revealed the danger.

### Lessons learned

In spite of a prompt response for mitigation and intervention in these cases from the General Inspectorate for Emergency Situations (the main institution with responsibilities in disaster management), and other governmental and non-governmental institutions that have support functions in disaster management, there was significant loss of life and property. From the lessons learned, we can say that the response in case of disaster is not sufficient and we must highlight the importance of preparation for all phases of a disaster (pre-disaster, disaster and post-disaster) and also of the community's involvement in activities that can increase resilience and decrease vulnerability in case of disasters.

Natural risks are a fact and 'fighting risk' is a battle that cannot be won, so Romania has approached the idea of 'living with risk' through programmes for awareness and preparation.

This idea must be adopted by every member of the community in order to increase involvement in activities aimed at improving

resilience to disaster, so that preparation and response become everyone's responsibility. Also, it is well known that the first and most efficient intervention is that initiated by the members of an affected community, and it can make the difference in terms of human life and material losses. For that first intervention to be efficient, the community's members must prepare before a disaster occurs. To integrate risk in the community's life and to create resilience, there are some instruments that can be used in all of the phases of a disaster (prevention, preparedness, mitigation, response and reconstruction) in order to minimize negative effects afterwards.

In the first phase Romania takes into account community awareness of prevention measures through awareness campaigns. Examples include information materials created by the General Inspectorate for Emergency Situations, such as *Citizens' Guide in Emergency Situations* or *Protective Measures in Case of Earthquake*. Such campaigns were started in schools by some institutions (Save the Children Romania, Ministry of Education, Research, Youth and Sports, General Inspectorate for Emergency Situations and High Group for Romania's children). A curriculum was devised, along with a handbook, *Let's Learn to Prevent Disasters*, initially in two areas affected by the floods in year 2006, and later expanded to national level.

### Preparedness is the key

For the preparedness phase, the General Inspectorate for Emergency Situations created different materials to train people how to act in case of disasters. The same





Image: General Inspectorate for Emergency Situations

A main street affected by the collapse of land in Ocna Mureș, 2010

institution has created, at county level, *Plans for Analysis and Hedging Risks* to identify the ways in which scenarios and histories of existing risks can be used for warning, evacuating people, mitigation and response to disasters, along with tests and exercises. In this phase, early warning systems have an important role in risk monitoring. For dangerous meteorological and hydrological phenomena in Romania, there are two agencies (National Meteorological Administration and National Institute of Hydrology and Water Management) that provide meteorological and hydrological forecasts. The forecasts use colours (green, yellow, orange and red) to highlight the gravity of each phenomenon, where green represents normal conditions and red represents very dangerous meteorological and hydrological phenomena that could cause damage. These forecasts and warnings are very useful for decision makers to help them initiate the necessary measures and also for communities to protect themselves.

For earthquakes, the National Institute for Earth Physics monitors seismic activity. This institute has developed a warning system, the Rapid Early Warning System, or REWS, for earthquakes in the Vrancea area. REWS provides a warning of 25-28 seconds between identification of the earthquake and the moment it strikes. This system could not be called an early warning system because the time is too short for people living in multi-story buildings to be evacuated. Unfortunately, at this time, there is no early warning system to provide forecasts or warning regarding earthquakes. Another measure taken by the Romanian authorities in this phase was the introduction of a requirement for people to acquire home insurance contracts in order to facilitate the reconstruction process.

Intervention after a disaster is mainly the responsibility of the competent state institutions. Besides these, there are also in place voluntary and private services for emergency situations that have the necessary training to respond. Lessons learned teach us that involving other

stakeholders like civil society or private sector increases efficiency and decreases the necessary time period for response.

The reconstruction phase, representing the end of one cycle (prevention, preparedness, mitigation, response and reconstruction) and the beginning of another, is important in order to decrease vulnerability and increase resilience of the community to further risks by using new methods for the reconstruction of the affected community. Romania has used a number of methods and actions like resettlement of houses built in floodable areas, restoration of river flow and resizing dams.

#### **Future strategies**

In respect of the legal framework, a number of laws, strategies and regulations have been adopted to reduce risk in case of floods, earthquakes or dangerous meteorological phenomena. Ministries that deal with environment preservation or safe development have projects to restore the flow of rivers or to reinforce high buildings that are in danger of collapse in case of earthquakes.

In conclusion, we can say that natural risks are a part of our life, turning into disasters that disturb the normal existence of a community — but fighting against nature is a lost battle. The number of losses in case of disaster is related to the vulnerability of the community. Vulnerability and resilience represent instruments that can be used in order to minimize losses within a community. As much as risks return and disasters strike again, at least we can help grow the resilience of our communities.

# Disaster risk reduction in Croatia

*Damir Trut, General Director, Damir Čemerin, Deputy Civil Protection Commander and Nataša Holcinger, Officer for Prevention Measures, National Protection and Rescue Directorate, Croatia*

**While the term ‘disaster risk reduction’ has only recently been used in daily policies and practices in Croatia, interest in it has existed in the country for many years at all levels.**

A number of acts and legal documents in the Republic of Croatia have addressed solutions concerning quake-safe construction, environmental protection and physical planning that deals with risk reduction, as well as preparation of capacities for disaster response. Introduction and application of quake-resistant construction regulations as far back as in 1964 considerably reduced disastrous quake consequences in such buildings and today over 50 per cent of people live in quake-safe structures. Embankments, retention devices and other structures have reduced flood risk in densely populated areas and industrial zones for almost 100 years, while physical planning provides for construction zones, taking into account risks from natural and man-made disasters.

## Croatian National Platform for Disaster Risk Reduction

The Croatian National Platform for Disaster Risk Reduction has been established as a forum for the exchange of information, knowledge and achievements in various fields of natural and social

sciences, as well as for practical application. It has gained a special momentum because its establishment under the auspices of the Government of the Republic of Croatia has articulated joint activities of this nature as a national priority.

The Government of the Republic of Croatia decided to establish the Platform in March 2009 as an instrument for the implementation of systematic disaster risk reduction. A committee was formed, constituting representatives of the National Protection and Rescue Directorate, Ministry of Defense, Ministry of Environmental Protection, Physical Planning and Construction, Ministry of Foreign Affairs and European Integration, Ministry of Economy, Labour and Entrepreneurship, Ministry of Agriculture, Fisheries and Rural Development, Ministry of Sea, Transport and Infrastructure, Ministry of Health and Social Welfare, Ministry of Regional Development, Forestry and Water Management, Ministry of Culture, Ministry of Science, Education and Sports, Meteorological and Hydrological Service, and the Croatian Academy of Sciences and Arts.

Also involved in the work of the committee are Hrvatski Caritas Croatia, Croatian Red Cross and Croatian Mountain Rescue Service and, more recently, the Croatian Seismological Survey and Croatian Waters Company.

One of the achievements of the Platform is the organization of regular annual conferences where scientific and professional papers are presented and after which books of conference proceedings are published.

In addition to state administration bodies and other institutions such as citizens' associations performing protection and rescue activities, each conference is attended by other central state organizations (State Office for Nuclear Safety, State Office for Radiation Protection, Croatian Environment Agency, State Geodetic Administration), Universities of Zagreb, Split, Rijeka, Osijek, and public companies including INA Oil Industry, Croatian Railroad Company, Croatian Electricity Company, Croatian Waters Company, JANAF (Adria Oil Pipeline). Other guests include large economic entities, associations involved in environmental protection, and religious communities.

The First Conference of the Croatian Platform, held on 9 November 2009, addressed the topic of disaster risk reduction. More than 180 participants attended from authorities, large economic entities, academia (Croatian Academy of Sciences and Arts and several schools and



Image: Goran Violic

Disaster risk reduction in schools, Dubrovnik, Croatia

institutions), citizens' associations and religious communities. A total of 51 professional and scientific papers were registered for the conference. Several papers addressed emergency management and strengthening of response capacities, emphasizing strengthening of cooperation and interoperability of different types of responders in complex situations.

The Second Conference of the Croatian Platform was held on 14 October 2010. The conference was opened by Minister of the Interior Tomislav Karamarko and the special envoy of the Prime Minister of the Government of the Republic of Croatia, Jadranka Kosor. Papers by 41 authors covered management in emergency situations; climate change, extreme weather conditions and necessary adjustments; early warning and capacity development for response to emergency situations and disasters; theory and practice of science in reducing disaster risk; raising awareness on hazards and safety culture development (education, role of media and promotional activities); and international cooperation in disaster risk reduction. Guests included the heads of protection and rescue services from the countries of the region (Slovenia, Bosnia and Herzegovina, Montenegro, Serbia and Macedonia).

Margareta Wahlström, the UN Assistant Secretary General for Disaster Risk Reduction, addressed the conference, stressing the importance of establishing a national platform for disaster risk reduction, especially the adjustment of response to risks caused by climate change.

The conference concluded that action was needed in the following areas:

- Further strengthening of cooperation, strategic planning and management of natural disaster risk reduction at national level in the Republic of Croatia, while continuing to build on the existent institutional framework, as well as strengthening the role of the National Protection and Rescue Directorate
- Evolution of the Platform into a national mechanism, ensuring coordination and support to all involved in the implementation of strategic planning for and management of natural disaster risk reduction
- Support for all existing actors in the field of natural disaster risk reduction in Croatia, including the National Protection and Rescue Directorate, Meteorological and Hydrological Service, Croatian Seismological Survey, competent ministries and relevant public companies, Croatian Red Cross, civil society and the business community
- A headquarters role for, and raised public and media awareness of, the 112 system within the National Protection and Rescue Directorate and linkage of all emergency services to the single European emergency 112 call number, along with real-time collection and distribution of information through hydrological, meteorological and seismic networks of supervision, with the establishment of an integrated system of horizontal and vertical links between all disaster risk reduction actors
- Adaptation to climate change in the region, with more investment in climate mapping, forecasting and analysis so as to provide support for planning in risk-exposed sectors
- Joint activities of the National Protection and Rescue Directorate, Meteorological and Hydrological Service, Croatian Seismological Survey, relevant ministries, Croatian Red Cross, professional organizations and individuals to introduce the topic of natural disaster risk reduction into national curricula

- Intensified education and greater financial responsibility for heads of local self-government units to raise awareness of their responsibilities to protect populations, property and the environment in all of the planning and development projects in their areas
- Further strengthening of all activities aimed at disaster risk reduction in all areas and with all actors, with financial support for projects focused on protection and rescue systems
- Participation of the Platform in the European Forum for Disaster Risk Reduction, raising it to international level with annual sharing of experiences with other members (Croatia co-chairs the Forum in 2011 and chairs it in 2012).

### **Building an effective response system**

Croatia makes every effort to achieve the objectives set out in the Hyogo Framework for Action. Risks are identified and documented in assessments and risk mapping up to national and regional levels. In May 2009, the National Protection and Rescue Directorate conducted a disaster and major accident threat assessment for populations, property and cultural heritage of the Republic. The assessment, which was carried out in collaboration with central state administration bodies, public companies and national administrative organizations, represents a fundamental tool for drafting action plans for all participants of the protection and rescue system, from central state administration bodies to operational forces (firefighters, civil protection, legal entities involved in protection and rescue activities and citizens' associations), as well as for local self-government units in drafting their threat assessments.

Comparison of the Croatian Threat Assessment with risk assessments of the European countries and the EU Risk Assessment Guidelines of 21 December 2010 is a good place to start but a great amount remains to be done. In contrast to the threat assessments for natural and man-made disasters in EU member states, the Croatian assessment is a mere list of threats present in Croatia. The risk assessment process should include risk reduction indicators as well, which then need to be followed and checked regularly in order for the process to be measurable and efficient. To this end it is also necessary to set early warning systems that would signal indicators related to heightened risk, as well as public information systems to ensure correction of errors. In the field of risk reduction, the most significant partners to the National Protection and Rescue Directorate (DUZS) are the Croatian Waters Company and the Meteorological and Hydrological Service (DHMZ), which warns of weather-related disasters at several levels. Last year, in collaboration with the Network of European Meteorological Services, the Croatian Meteorological and Hydrological Service introduced the early warning system *Meteoalarm* as a network tool for interested users.

In the Republic of Croatia, databases are developed by central state administration bodies. DUZS data-





Disaster Risk Reduction training course, Croatia

bases are the most comprehensive as they are linked to geographic information systems and to the databases of other central state administration bodies, thus enhancing their efficiency.

Sharing of information at all levels is of utmost importance in building the culture of safety. Science and education play an essential role in this respect, as well as the development of interdisciplinary networks for information sharing and networks within individual regions, especially for the risks they have in common (for example, for earthquake- or flood-prone areas). It is important to harmonize disaster risk reduction terminology in all scientific and professional disciplines to ensure understanding of terms and procedures and to avoid misinterpretations. In raising public awareness it is important to make disaster risk reduction part of national curricula, which currently tend to neglect this area of study.

In this respect, cooperation with the media is especially important to ensure access to the general public and to raise community awareness of procedures and measures undertaken to reduce disaster risks. Systematic involvement of the media in the work of the Platform as permanent participators is still missing, as is media training in disaster reporting in order to create a basis for good cooperation in emergencies. However, a large step forward has been made regarding the education of the population concerning this topic.

Another component of action plans is the protection of critical infrastructure, which this year has become a systematic activity in disaster risk reduction and strengthening of response capacities.

Through the Platform all participants must recognize their respective tasks in the development of response capacities and disaster management at political, technical and institutional levels. The protection and rescue system in the Republic is statutorily based upon the principles of subsidiarity and solidarity, as well as continuity of action of all participants. In practice, this means that response (but also prevention and risk reduction) must begin where the risk occurs, in the local community, with further expansion of operations

as appropriate up to the national level. The continuity principle provides for all actors involved in protection and rescue to fulfil their regular tasks unless such operations are a threat to their life and health. Through the Platform, efforts are directed at raising public awareness and responsibility, while fostering risk reduction activities before an emergency strikes.

Since disaster risk reduction activities and development of response forces call for significant financial means to be available at short notice, it is important to develop and ensure awareness of investing in disaster risk reduction as part of sustainable development costs, both locally and nationally. The need to strengthen the insurance sector in disaster risk reduction has also been addressed in debates, as well as cost sharing related to disasters and damages. In Croatia, as in other developing countries, only a small number of people insure their property and the state is expected to cover most damage, which is unsustainable, and there is a focus on changing the existing situation in this segment.

The Republic has been active in a number of international projects related to disaster risk reduction and response system development, including bilateral projects with neighboring countries, as well as with the Council of Europe, European Union and United Nations International Strategy for Disaster Reduction.

The Platform as an evolving body has shown excellent results but in order to achieve the final objective of making disaster risk reduction a national priority, it has to operate as a body which encourages continuous investments in set objectives at high levels and produces results in planning and risk awareness, strengthening response capacities where risks have been lowered to an acceptable level.

# Cyclone hazard and unpredictability: preparing coastal communities

Yugraj Singh Yadava, Director, Bay of Bengal Programme Inter-Governmental Organisation

**The Bay of Bengal (BoB) forms the north-eastern part of the Indian Ocean. Resembling a triangle in shape, the Bay is bordered by Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand. It is also the largest bay in the world by area.**

A number of large rivers and their tributaries flow into the BoB, which is situated in the monsoon belt and receives high rainfall. It is a hot spot of biological diversity thanks to its coral reefs, estuaries, coastal wetlands and mangroves. More than a quarter of the world's population resides in the countries around the bay, many of them living below the international poverty line of US\$1 per day and dependent on coastal resources for food and livelihood security.

## Cyclones in the Bay of Bengal

The BoB is also periodically in the news for the destructive cyclones<sup>1</sup> storms that occur from time to time. Of the 30 deadliest cyclones in world history from 1584 to 2008, as many as 22 have occurred here. Three recent cyclones, Sidr (2007), Nargis (2008) and Aila (2009), have caused great loss of life and property in Bangladesh, Myanmar and India respectively.

With a long coastline of over 8,000 kilometres, the Indian subcontinent is exposed to nearly 10 per cent of the world's tropical cyclones. Most of these have their genesis over the BoB and strike the east coast of India. On average, five to six tropical cyclones form every year, of which two or three could be severe. About four times as many cyclones occur in the BoB as in the Arabian Sea.

Bangladesh, due to its unique geographic location, frequently suffers from devastating tropical cyclones. The funnel-shaped northern portion of the BoB causes tidal bores when cyclones make landfall, affecting thousands of people living in the coastal

areas. One of the most devastating natural disasters in recorded history was the 1970 Bhola cyclone in Bangladesh (then East Pakistan) that alone claimed more than 500,000 lives. The maximum recorded wind speed of this cyclone was about 222 kilometres per hour and the maximum storm surge height was about 10.6 metres. The cyclone occurred during high tide, causing enormous damage. Table 1 provides a summary of loss of life and damage to property from cyclones in the BoB during the period 1900–2010.

## Cyclone warning systems in the region

Ocean Observation Systems (OOS) have become vital for countries bordering the BoB. In 1996, the Indian National Institute of Ocean Technology (NIOT) established the National Data Buoy Programme with the objective of operating, maintaining and developing moored buoy observational networks and related telecommunication facilities in the Indian seas. These data buoys are offshore floating platforms, fitted with meteorological and oceanographic sensors and moored at specific locations to observe met-ocean data at regular intervals. The buoys are powered by lithium batteries and are equipped with Global Positioning Systems (GPS) to provide their locations. The observed data is then transmitted through satellite along with the location reference, in synoptic hours, to the state-of-the-art shore station facility at NIOT, Chennai. The OOS team at NIOT has also developed, tested and established a Tsunami Buoy System, using bottom pressure recorders in the Indian seas. The new venture has expanded the

**Table 1: Summary of casualties in the countries around the BoB due to tropical cyclones, 1900 – 2010**

Country	Tropical cyclones (nos)	Killed	Total affected	Estimated damage (US\$ Million)
Bangladesh	84	626 843	73 556 523	4 765.98
India	97	159 130	87 392 126	8 600.90
Maldives <sup>2</sup>	1	0	23 849	30.00
Myanmar	17	144 663	3 935 844	4 079.39
Sri Lanka	5	1 160	2 060 000	137.30

Source: EM-DAT, OFDA/CRED International Disaster Database. Université Catholique de Louvain, Brussels, Belgium



Image: Yugraj Yadava

Small fishing boats that lack safety and communication equipment are at risk during bad weather conditions



Image: Yugraj Yadava

Cheap locally fabricated floatation devices come in handy during emergencies at sea

horizons of OOS in taking care of the safety and well-being of the coastal communities in the region.

The most important aspect of OOS is the real time dissemination of data, especially during extreme weather conditions. The shore station is manned 24 x 7 and the data obtained from buoys are disseminated in real time to the Indian National Center for Ocean Information Services, Hyderabad for further processing. The data is utilized by a wide spectrum of end users such as meteorologists, oceanographers, environmentalists and offshore engineers in the region and elsewhere.

In Bangladesh, a detailed programme for storm prevention was implemented by the Government following the 1991 cyclone. A comprehensive Cyclone Preparedness Programme (CPP) is jointly planned, operated and managed by the Ministry of Food and Disaster Management and the Bangladesh Red Crescent Society. A volunteer force of more than 32,000 people has been trained to help with warnings and evacuation in the coastal areas. Around 2,500 cyclone shelters have been constructed on elevated platforms in these regions, serving the dual role of schools or community centres during normal weather. The Chittagong coast has been

heavily protected with concrete levees and afforestation to create a green belt.

In the BoB Region, the Indian Meteorological Department (IMD) is designated by the World Meteorological Organization (WMO) as a Regional Specialized Meteorological Centre for tropical cyclones and is responsible for providing advice to neighbouring countries. As a part of the WMO Tropical Cyclone Programme (TCP), five regional panels have been established, which coordinate the planning and implementation of measures to mitigate tropical cyclone disasters on a worldwide basis. The main objective of the panels is to promote measures to improve tropical cyclone warning systems in the BoB and the Arabian Sea through an effective operational plan. The plan records the agreed arrangements for standardization of operational procedures, efficient exchange of various data related to tropical cyclone warnings, issuing of cyclone advisories from a central location (Regional Specialized Meteorological Centre), archiving of data

**Table 2: Institutional arrangements for disaster management in the BOBP-IGO countries**

Country	Nodal agency	Operational arm
Bangladesh	Disaster Management and Relief Division (Ministry of Food and Disaster Management)	Disaster Management Bureau
India	Ministry of Home Affairs and Ministry of Earth Sciences/IMD (for earthquake, cyclone and tsunami)	National Disaster Management Authority
Maldives	Ministry of Defence and National Security Services	National Disaster Management Centre (NDMC)
Sri Lanka	Ministry of Disaster Management	Disaster Management Centre of Sri Lanka





Image: Yugraj Yadava

Safe anchorages and berthing places can reduce damage to boats and gear during cyclones

and issuing of tropical weather outlooks. Table 2 provides details of the nodal organizations responsible for disaster management in the four member countries (Bangladesh, India, Maldives, and Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO).

#### **Cyclone preparedness activities in the region**

Key programmes on cyclone preparedness and vulnerability reduction have been implemented in the four BOBP-IGO member-countries, generating important lessons for the region.

#### **India**

On 6 November 1996, a tropical cyclone with a wind speed of 220 kilometres per hour and tidal surge of more than 2.2 metres crossed the coast of East Godavari district in Andhra Pradesh, India. Approximately 3,000 people perished in the cyclone and property worth millions of US \$ was destroyed. This cyclone focused attention on the need to take a fresh look at disasters and their management in India. Subsequently, in early 1997, the Food and Agriculture Organization of the United Nations implemented a Technical Cooperation Programme in association with the Ministry of Agriculture, Government of India and the Department of Fisheries, Government of Andhra Pradesh. This pilot project, implemented in and around Kakinada, Andhra Pradesh, was aimed at investigating and introducing measures that could reduce the vulnerability of fishing communities to cyclones.<sup>3</sup> It yielded many important lessons on effective cyclone disaster prevention and mitigation, which are summarized below:

##### *Cyclone forecasting and warning*

For communities living in the coastal areas, survival is dependent on

- Early warnings that are timely, readily comprehensible and perceived to be accurate and reliable for their locality
- Availability and effectiveness of evacuation measures
- Availability of cyclone shelters or other safe buildings.



Image: Yugraj Yadava

Mangroves act as bio-shields and help in mitigating the effects of cyclones and storm surges

Similarly, survival at sea is dependent on the capacity to receive warnings as well as the capability of the vessel and crew to escape, find shelter or ride out the storm. For those who survive the immediate effects of the cyclone, timely rescue and relief may be required to ensure survival in the aftermath. At the community level too, there needs to be considerable awareness and educational work on how to best adapt forecasts and improve comprehension and trust among communities. Such work should build on indigenous knowledge about cyclones.

##### *Connection between development and disaster preparedness*

For community disaster preparedness to be sustainable, there needs to be long-term follow up by the Government and non-governmental organizations. Further, to assure sustainability the work needs to be interwoven with other livelihood and developmental activities undertaken by the Government and other civil society organizations in areas such as sanitation, water supply, education and housing, which are all vulnerable to disasters.

##### *Gender mainstreaming*

Gender balance is essential at all levels of disaster preparedness as women are frequently the caretakers and provide for basic survival. They also have a number of particular problems and perspectives that are different from those experienced by men in a disaster.

##### *Creative approach to cyclone shelters*

Such facilities in the coastal areas should have multi-purpose functions and could serve as schools, community halls, offices, etc., besides providing shelter from cyclones in an emergency. They should be constructed and managed with full participation and involvement of the local community.



Image: Yugraj Yadava

Folk songs and village theatre are effective media for raising awareness amongst communities

#### *Learn from what is already being done*

Exposure of Government officials and civil society organizers to disaster preparedness work at national, state and regional levels is essential since there is so much to learn from others' experiences.

#### *Awareness raising and use of multimedia*

There is a widespread lack of awareness on disaster preparedness at all levels of the community and Governments. There should be much greater use of media, especially television and radio, in raising awareness.

#### *Teaching children disaster preparedness*

Schools should include disaster preparedness and awareness raising about cyclones and their nature, especially at community and household levels.

#### *Green belts protect communities*

Forest and mangroves in the coastal areas help reduce storm surge penetration, soil loss and flooding. They sustain marine and brackish water fisheries and other ecosystems, and provide fuel, fodder, building materials and livelihoods to coastal communities. Therefore, their protection is important for the well-being of the community.

### **Bangladesh**

The Empowerment of Coastal Fishing Communities for Livelihood Security (ECFC), an FAO/UNDP/Government of Bangladesh Project, was implemented in Cox's Bazaar district between 2002 and 2006. One of the main components of the project related to strengthening the capacity of the coastal fishing communities for disaster management, focusing on cyclone preparedness measures. The objective of this component was to facilitate and enable community access to advance disaster warnings in order to prepare them to cope with and recover from natural and other hazards at sea and on land.

One of the important lessons learnt from the project was that disaster preparedness in real time should be driven by a sense of



Image: Yugraj Yadava

Gender mainstreaming is vital for success of disaster preparedness

responsibility. This was shown during the cyclonic period in May 2004 by the fishing communities of all the villages covered under the project. The role played by Village Disaster Preparedness Committees (VDPCs), change agents and volunteers (both men and women) in alerting the communities was highly effective. These groups shared responsibilities for disseminating door-to-door weather forecasts and danger signals. The teamwork shown by the community in taking prompt initiative for cyclone preparedness was found to be excellent and highly appreciated by people from all walks of life.<sup>4</sup>

### **Regional training**

The South Asia component of the FAO Global Project on Safety at Sea for Small-Scale Fisheries in Developing Countries was implemented in the four member countries of the BOBP-IGO from May 2007 until December 2010. The project focused on training, education and awareness for improved safety at sea. Various approaches were used to take the message to the community. These included colourful leaflets giving key messages on subjects such as cyclone signals, folk songs and village theatre, and video films in local languages.

### **Rising risk, prepared communities**

With the increase in sea surface temperatures due to global warming, there is likely to be an increase in the frequency and intensity of tropical cyclones. In such situations, community preparedness will be of immense help. There is a pressing need to replicate the lessons learnt from the above examples, not only within the BoB region but also in other parts of the world, where coastal communities face constant threat from cyclones and other natural hazards.



# Reducing vulnerabilities and enhancing resilience in Nigeria

Muhammad Sani Sidi, Director General, National Emergency Management Agency, Nigeria

**A**gwgune is a community in Cross River State, Nigeria. It lies between latitude 5°41' and 5°41' and longitude 7°50'E and 8°E, and consists of flat to gently-undulating plains developed over sandstone, shale and coastal plain sands. The bank of the Cross River has been severely eroded around Agwgune. Rainfall upstream of Agwgune is between 300mm and 3,500mm, leading to high runoff. This is also exacerbated by deforestation for urbanization and agricultural activities. Over the past 50 years, the land has receded as much as 120 metres and has gone down to as close as 9-13 metres to the community. In addition to this, there is perennial severe flooding. At the peak of the rains, the river overtops its bank and floods the town while the inflow into the stream inundates access roads to the community, thus trapping the people. Flood levels on houses can reach 1.6 metres or more and commuting between streets is mostly by canoe. Destruction of houses through landslides has also been recorded.

The Agwgune rehabilitation project was conceived as a result of the perennial flooding/landslides that have ravaged the community with grave humanitarian consequences over the years. This project is a

joint disaster risk reduction (DRR) programme, being implemented by a committee comprising the following ministries and organizations:

- Federal Ministry of Environment
- Federal Ministry of Housing and Urban Development
- Office of the Surveyor-General of the Federation
- Cross River State
- Biase Local Government Area
- Agwgune Community
- National Emergency Management Agency (NEMA).

The community donated the land area of about 2,591 hectares for the project. Biase Local Government provided basic facilities like markets and clinics through budgetary provision. The Cross River State government undertook the perimeter survey and produced the layout design, access roads, water, electricity and environmental protection works. The Federal Ministry of Environment is to undertake mitigation works against flooding and landslide, and NEMA is to provide 400 flats consisting of 200 blocks of two-bedroom semi-detached bungalows.

## DRR measures

Based on various assessments, participatory discussion and technical analysis of the situation, the following DRR measures were proposed:

- Resettlement of the entire population on higher and safer grounds
- Provision of erosion and flood control structures for the proposed new settlement
- Riverbank protection works for the entire area
- A long-term plan to dredge the Cross River to protect other communities along the bank.

Due to the campaign to promote awareness on DRR, embarked upon by NEMA and the State Emergency Management Agency in Nigeria, the community agreed to be resettled. The development of the New Agwgune Town involved the construction of 200 housing units of 400 flats; 12 kilometres of road network and concrete side-drains; and 17.65 kilometres of storm drainage systems. Already, 17 housing units have been commissioned and handed over to members of the community who are most affected by floods and erosion.



NEMA and stakeholders developing DRR curriculum for primary and secondary education

Image: NEMA, 2010



### Early warning systems for Lake Nyos

Lake Nyos is a crater lake in the Northwest region of Cameroon, located about 322 kilometres north-west of Yaounde and about 436 kilometres south-east of Abuja in Nigeria. It lies on latitude 6°26'17"N and longitude 10°17'56"E. It is a deep lake, high on the flank of an inactive volcano in the Oku volcanic plain; a zone of crustal weakness and volcanism that extends to the south west through the Mount Cameroon stratovolcano. The lake covers an area of about 1.5 square kilometres, with a surface elevation of 1,091 metres and a depth of 208-210 metres. Its volume of water is 132 million cubic metres, with a dam length of 50 metres. The lake is compositionally stratified, with a 200-metre deep fresh water area in the upper 50 metres and heavier sodium and carbon dioxide (CO<sub>2</sub>) rich water below that. The water below 180 metres is particularly rich in sodium and CO<sub>2</sub>. Most of the sodium and CO<sub>2</sub> come from numerous sodium-bicarbonate bearing springs — derived from an underlying magma chamber — feeding into the bottom of the lake.

The dam wall of Lake Nyos consists of very poorly consolidated pyroclastic layers of gravel, rock and mountainous soils and is subject to erosion from rain, wind and the lake waters. This region has an average rainfall of 2.5 metres each year. A natural dam of volcanic rock hems the lake waters.



Image: NEMA 2010

Flood early warning equipment

A sudden out-gassing of CO<sub>2</sub> occurred from Lake Nyos on 21 August 1986, when a limnic eruption triggered the sudden release of about 1.6 million tonnes of CO<sub>2</sub>; this cloud rose at nearly 100 kilometres per hour. The gas spilled over the northern lip of the lake into a valley running roughly east-west from Cha to Subum, and then rushed down two valleys branching off it to the north, displacing all the air and suffocating some 1,700 people — mostly rural villagers — within 25 kilometres of the lake, as well as 3,500 livestock.<sup>1</sup> As at May 1987, there was about 26 per cent build-up of CO<sub>2</sub> and scientific findings in 1991 show that Lake Nyos now poses an even greater threat to thousands more people than before, because it is being recharged with deadly CO<sub>2</sub>.

The dam at the northern end of the lake has obviously receded since its formation some 400 years ago. The area surrounding the lake shows traces of nearly vertical landslides and rock falls. In addition, in the downstream of the dam, old and recent landslides can be identified. There are even indications that landslides will occur at the section of the dam just east of the spillway.

The collapse of the dam would result into the release of water at an estimated peak discharge of 17,000 cubic metres per second into the Kumbi River, and discharge into the Katsina-Ala River in Benue State, Nigeria. About 50 million cubic metres of water would flow downhill, flooding the Northwest Province of Cameroon and seven frontline States in Nigeria — Taraba, Benue, Kogi, Adamawa, Akwa-Ibom, Cross River and Anambra.

These massive floods would, in a matter of minutes, submerge and sweep through Katsina-Ala in Benue State, as it hurried into the Benue River and Makurdi, 100 kilometres away. Within a few hours it would be felt in Lokoja, Asaba and Onitsha. The destructive impact of the flood would put thousands of lives at risk, and over 20,000 herds of cattle and other livestock and 15,000 hectares of arable land would perish. The estimated financial loss would be in billions, comprising crops, residential and commercial structures, utilities and infrastructures including roads, bridges and other services.

A lot of degassing activities have been ongoing to prevent the occurrence of toxic gas release from the lake. However, it is believed that CO<sub>2</sub> is building up in the lake so quickly that it raises the risk of a new catastrophic release.

If the dam breaks, the gas would spill from the upper section of about 40 metres of the lake downward to the region inhabited by hundreds of people. In effect, Lake Nyos and its neighbourhood is still a disaster zone, given the evidence of human activities and the presence of farms, houses and cattle-rearing around the lake.

NEMA has acquired and installed early warning equipment that will give an alarm to warn the communities around the lake to move before the release of poisonous flood water into River Katsina-Ala and other tributaries.

# Integrated disaster risk reduction in the Southeast Asian region

*Dato' Ibrahim Bin Komoo, Southeast Asian Disaster Prevention  
Research Institute, Universiti Kebangsaan, Malaysia*

**S**outheast Asia is one of the most vulnerable parts of the world to natural disaster. The region is frequently exposed to hazards due to geological processes such as earthquakes, tsunamis, volcanic eruptions and landslides, and climatic hazards such as floods, droughts, typhoons and storms. Natural disaster is the main contributing factor to the high level of casualties and property damage in many countries, which have yet to implement appropriate disaster risk reduction (DRR) strategies.

The Southeast Asia Disaster Prevention Research Institute (SEADPRI), established by Universiti Kebangsaan, Malaysia in 2008, focuses on initiatives for integrating the management of DRR via research in the Southeast Asia region. Its aims are to lead innovative knowledge transfer on holistic disaster prevention in the region and to research issues related to science and governance for DRR. Multidisciplinary research programmes in disaster management and DRR are conducted to expand knowledge of climatic, geological and technological hazards. Training of human capital is also a primary focus, particularly in addressing disaster issues for both the public and private sectors through postgraduate programmes.



Rockfall along the main highway near Kuala Lumpur. Landslides on man-made slopes are the most common hazards for the Southeast Asia region

Information gathered by SEADPRI shows that a variety of natural disasters have taken a cumulative toll on countries across the region in recent years. Significant disasters recorded in the Southeast Asia region are as follows:

### *Earthquake and tsunami*

Earthquake is the major geological hazard in Southeast Asia. The region is the most tectonically active zone on earth as the lithospheric plate is crushed between three major subducting oceanic plates, namely the eastward-moving Indian Ocean Crust, the westward-moving Philippines Sea Plate and Pacific Plate and the northward-moving Australian Plate, squeezed northwards towards the Eurasian Plate. Collisions along these boundaries have caused enormous earthquake events. Several large-scale earthquakes have triggered tsunamis, which lead to high levels of risk particularly to coastal areas in Indonesia and the Philippines.

The North Sumatra earthquake that took place in 2004 with a magnitude of 9.3, followed by a tsunami, was a critical lesson for countries in Southeast Asia, revealing that most of these countries were still unprepared to face major natural disasters. Deaths due to the tsunami in the affected countries were very high: 165,708 in Indonesia, 8,345 in Thailand, 80 in Malaysia, 61 in Myanmar, 35,222 in Sri Lanka and 12,405 in India. The events highlighted several basic weaknesses in the region, particularly in terms of the lack of infrastructure, emergency response, preparedness and public awareness.

Such gigantic seismically triggered tsunamis events have caused catastrophic consequences in terms of the number of people killed – for example in 1992 in Flores, Indonesia (2,200 deaths), in 1990 in Luzon (1,621 deaths), in 1998 in Papua New Guinea (2,183 deaths), in 2004 in Indonesia (227,898 people killed and about 1.7 million people displaced), and in 2005 Northern Sumatra (1,000 people killed). Earthquakes also trigger landslides. On the coast of Padang after the Sumatra earthquake (2009), several villages slid into the valley after the quake, killing 1,117 people and injuring 1,214. There was damage to 181,665 buildings and 451,000 people were displaced in the Padang-Pariaman area.



Image: SEADPRI

Mt. Merapi, the most active volcano in Jawa, erupted in 2010, killing 353 people

#### *Volcanic eruption*

The subduction zone across the Southeast Asian rim has created over 200 active volcanoes along the archipelago of Indonesia and the Philippines. Major eruptions occurred on Krakatau island in 1883 (killing approximately 40,000 people) and Mount Pinatubo in 1991 (killing 1,335). Krakatau also generated a giant tsunami. The most recent eruption in Indonesia was Mount Merapi in 2010, forcing the evacuation of at least 19,000 people and killing 353. This was the fourth episode following eruptions in 1930, 1994 and 2006.

#### *Landslides*

Landslides such as rock fall and debris flow are natural phenomena that occur in sloping or hilly areas with localized impacts. Even though landslide events in Southeast Asia are widespread, information on these disasters is still poorly recorded. Landslides in this region vary in size and nature. In Southeast Asia, one of main issues related to landslides is human-induced landslide, commonly known as slope failures. These landslides have become more serious than natural landslides in some countries due to poor slope design, construction and maintenance.

In Malaysia more than 620 lives were lost due to landslides between 1900 and 2010. Debris flow in mountainous area was the major killer in a landslide disaster in 1996 with 66 deaths, following the Highland Towers collapse in 1993, which killed 48. Subsequently two disasters took place in 2002 and 2008 on the same hill. Meanwhile in Indonesia, 498 people died and 249 people were reported missing in 23 landslide events between 2001 and 2004. Landslides in Banten (2001) killed 94 people, while in Nias (2001), 50 people were killed, 114 went missing and 325 houses were damaged. The landslide in Baharok River area killed 151 people and 100 were reported missing.

#### *Floods*

Flood is the most prevalent serious natural disaster phenomenon in many Southeast Asian countries, including Thailand, Cambodia, Vietnam, Indonesia and Malaysia. Many major cities and settlements located along major rivers or deltas are flood areas, including Kuala Lumpur, Bangkok, Rangoon, Phnom Penh and Hanoi.

Floods in Thailand and Cambodia are among the worst in Southeast Asia, affecting millions of people. In Thailand, floods in 1995, 1996 and 2002 affected 4.2 million, five million and 3.3 million people respectively. Meanwhile, in Cambodia the floods in 2000, 2001, and 2002 affected 3.4million, 1.7 million and 1.5 million respectively. Taking Malaysia as an example, the monsoon floods are less life threatening but cause significant monetary loss to agricultural land and infrastructure. There were particularly heavy losses during major statewide floods in the Northern and Southern Peninsulas of Malaysia in 2003, 2006 and 2011.

#### *Storm surge, typhoon and drought*

Storm surge and typhoon occur in abnormal weather conditions, with storms also triggering landslides and floods. Droughts following prolonged lack of rain cause the land to dry up, which in turn leads to famine and destruction of crops.

Nine out of ten killer disasters in Myanmar have been related to storm surges, including the Nargis cyclone in 2008, which was the worst natural disaster ever recorded in the history of the country, causing at least 138,000 fatalities. In the Philippines, nine typhoon



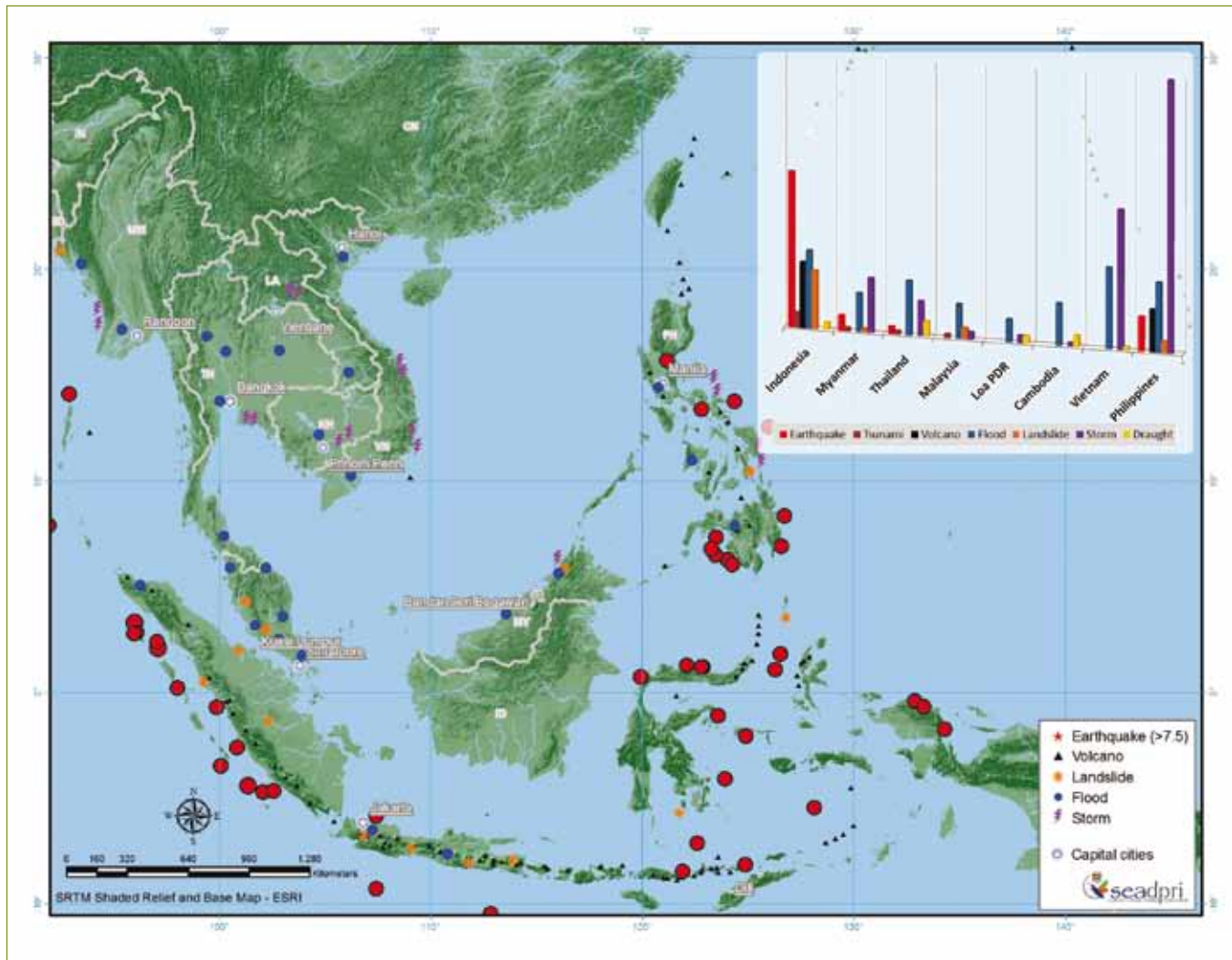


Image: SEADPRI

Distribution of natural disasters in Southeast Asia. Inset: Chart showing number of major disaster events in these countries

events from 1900 to 2011 have affected more than 35 million people, including 6.1 million people in 1990, 4.8 million people in 2008 and 4.9 million people in 2009. In Vietnam, storms top the list of killer disasters in the country, with 22 million people affected between 1900 and 2011. The droughts in Thailand in 1999 2002, 2008 and 2010 have had an impact on millions of lives.

#### *Lessons from disasters in Southeast Asia*

Regardless of the type of hazards, whether geological or climatic, the impacts are enormous, and many areas are exposed to multiple disaster risks. Major disasters, such as earthquakes, volcanic eruptions and storms, trigger other disasters such as landslides, floods and tsunamis.

Disasters normally occur unexpectedly and communities are ill-prepared, due to the irregular frequency of the events. Therefore DRR needs to be mainstreamed into planning, implementation and monitoring of development projects.

Currently, the approach for managing disasters in most countries in Southeast Asia is sector-based, with different agencies handling earthquakes, volcanic eruptions, floods, storms and landslides separately and in isolation. This approach is not the most effective and cannot provide comprehensive long-term solutions. Often disasters

occur in multiple hazard zones, and the implications in terms of death, property damage and psychological effects to the community are similar.

Therefore, an integrated approach is critical when implementing DRR programmes. Some methods which can be introduced to initiate such integrated management include the following:

- Scientific research on disasters needs to be carried out holistically, looking at the likely chain of events — pre-disaster, during the disaster and post-disaster — linking each to other possible consequent events
- Disaster governance should emphasize policy integration, especially in the context of multi-disaster events and linkages between disasters
- Integrated implementation should be carried out by all agencies through inter-agency coordination and joint planning if necessary
- DRR approaches should be mainstreamed through policy planning responses in each country, and subsequently expanded to integrate programmes among countries in Southeast Asia.

# Integrating disaster risk reduction in water, sanitation and hygiene (WASH)

*Erik Rottier, Disaster Risk Reduction Coordinator, CARE Nederland*

**C**ommunities, and the people living in them, depend upon services, such as energy, transport, education, and access to markets, for their proper functioning. While all services are important for society to function, some, like water, sanitation and hygiene (WASH) and medical services, are critical to survival and thus need special attention to ensure continuity, especially after a disaster occurs. The breakdown of these services could result in secondary disasters.

There are several links between disasters and WASH; disasters can destroy or degrade WASH services at a time society can ill afford it, resulting in the breakdown of services and/or contamination of the environment, which may create conditions that can lead to follow-up, or secondary, disasters. A community displaced because of flooding, and living in crowded and unhygienic conditions, may be at risk of an outbreak of cholera, louse-borne typhus and other infectious diseases. A disaster that damages the water supply used for irrigation may result in the loss of livelihood opportunities in the community, leading to

poor food security. Inadequate WASH services can also cause conditions that increase the likelihood of disasters. For example, a community using river water that is polluted by faecal matter from upstream communities will be at risk of an outbreak of faecal-oral infections (such as typhoid fever and cholera). Stormwater drainage systems that cannot evacuate the water generated by heavy rains, because of poor design or blockage with soil or solid waste, may cause flooding of communities.

It is also essential that new vulnerabilities or hazards are not introduced or reinforced through existing or newly built WASH installations.

It is essential to increase the resilience of WASH systems towards natural hazards and increasingly development and relief agencies are recognizing the need for integrating disaster risk reduction (DRR) activities in the WASH systems that are being set up.

The kind of measures that can help create more resilient WASH services are often quite straightforward. For example:

- Reduce exposure by adequately choosing the location for WASH structures
- Use looped network systems over branched systems
- Use of quality materials that can better withstand shock
- Set up systems that allow for quick detection and repair of damage
- Consolidate areas at risk through reforestation
- Ensure there is redundancy built into the system, covering physical structures, human resources, and organizational units
- Develop emergency preparedness plans
- Train stakeholders in dealing with the effects of hazard events/disasters.

Making WASH systems more resilient to natural hazards will also ensure that development gains are better preserved.

In May 2009, Cyclone Aila touched India's south-eastern coast, affecting almost 6.6 million people across 18 districts. Homes were destroyed, as were standing crops, fisheries and livestock. Water sources were contaminated with saline water. Traditionally the population was largely dependent on surface water ponds for its water supply: these ponds were now filled with

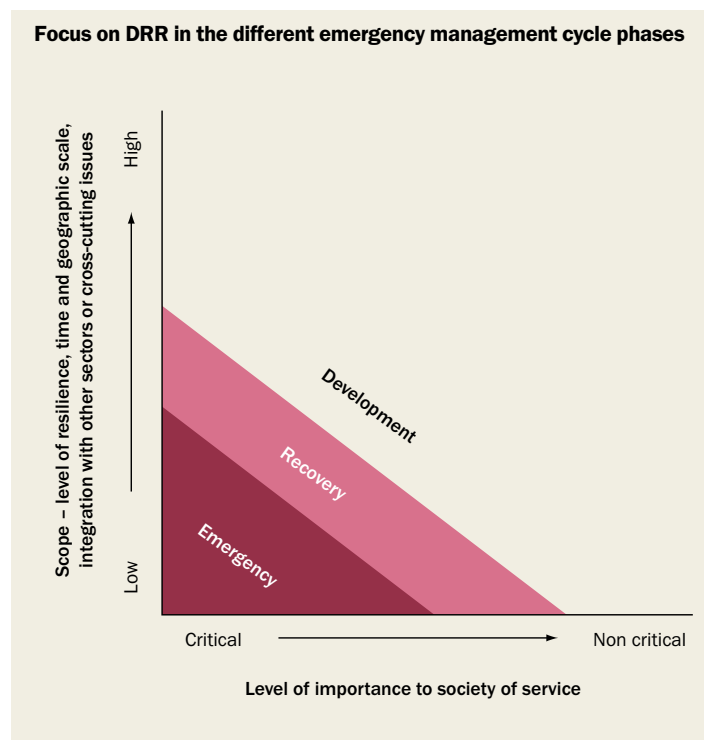




Image: © CARE India

Raised handpump installed in Gangapur Village; installations were made in close collaboration with the community

saline water. Five months after Aila, many villages were still inundated, and needs in the community with regards to shelter, food, and WASH services were very high.

Funded by the European Commission's Humanitarian Aid department (ECHO), CARE India implemented the Sundarban Aila Recovery Project from February 2010-January 2011. This project covered shelter, worked on strengthening livelihoods, and supplied WASH services to a number of communities. The vulnerability of the communities to future flooding was obvious, and the handpumps installed were raised so as to ensure they would not be affected during flooding, and that they would continue to be operational even if the surroundings were inundated. The raised handpumps were made in such a way that disabled users could also use them.

The project addressed the needs of the community in hardware, software, and community organization. The raised handpumps were installed in collaboration with the community. Potential users of the system were involved in hygiene promotion activities aiming to improve public health, and in awareness activities on the proper use and cleanliness of the pump and its surroundings. Instructions for the proper operation of the handpumps were also painted on the platforms.

Users Committees, consisting of locally elected representatives, and members of the community, were formed. These committees were trained in the operation and maintenance of the systems, and in basic management and administration tasks needed to keep the systems operational.

Engagement of the community in the development of the project was strong, which, together with a cost recovery system that will cover the funds needed for operation and maintenance, will assist in the sustainability of the systems.

This is an example of mainstreaming DRR in a recovery project. The project also shows the importance of keeping in mind a bigger picture. The aim of protecting WASH services is to ensure users have the minimum services required to survive and thrive, so the focus should be on users rather than the services themselves. Even though attention to WASH is vital, in any action the links with other sectors (such as shelter, food security, energy or health services) have to be considered and priority given to the sectors that can maximize the positive impacts on a society. In the project in India, shelter, livelihoods and WASH were combined.

When looking at disaster risk, WASH services have to be considered as part of the larger picture, a picture that looks at the functioning and resilience of society as a whole.

There is space for the integration of DRR in WASH in emergency response and early recovery as well as in development interventions.

In emergencies, DRR will be limited in scope. In relief, the focus will be on critical services, ensuring users have access to enough safe water for their survival needs. As such, DRR actions will be limited to essential elements (safe location of emergency systems, or ensuring sufficient stock and safe storage of water treatment chemicals). The timescale considered will be narrow, ranging from hours to weeks. Integration with other sectors and cross-cutting issues will be more limited.

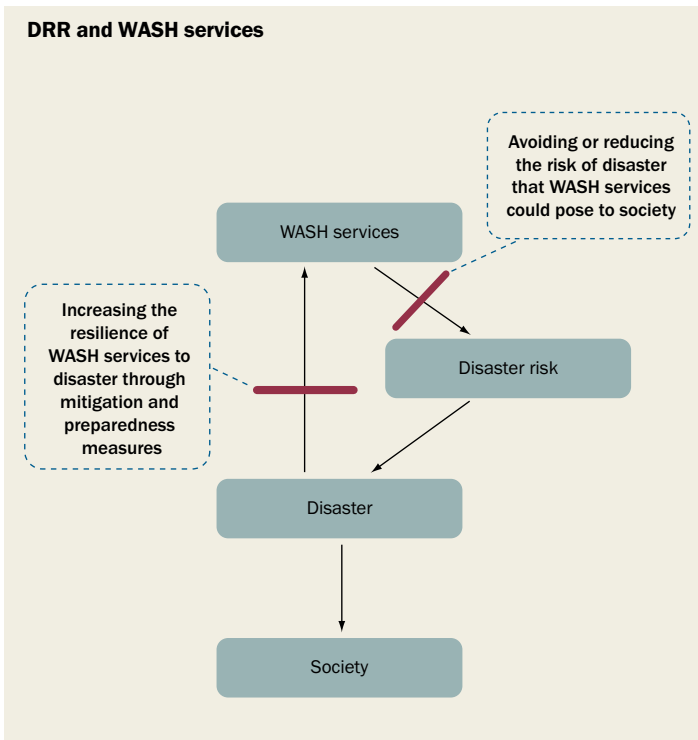
In the recovery phase, these boundaries are enlarged. While elements covered in relief remain important, services covered will be extended to less critical but





Image: © CARE India

Raised handpump installed in Bidhan Colony Village; note the instructions on operation and hygiene promotion messages



Source: CARE

key services (for example, solid waste management where the presence of waste might pose a risk to public health). DRR actions will be more involved, and will aim for higher levels of resilience. Timescales considered will be extended. The integration with other sectors and cross-cutting issues will become much stronger.

In the development phase, the elements of the relief and recovery phases are covered but with added scope. All WASH services are covered, including non-critical ones (e.g. solid waste management where presence of solid waste is not considered a large public health or safety issue). DRR actions will be comprehensive, and will aim for a high level of resilience, especially for critical WASH services. Timescales considered will be longer still. Integration with other sectors and cross-cutting issues will be significant.

The importance of disaster risk in development initiatives is often still underestimated. This results in communities and societies that are left vulnerable to the impact of hazard events. When these events occur, people and communities are often heavily affected, and development gains are lost. While it is impossible to completely eliminate the impact of disasters on society, the losses are often unnecessarily high.

Disaster risk should be adequately addressed in society by increasing resilience to hazard events in all sectors that contribute to development. The task of creating more resilient societies is a large one, and no single organization will encompass the skills and authority needed to achieve this on its own. To maximize impact, an approach of collaboration and coordination between different stakeholders will be necessary.

While the task of creating more resilient societies is a challenging one, it is also an important one, and to achieve stronger societies, the policy guidance as presented in the Hyogo Framework for Action will have to permeate throughout development plans and policies.

# An integrated approach to disaster mitigation at Nyachilenda River

Abel Chigunduru, Engineering Coordinator and  
Charlie Kabanga, Programme Coordinator, Disaster Risk Reduction and Food Security,  
GOAL Malawi

**N**sanje district, in the far south of Malawi, is one of the most vulnerable districts in the country to floods and drought. GOAL, an Irish international relief and development NGO, has been working in Nsanje since 2004, initially as a partner of the World Food Programme on food distribution, then transitioning to long-term community resilience programmes. In order to build comprehensive resilience to natural disasters it is essential to facilitate local-level preparedness for the alternating hazards of floods and drought, including provision of necessary technical support. The current challenge is to continue improving community preparedness to potentially devastating flash flooding while most households are struggling with food insecurity after crop failures caused by erratic rains during the rainy season.

GOAL is responding through linked Disaster Risk Reduction (DRR) and food security projects, funded by the Disaster Preparedness arm of the European Commission Humanitarian Office (DIPECHO) and by the mainstream European Commission Humanitarian Office (ECHO). The focus of the DIPECHO project is on capacity building of community Civil Protection Committees from village up to district level, strengthening the district government's DRR capacity and refining early warning systems (with exchange visits to counterpart community organisations and local government in Mozambique contributing to all of these aspects); while the focus of the ECHO project is on improving food security of vulnerable households via trialling climate-shock varieties of seeds and via Cash for Work activities on flood mitigation works and tree planting, which in turn substantially reduce disaster losses.

A holistic approach to DRR has improved the resilience of communities living in flood-prone areas, as illustrated by the case of the Traditional Authority area (sub-district) of Ndamera.

## Issues faced in Ndamera

The people in Ndamera started experiencing flash floods from the Nyachilenda River in 1978, according to local elders. They blame the influx of Mozambican refugees fleeing the protracted civil war in their country. The refugees would indiscriminately cut trees to clear land for agriculture, and would settle on fragile lands (wetlands and mountain slopes) as long as the land was tillable. The situation was made worse by the fact that during this time land distribution in Malawi was handled by political figures. Traditional leaders' roles had been reduced to those of virtual onlookers. They suspected that politicians had an incentive to bring in more people as this would

increase their support base. Refugees' allocated land exceeded the sustainable carrying capacity of the land and this resulted in massive deforestation, land degradation and silting of rivers and streams.

The Ndamera area has often suffered from crop failure due to erratic rains, flash floods and unsustainable agricultural practices. In cases of severe erratic rains, the population has resorted to stream bank and, in some cases, riverbed cultivation as community members seek to take advantage of residual moisture from the floods. There are no strict bylaws to curb this practice.

All the nine villages in Group Village Head (GVH) Ndamera (Ndamera, Katsano, Malemia, Thipa, Kadambe, Mankhangwe, Dalesi, Zavedo, Karikoka) are affected. At least 300 houses are usually affected by flash floods whenever there is a flood. Though there is no record of human deaths, structure and asset loss has been very high with houses and toilets falling and crops, grain reserves, goats, chickens and bicycles being swept away. Ndamera Full Primary School, with an enrolment of 1,713 pupils, is not spared. The schoolyard is usually flooded and attendance significantly reduced as pupils from across Nyachilenda River, as well as young pupils from the whole school catchment area, do not come to school. Several other infrastructures including the local Post Office, Ndamera Court building, Extension Planning Area offices, Ntowe Community Day Secondary School and Ndamera Training Centre have also often been affected by floods.

## Geography of the Ndamera area

Ndamera lies some 45 metres above mean sea level with very high average summer temperatures (42°C)<sup>1</sup>, low and unevenly distributed annual rainfall (590mm) and poorly drained soils. Almost 35 per cent of Ndamera lies in the Ndinde marsh along the Shire River. When the Nyachilenda River reaches the Ndinde marsh it ceases to have a defined channel and discharges its water into the marshes. The Nyachilenda River's source is in the hilly Kalitera area, 540 metres above mean sea level and some 16 kilometres from Ndamera Primary School. The river meanders from the uplands for 7 kilometres at gradients of over 5 per cent, with the last 9 kilometres at more gentle gradients. Most of the silt comes from the uplands due to a combination of poor agricultural practices, lack of soil conservation methods and population pressure.



Image: Kingsley Khola, 16 March 2011

A GOAL engineer inspects the foundations of the planned gabion wire mesh reinforced concrete lining at Nyachilenda river

#### *Livelihoods along the Nyachilenda River*

The Traditional Authority of Ndamera is one of GOAL's operational areas. GVH Ndamera has nine villages, and almost all of them are affected by climatic shocks and flash floods from the Nyachilenda River. GVH Ndamera communities depend mainly on subsistence farming complemented by fishing on the perennial Shire River. However, dependency on maize as a staple food has severely compromised crop diversity. The cultivation of sorghum and millet varieties, which are both flash-flood and drought tolerant, including other small-scale crops that are usually consumed as supplements to maize, has declined over the years with some species virtually extinct. This, compounded by the critical shortage of irrigation facilities that would enable farming families to intensify their crop production and produce outside the rainy season, has compromised food security.

#### **Addressing vulnerability to flood and drought**

Several approaches have been used to address the vulnerability to flood and drought, including mitigation works, reforestation and food security interventions, and capacity-building.

#### *Mitigation works*

The Nyachilenda River is one of eight problematic rivers being targeted under GOAL's ECHO-funded programme, 'Improving Food Security and Resilience to Natural Disasters in Nsanje District'. Some areas along the Nyachilenda River have either no defined banks or low-level banks, allowing floodwaters to overtop the banks and flood villages and fields. At these vulnerable points the community is working with technical assistance from relevant government departments and GOAL to dredge the river, create dykes, increase the height of banks and fortify unstable banks.

The quantity of material to be dredged was very large, prompting the hiring of a bulldozer. It would have taken the whole Ndamera community nearly a year to dredge by hand the material which the bulldozer cleared in 10 days. The community was actively involved as people came in after the bulldozer to do the final shaping of the cleared material to form a uniform dyke. A total of 189 people from the Ndamera area were engaged on the project for three months as workers under Cash for Work programming. Workers received MK200 (€1) for a three-hour working day, with tasks-modality being used where possible. Working hours were flexible to allow workers to attend to their agricultural activities. The programme was very popular as there was cash transfer into a community which hardly uses cash as a medium for trade. The project was executed during the lean hunger period when the community faces its worst food security challenges, so the cash transfers were primarily used to procure cereals. According to GVH Ndamera, people from his area would normally need to dig for tubers (Nyika) on the riverbed of the Shire River, risking attack from crocodiles.

After shaping the dykes the workers planted local grasses (runner grass, elephant grass) on the top and land-side of the dyke to protect it from erosion. On the river side of the dyke, properly staked cement-stabilised sandbags were used to protect against erosion by flowing water. Cement-stabilised sandbags were also used to increase the height of the riverbank where there was potential for floodwaters to overtop the existing





Image: Evance Mandala, 3 March 2011

Members of the Ndamera community draw a vulnerability map of their area from high-resolution satellite images

bank. The Ndamera community is excited that since the erection of the dykes it has not experienced flash flooding, despite the river waters reaching levels which usually would flood the villages. The people pray that the dykes hold strong, especially for the remainder of this year when they have not yet gained significant strength.

Soils in Ndamera are uniformly graded which make them highly erodible. Where there are defined banks they are collapsing due to undercutting. Gabion baskets were used to protect these banks especially where the river changes direction. Steep banks were beveled to create gentle slopes which will promote re-colonization by plant species. It should be noted that the Nyachilenda River flows only when it is raining or when its source receives significant rains, otherwise the flow is subsurface.

#### *Reforestation interventions*

Deforestation was a major problem for the Ndamera community, which has undertaken a massive tree-planting drive since the mid-1990s with support from the United Nations High Commission for Refugees. Under this drive efforts were concentrated on planting trees at homesteads for firewood, shade and wind breaks. However, due to limited land at homesteads the community was advised by the Department of Forestry to consider establishing plantations on the riverbanks. Reforestation activities are spearheaded by the Village Natural Resources Committee (VNRC) which works closely with the local forestry officer.

The community has started realising the benefits from its 2-hectare plantation through harvesting timber and firewood. The plantation has also fortified the riverbanks, reducing erosion. Under GOAL's ECHO-funded project 10,000 seedlings (Neem and Acacia) have been planted on the banks of the Nyachilenda River. The tree planting activities have the immediate benefit of curbing

stream bank cultivation, medium-term benefits of providing timber and firewood, and long-term benefits of negating effects of climate change. The community intends to establish a saw-mill in the area to add value to the timber as well as creating employment for future generations.

#### *Food security interventions*

GOAL's ECHO-funded programme has had a food security component where 902 farming families in Ndamera received short-cycle flash-flood and drought tolerant seeds with technical assistance from the UN Food and Agricultural Organization. Each participating household received sorghum, pearl millet, cassava cuttings, sweet potato vines, carrot, garlic, onion and vegetable seeds. It is pleasing to note that the seeds were distributed to a receptive and willing community as almost all of them were planted. While the traditional maize crop wilted, farmers were assured of realizing up to 80 per cent of the expected yield from sorghum and millet crops. Having gone through seed multiplication training, participating farmers will now retain seed for the coming season and plant it on time.

#### *Capacity-building through training and workshops*

Ndamera, like most areas in Nsanje district, has civil protection structures which include Village Civil Protection Committees (VCPCs) and VNRCs. These committees report to the district and are voluntary. Their operations in Ndamera were, however, affected by lack of support and follow-up by the district



Image: Malango Singini, 1 March 2011

A thriving pearl millet crop in Bambo Kanjira's field in Ndamera, visited by an ECHO representative

officials. The situation has now been ameliorated by GOAL's DIPECHO-funded programme, which seeks to strengthen such institutions. Several workshops and training sessions have been carried out to enhance the capacity of VCPCs and VNRCs, including coordination and communication protocol mechanisms. An integral part of the programme was to come up with a community-drawn vulnerability map. The Ndamera community did the hazard identification and prioritization process as well as the vulnerability list. They then participated as a community and produced a vulnerability map of the area using high-resolution satellite images. This has led to community-driven initiatives like the establishment and management of community tree nurseries, community forests along riverbanks, river dredging, and follow-up visits for coordination and monitoring of mitigation works.

### Main findings

The Ndamera community, through the DRR process, has participated very actively in the planning, design and implementation of GOAL's DIPECHO and ECHO-funded projects, thus ensuring ownership. The community is well-equipped to maintain the established structures since its members planned, designed and instituted them. However, the flood mitigation works and forestry activities done are just a drop in a bucket when one considers the whole catchment area. The DIPECHO and ECHO-funded projects have provided a balanced basket in terms of DRR programming. It is important, with adequate funding, that a holistic approach be taken in the whole Nyachilenda River catchment in future years, to do land rehabilitation, soil conservation works and reforestation activities, including all the relevant software.

By looking at the example of the Nyachilenda River it is possible to see how a holistic approach to addressing DRR issues can prove highly

successful. So far, in spite of receiving slightly more rainfall than last year, there are no reports of flooding along the river thanks to the mitigation works, whereas floods have been recorded in other areas of the district. While maize crops were a write-off due to unevenly distributed rains, climate-shock-resistant sorghum and millet crops trialed as part of GOAL's ECHO-funded project withstood the unpredictability of rains, thereby enhancing communities' resilience. It is difficult now to measure the impact of this year's reforestation activities, but GOAL believes that in two or three years, sites where this activity was conducted will be protected from erosion and landslides, as is now the case where trees were planted a few years ago.

“We used to have problems with most donor-assisted programmes where no consultations were done. Our vulnerability would force us to accept whatever was put on the table even if we did not like it, lest we would be abandoned. A person leaving the dentist will insist, through painfully gritted teeth, that they are just fine, thanks, lest the drill comes out again.”

Group Village Head Ndamera (local leader)

# Risk reduction and adaptation: good concepts with great challenges

*Hassan Ahmad and Siti Sayadi, Mercy Relief, Singapore*

**H**umans are the definite perpetrators of climate change and have in due course also suffered its backlash. Climate change exacerbates poverty, as erratic weather induces environmental disasters such as drought, flooding and soil degradation that lead to displacement and food shortage issues. The impacts of climate change fall disproportionately on developing countries and poor people in all countries — in other words, those who have contributed least to greenhouse gas emissions. This will in turn worsen existing inequities in health status and access to adequate food, clean water and other resources.

Given the escalating occurrences of natural disasters, it is imperative that national strategists and humanitarian implementers put in place critical processes and capacity-building strategies, driven by risk reduction and adaptation initiatives to prepare vulnerable communities for future calamities. As the implementation of appropriate disaster risk reduction (DRR) measures is an important element in disaster management, the lack of them could lead to significant loss and damage to human and materials and could hamper economic wealth of the society, along with disruption to its essential functions and development goals mapped by the Government.

DRR can be defined as the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Integrative humanitarian actions to address both climate change adaptation (CCA) and DRR efforts need to create an enabling environment for improved early warning, information management and community-based disaster preparedness. Ultimately, responding to disaster should be seen a development action, the advocacy potential from the disaster's profile itself offering opportunities to build longer-term agendas. Within the framework of DRR there have already been efforts to integrate development and humanitarian perspectives through key policy commitments like the Hyogo Framework for Action (HFA). What is needed now is a scaling up of investment at the local level in the achievement of both development goals incorporating the outcomes of the HFA.

The Stockholm Plan of Action for Integrating Disaster Risks and Climate Change Impacts in Poverty Reduction (October 2007), with participation from governments, bilateral and multilateral agencies, civil society organizations, experts and researchers, outlines five recommendations for linking these related fields. These are:

1. DRR and CCA cannot be dealt with in isolation
2. Risks due to disasters and climate change must be known and measured
3. Disaster and climate change risk analysis must be integrated into national planning processes, including the poverty reduction strategy process, in each country
4. DRR and CCA are not sectors but need to be factors in all sectors
5. Capacity-building is required at local, national, regional, and global levels.

Adaptation to climatic variability consists of initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. As opposed to mitigation, climate change adaptation (CCA) strategies outline practical actions recommended to prepare for and respond to the potential impacts of climate change. Adaptation can adopt a variety of forms such as better education, training and awareness of climate change and more technical measures which include, inter alia, better coastal protection through enhanced marine engineering, and use of non-seasonal seeds for prolonged harvest. Adaptation strategies may be implemented in an autonomous or planned manner and differ in their scope to promote anticipatory or reactive response and public or private participation.

Working in a region where 70 per cent of all natural disasters occur, it is an obvious choice for Singapore-based humanitarian relief and development organisation Mercy Relief to focus its operational mandate on alleviating the sufferings of disadvantaged and distressed in Asia. As an implementing outfit, Mercy Relief focuses directly on the work and has steered away from working within closed-door adaptation strategies that have seemingly provided lacklustre and less-than realistic solutions to the challenges faced by rural communities. Mercy Relief's work is centred on serving the very people who suffer the negative brunt of climate change and addressing their immediate subjective wants rather than gradual objective needs, indicating the organization's intent to tackle risk reduction at community level.

With the implementation of risk management processes through its disaster recovery and sustainable developmental programmes, Mercy Relief has discovered the importance of putting forward a





Image: Mercy Relief

Process socialization: Mercy Relief's staff visited communities in China to garner their support prior to the implementation of the development project

community-based DRR initiative to influence vulnerable communities to adapt to such changes. In locations where Mercy Relief has successfully implemented a DRR programme stemming from its post-disaster reconstruction and rehabilitation efforts after major recent disasters in the Asian region, such amalgamation of risk reduction and adaptation strategies could help vulnerable communities reap benefits from the burdensome environment they have been accustomed to. By identifying appropriate technologies that can be adapted for application in varying conditions and be used sustainably to stimulate development of vulnerable and rural communities, process socialization for adaptation of risk reduction strategies in community-based environment would be well received by communities themselves.

As DRR propagates a set of activities carried out to minimize vulnerabilities and disaster risks in a society, and avoid (prevention) or limit (mitigation and preparedness) the adverse impact of hazards within the broad context of sustainable development, it is imperative that community-based disaster risk reduction (CBDRR) interventions build resilience in a sustainable manner that integrates participation across different demographics within targeted societies. In line with the humanitarian sector's perspectives, Mercy Relief's CBDRR efforts have been implemented with the objectives of effectively empowering communities and enhancing their capacities to deal with disasters by establishing management and governance systems to identify risks and find solutions through participatory exercises to create a conducive environment. This is implemented with the recognition that for comprehensive risk reduction programmes to be effective, targeted communities need to understand simple and practical actions required to protect lives and properties from natural hazard induced disasters.

### **Culture and disaster risk reduction**

Culture has the power of increasing or reducing vulnerability of communities towards disasters and may become either a factor

for the survival of the communities from disasters or a barrier for effective DRR activities. In situations where cultural factors influence behaviour of people when facing a hazard (Oliver-Smith, 1996), researchers and field workers have observed that people not only consider the danger they could encounter during a hazardous situation, but give priority to factors like social values, religious beliefs, traditions, and attachment to a location. Consequently, the lack of consideration of cultural aspects of the affected community can hamper effective DRR strategies, increasing vulnerability rather than reducing it. In the formulation of DRR strategies, implementers should explore measures that are compatible with the cultural habits of targeted communities. To integrate culture and DRR, positive aspects of cultural activities can be highlighted, along with the provision of appropriate scientific knowledge to increase community resilience against natural disasters.

Proper engagement with culture is, therefore, vital if implementers are to use culture as part of effective DRR activities and vice versa. Accordingly, CBDRR activities are considered a better way of integrating cultural aspects for effective DRR activities (Mercer, 2009). CBDRR activities that promote participant empowerment and allow for transfer of ideas from community to authorities will garner more support and gain due acknowledgement. Ultimately, CBDRR activities need to provide opportunities for affected communities to contribute towards the development of DRR strategies and measures, increasing commitment and sense of belonging to for the disaster management activities that they are involved in. The implementation of CBDRR programmes needs to consider influential factors:



Image: Mercy Relief

Provision of necessary medical equipment and supplies at the village clinic used by evacuees during an eruption times Mt Merapi

culture, threat of climate change and practicality of efforts in the advent of complex humanitarian situations.

*Cultural belief: Mount Merapi eruptions, Central Java*

Despite their destructive prowess, Indonesia's volcanoes have played an important role in feeding the soil — and have deep cultural influence. Agricultural productivity is a direct result of volcanoes like Merapi. The short-term destruction of eruptions like the one now occurring is more than outweighed by the long-term benefits of the nutrients that ash falls bring to soils.

Due to their attachment to mythical beliefs, villagers living on the slopes of Mount Merapi continued to trust the power of their cultural leader, Mbah Marijan, the Gatekeeper of Merapi, who believes that it is his duty to stay even when an eruption is imminent. Despite the Government's order for a full-scale evacuation, villagers will not move until the Gatekeeper does. The fate of 500,000 residents of Yogyakarta, a city 20 miles (32km) to the south, rests on Marijan's thin shoulders. It is his responsibility to perform the rituals designed to appease an ogre believed to inhabit Merapi's summit.

Marijan's behaviour might seem suicidal anywhere else, but not in Indonesia, an archipelago of 17,500 islands that straddles the western reaches of the hyperactive Ring of Fire. It is a zone of geophysical violence, a juncture of colliding tectonic plates that loops more than 25,000 miles (40,200km) around the Pacific. Geography has dealt Indonesia a wild card: nowhere else do so many live so close to so many (129 by one count) active volcanoes. On Java alone, 120 million people live in the shadow of more than 30 volcanoes, a proximity that has proved fatal to more than 140,000 in the past 500 years.

Given Mount Merapi's characteristics, spewing or erupting once every four or five years, local authorities have been trying to relocate those communities between three and ten kilometres from the volcanic mountain. Based on Mercy Relief's experience with the communities from its post-2010 eruptions relief and recovery efforts in Central Java, while Merapi may have ceased erupting, the impact on the communi-



Image: Mercy Relief

As part of the DRR training programme in the Philippines, participants were guided to prepare presentation materials to highlight disaster risk factors present in their community and ways to counter them

ties residing on its slopes remains, and the people remain vulnerable to the onset of disaster. As well as reconstruction efforts to provide new communal water distribution systems (which were damaged during the eruptions), a comprehensive disaster risk mitigation (DRM) programme has been implemented for the communities. The DRM programme includes the provision of respiratory care equipment for three health clinics where medical personnel will be trained in first response and respiratory care management. Two multi-purpose halls and improved sanitation facilities at two schools in the Dukun and Muntilan sub-districts were also constructed, for conversion into relief evacuation centres in the event of an emergency. Along with the establishment of an early warning system, educational workshops were held to prepare communities for future eruptions. In this instance, it is hoped that if communities go against the government's disaster mitigation strategies and evacuation efforts by strictly sticking to their traditional cultural beliefs, loss of lives could be avoided as communities themselves are equipped with disaster response facilities and knowledge on preparedness. In short, CBDRR initiatives were embraced by the people as they could still maintain, to some extent, their cultural beliefs.

*Ancestral knowledge: earthquake and tsunami, Simeulue Island*

The tsunamis on 26 December 2004 and 28 March 2005 killed only seven people on Simeulue Island in Indonesia's Aceh province. Simeulue was close to the epicentre of the 2004 earthquake, but loss of life was surprisingly low, mostly due to the impact of the earthquake rather than the tsunami, because the people are familiar with the twin disasters in the seismically active region. At Langi, on the north end of Simeulue, which is 40km south of the



Image: Mercy Relief

False sense of security? A house deposited at the concrete breakwater by the retreating tide at Otsuchi, Iwate Prefecture

December earthquake's epicentre, maximum wave heights exceeded ten metres less than ten minutes after the shaking ceased. In the more populous south, wave heights averaged three metres and caused significant structural damage, destroying entire villages. Oral histories recount a massive tsunami in 1907 and advised villagers to run to the hills after 'significant' shaking lasting one minute and when the sea waters recede drastically. Simeulue survivors recounted the historical knowledge and the necessary action to be taken. Simeulue's ancient folklore and knowledge provided an extraordinarily powerful mitigation tool that saved countless lives where even a high-tech warning system with a 15 minute response time would have been of much lesser help.

#### **Processed socialization and alternative source of survival, China**

Villagers living below the poverty line in rural areas of Shanxi and Sichuan provinces have succumbed to exploiting nature to offset the severe lack of resources and poor crop output. With numerous incidents of landslides due to rapid deforestation after trees have been largely sacrificed for energy use, development projects have been implemented with due consideration to the communities' socio-economic needs. To address this situation, Mercy Relief programmes look to pragmatic solutions to provide villagers with alternative sources of energy. Anaerobic biogas digesters have been installed to generate biogas for cooking and lighting. This helped cut down expenditure on coal, as well as minimizing use of firewood — which helps protect the environment and improve health. At the same time, ecological sanitation was introduced to the villagers, that is, proper toilets were built in homes, with the excrement collected treated by the biogas digesters. This paves the way for effective and hygienic management of domestic waste, and the residue from biogas extraction also provides the villagers with natural fertilizer for their crops. Besides the economic benefits of saving on fuel by using biogas for cooking, it is a more environmentally-friendly and healthier alternative to using coal or wood. The savings generated present the villagers with livelihood investment possibilities.

#### **Community-based DRR, Philippines**

In a country where between ten and twenty typhoons mercilessly slash its land every year, the lives of large communities across the Philippines are made worse by chronic poverty, a lack of economic diversification and environmental degradation. When Typhoon Morakot hit Zambales province in August 2010, those living in the municipalities of Botolan and Palauig were crippled as they saw river channels being damaged by the lahar build-up around it, submerging their villages. Although the Philippine Government had spent more than US\$19.6 million to build a series of dikes to prevent further lahar damage, there had been little efforts to maintain them. To prevent more casualties from future typhoons and rains, the people in Botolan had been asked to move to the highlands. However, being mostly fishermen, they have no means of livelihood on the slopes of Mount Pinatubo, increasingly barren from the slash-and-burn hunting methods of the indigenous Aeta people. Thus, the village community needs either a means of sustaining its livelihood (fishing) or diversification into other sources of income that could increase its resilience in the face of disasters.

To tackle this, Mercy Relief started a few livelihood projects aimed at increasing the resilience of the coastal communities to damage by seasonal monsoons and as well as increasingly-common disasters such as typhoons and accompanying flooding and tidal surges. To ensure that developmental efforts are followed through during disaster times, Mercy Relief, with its local partner, Citizens' Disaster Response Center (CDRC) came together to launch a community-based DRR programme in 24 landslide and flood-prone communities in the provinces of Negros Oriental, Negros Occidental, Iloilo, Sarangani and Misamis





Image: Mercy Relief

One of the many vessels left stranded on the solid coastal defence in Ishinomaki, Miyagi Prefecture

Oriental. The project hopes to build the capacity of selected communities through awareness-raising and training of participants. Through the formation of Disaster Preparedness Committees (DPCs), community leaders have been identified to build community resources for long-term mitigation and risk reduction. Through training and formation of the DPCs appointed by the villagers, Mercy Relief and CDRC ensure developmental initiatives remain sustainable and community-driven.

#### **Practicality of DRR in complex or large-scale humanitarian crises**

While most DRR strategies have been developed for implementation in rural and poverty-stricken areas during peacetime, measures have to be effective in the advent of complex humanitarian situations. Most traditional DRR strategies are based on the perspective that if disaster risk measures have been taken into account when planning development projects, those projects are less likely to be undermined by the impact of a hazard, and that if programme implementers adopt a developmental approach to emergency relief, then the capacity of that community will be built up.

However, this is of little relevance when countries and communities have been crippled by disasters. For instance, after Sri Lanka and Pakistan were swept with prolonged flash floods just months after the countries had been resuscitated following an armed conflict, their governments and aid agencies were economically unable to combat another disaster.

DRR has increasingly been seen as a growing area of policy and programmatic investment for NGOs, including a greater focus on partnerships and community engagement, and an increased awareness on the part of development colleagues of the need for risk reduction work in development programming. There is, however, a general recognition that resources for DRR are still insufficient.

Although most countries have shown progress in terms of preparedness and response in recent times, this has not matched up to the increasing frequency and force of natural hazards.

For example, Japan, the world's most prepared nation against natural disasters, recently faced an extremely complex humanitar-

ian crisis — an earthquake that triggered a monstrous tsunami which made landing on 500 kilometres of coastline in less than an hour, and damaged nearby nuclear power plants, exposing the world to a radiation threat.

Mercy Relief response teams, which have been working in the two worst-affected prefectures of Miyagi and Iwate since the third day of the tsunami, found that risk mitigation initiatives were well implemented by the Japanese authorities, including a tsunami warning system and solid breakwaters. Unfortunately, these DRR mechanisms were breached and tens of thousands of lives were lost due to the speed and strength of the waves, with hundreds of thousands others displaced.

Despite Japan's trusted records of impeccable disaster risk reduction and management policies and systems, such adversities affect even the most prepared government and communities. The unprecedented scale of disasters simply overwhelms seemingly faultless risk reduction, mitigation and prevention measures. In less serious conditions, proposed DRR measures and subsequent response may be short-term and time bound, and will not engage with the deeper, underlying causes (political, economic or cultural) of disaster, thus making DRR strategies as a whole ineffective at critical points. Compared to their more learned urban and economically well-off counterparts, rural and disadvantaged societies have not been informed adequately, or worse misinformed, about the evolution of DRR within their societies, indicating a heightened need to formulate strategies that are relative and comprehensibly adapted to different target communities with varied socio-economic capacities and resource capabilities.

# Good practices in multi-hazard early warning systems

Maryam Golnaraghi, Chief, Disaster Risk Reduction Programme, James Douris, Consultant and Charles Baubion, junior professional officer, DRR Division, World Meteorological Organization

**Every year, natural hazards cause significant loss of life and set back economic and social development by years, if not decades. From 1980 to 2008, hazards and conditions related to weather, water and climate accounted for 90 per cent of the total number of disasters, 70 per cent of the two million casualties, and 75 per cent of total economic losses (source: EM-DAT: The OFDA/CRED International Disaster Database).**

As illustrated in Figure 1, trends in natural hazard impacts over the last five decades show that despite increasing economic losses, there has been a decrease in loss of life associated with hydrometeorological hazards. This has been attributed to the development of effective early warning systems based on advancements in monitoring and forecasting of weather-related hazards, combined with effective communication and emergency preparedness at both national and local levels in a number of countries with a history of high-impact weather-related hazards.

According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), new scientific evidence has revealed that the potential risks associated with weather-related hazards are on the rise due to the increasing frequency and intensity of droughts, extreme temperatures, severe precipitation and heavy

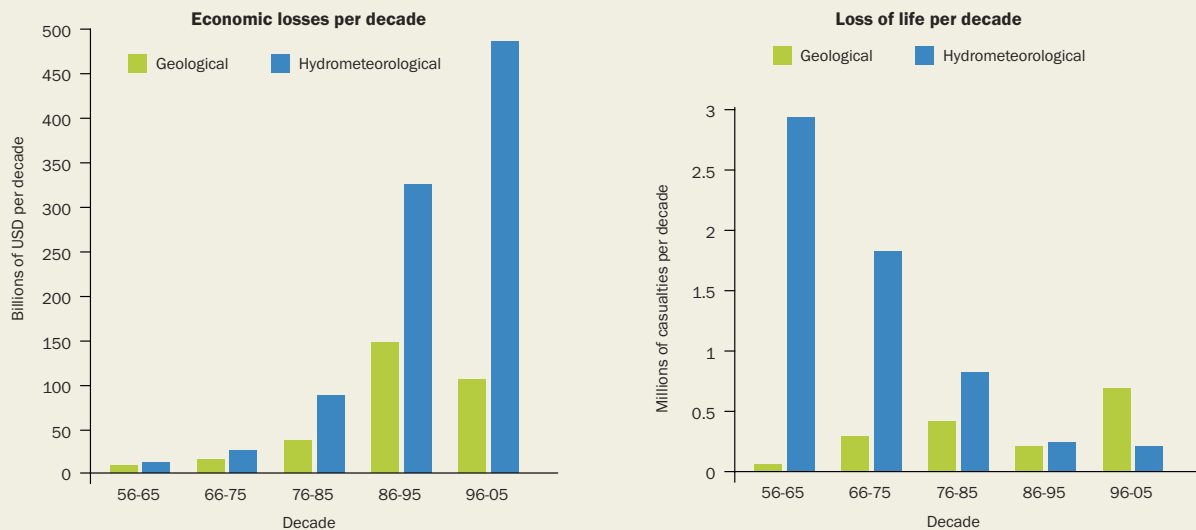
storms linked to climate change. If countries are challenged in managing the impacts of current levels of risk, how can they address the increasing risks associated with these hazards in the future?

In the last five years, the world has also witnessed a number of unusual extreme events such as:

- The very severe cyclone storm Gonu that affected Oman, Iran and the United Arab Emirates in 2007, the second cyclonic storm making landfall in Iran in more than 100 years since 1898
- Tropical cyclone Nargis, the first such storm to hit Myanmar in 40 years, resulting in the deaths of over 140,000 people and estimated losses at nearly 3 per cent of the national GDP for 2008
- Tropical cyclone Catarina, which affected Brazil in March 2004, the first hurricane-intensity tropical cyclone ever recorded in the Southern Atlantic Ocean.

The question remains whether these may become more of the rule than the exception and whether new patterns of risks are emerging.

**Figure 1: Natural hazard impact trends**



Trends in natural hazard impacts over the five last decades show increasing economic losses and decreasing loss of life associated with hydrometeorological hazards

Source: EM-DAT: The OFDA/CRED International Disaster Database

### International attention to early warning systems

In January 2005, the United Nations convened the Second World Conference on Disaster Reduction in Japan. During this conference the Hyogo Framework for Action 2005-2015 (HFA) was negotiated and adopted by 168 countries, shifting the paradigm for disaster risk management from post-disaster response to a more comprehensive approach that would also include prevention and preparedness measures. The second high-priority area of the HFA stresses the need for 'identifying, assessing and monitoring disaster risks and enhancing early warning'. Taking this into consideration, it becomes clear that an early warning system (EWS) must be an integral component of any nation's disaster risk management strategy, enabling national and local government and communities to take appropriate measures toward building community resilience in anticipation of disasters.

Over the past decade, there has been significant international attention given to this topic, including three international EWS conferences hosted by the government of Germany; two international experts' symposia on multi-hazard EWS organized by the World Meteorological Organization (WMO) in collaboration with UN International Strategy for Disaster Reduction, other UN and international partners; the Global EWS Survey Report requested by the former UN Secretary General, Kofi Annan; and a survey of EWS conducted by the WMO with the support of 18 UN and international agencies, as input to the 2009 Global Assessment Report (See References Section).

The Second International Conference on Early Warnings (2003) specified that effective early warning systems should comprise four operational components, to ensure that:

- Hazards are detected, monitored and forecasted, and hazard warning are developed
- Risks are analysed and this information is incorporated in the warning messages
- Warnings are issued (by a designated authoritative source) and disseminated in a timely fashion to authorities and public at risk
- Community-based emergency plans are activated in response to warnings to reduce potential impacts on lives and livelihoods.

These four components need to be coordinated across many agencies from national to community levels for the system to work. Failure in one component or lack of coordination across them would lead to the failure of the whole system. Furthermore, roles and responsibilities of various public and private sector stakeholders are reflected in the national and local regulatory frameworks and planning.

As revealed by various assessments and the outcomes of the mid-term HFA review, many nations around the globe operate early warning systems for various naturally occurring and man-made hazards. However, the governmental priority, stage of development and overall effectiveness of these systems vary widely. Differing approaches are taken to warning people of hazards in various countries, depending on economic and social factors that include the state of development of communications and other critical infrastructure, societal structure, literacy levels, and general awareness of the potential impacts of hazards to which people could be exposed. While there have been efforts by governments and by international and donor agencies to support the development of these capacities, many countries, especially those at highest risk, remain challenged in building and sustaining their early warning systems along regulatory, financial, institutional, technical and operational dimensions from national to community levels.

One of the major gaps identified is the need to document and learn from the experiences of countries with good practices and to develop guidelines that could help national and local governments and agencies in the development of EWS. Building on these developments, WMO (together with UNISDR system partners) is assisting countries in developing EWS strategies.

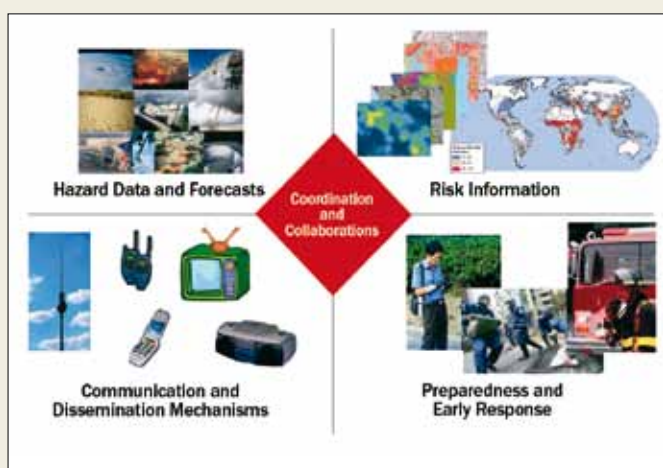
### A Simplified Outline of the Template Used for Systematic Documentation of Good Practices in EWS

- 1 Overview of early warning systems (EWS)
- 2 Background in the establishment of EWS
- 3 Governance and Institutional Arrangements (national to local levels)
  - a) Policy, institutional and legal frameworks to support emergency planning and response
  - b) National to local emergency planning and related linkages to EWS
  - c) Organizational structure for implementing the plans
  - d) Institutional capacities and concept of operations (coordination and operational collaboration)
  - e) Financial and budgetary aspects
- 4 Utilization of risk information in emergency contingency planning and warnings
  - a) Organizational responsibilities and arrangements for the development of risk information
  - b) Hazard assessment, quantification and mapping (national to local)
  - c) Assessment of vulnerabilities and exposure (national to local)
  - d) Storage and accessibility of disaster and national hazard risk information
  - e) Development and utilization of hazard/risk information to support emergency planning and warnings
- 5 Hazard monitoring, forecasting, and mandates for warning development
  - a) Organizational responsibilities for monitoring, forecasting and development of hazard warnings
  - b) Organizational collaboration and coordination for development of hazard warnings
- 6 Development of understandable, authoritative, recognizable and timely warnings
  - a) Warning message development cycle
  - b) Warning message improvement cycle
- 7 Warning dissemination mechanisms (national to local)
- 8 Emergency preparedness and response activities (national to local)
  - a) Disaster preparedness and response planning and emergency response activation
  - b) Community response capacities
  - c) Public awareness and education
- 9 Sustainability, resources and budgetary commitments
- 10 Improvement of overall operational framework of EWS through on-going drills and feedback and evaluations during and after an event
- 11 Examples of previous events where the operational EWS has led to improvements in emergency preparedness and prevention
- 12 Overall lessons learned and future steps for improving Meteorological, Hydrological and Climate services contribution in EWS particularly focusing on institutional coordination and cooperation with the disaster risk management agencies and EWS stakeholders (public and private)

Source: World Meteorological Organization



**Figure 2: Four elements of an end-to-end early warning system**



End-to-end early warning systems must coordinate collaborative hazard data and forecasts; risk information; communication and dissemination mechanisms; and preparedness and early response efforts

Source: First WMO Symposium on Multi-Hazard Early Warning Systems (May 2006, Geneva) and Platform for Promotion of Early Warning System

WMO, in cooperation with other UN and international partners as well as its Members, through consultations with experts involved in various national and local components of EWS during two international symposia and a number of regional and national events, has developed a systematic process for documenting good practices in EWS, including criteria for and examples of good practice around the world. The two primary assumptions that guided this work were that protection of citizens' lives is a responsibility of the government from national to local levels, and that the issuing of authoritative warnings is a national responsibility. A detailed template for documentation of good practices was developed, providing guidelines for systematic documentation of the various aspects of the early warning system.

To date, good practices have been documented in seven early warning systems for meteorological and hydrological hazards. These include the Bangladesh Cyclone Preparedness Programme; the Cuba Tropical Cyclone Early Warning System; the French 'Vigilance' System; the Warning Management of the Deutscher Wetterdienst; the Multi-Hazard Early Warning System in Japan, the Multi-Hazard Early Warning System of The United States National Weather Service; and the Shanghai Multi-Hazard Emergency Preparedness Programme as an example of good practice for mega cities. The documentation of these examples was carried out by teams of experts from relevant ministries and agencies in the respective countries and will appear in a forthcoming publication (Golnaraghi 2011).

A detailed synthesis of the good practices documented has revealed *ten principles* common to the implementation of all of the cases, irrespective of the political, social and institutional factors in each country:

1. There is a *strong political recognition* of the benefits of EWS reflected in harmonized national and local disaster risk management policies, planning, legislation and budgeting.
2. Each effective EWS is built upon *four components*: hazard detection, monitoring and forecasting; risk analysis and incorporation of

risk information in emergency planning and warnings; dissemination of timely and authoritative warnings; and community planning and preparedness with the ability to activate emergency plans to prepare and respond, coordinated across agencies involved in EWS, at national to local levels.

3. *EWS stakeholders are identified* and their roles and responsibilities and coordination mechanisms clearly defined and documented within national and local plans, legislation, directives and memoranda of understanding, including those of technical agencies such as the National Meteorological and Hydrological Services.

4. *EWS capacities are supported* by adequate resources (human, financial, equipment, etc.) across national and local levels and the system is designed and implemented to account for long-term sustainability factors.

5. *Hazard, exposure and vulnerability information* are used to carry out risk assessments at different levels, as critical input into emergency planning and development of warning messages.

6. *Warning messages* are: clear, consistent and include risk information; designed to link threat levels to emergency preparedness and response actions (using colour, flags, etc) and understood by authorities and the population; and issued from a single (or unified), recognized and authoritative source.

7. *Warning dissemination mechanisms* are able to reach the authorities, other EWS stakeholders and the population at risk in a timely and reliable fashion.

8. *Emergency response plans* are developed with consideration for hazard/risk levels, characteristics of the exposed communities (urban, rural, ethnic populations, tourists and particularly vulnerable groups such as children, the elderly and the hospitalized), coordination mechanisms and various EWS stakeholders.

9. *Training* in risk awareness, hazard recognition and related emergency response actions is integrated in various formal and informal educational programmes and linked to regularly conducted drills and tests across the system to ensure operational readiness at any time.

10. Effective *feedback and improvement mechanisms* are in place at all levels of EWS to provide systematic evaluation and ensure system improvement over time.

The lessons learned from these good practices can be adapted by countries that require multi-hazard risk management. The specific design and implementation of EWS strategies varies according to the specific history, culture, socio-economic conditions, institutional structure, capacity and available resources for sustainability of the system.

# Strategy and Alliance for Urban Disaster Risk Reduction

*Professor Yasuo Tanaka, Director, Research Center for Urban Safety and Security, Kobe University*

**A**t 5:46 am on 17 January 1995, Kobe City (with a population of over 1.5 million) and nearby cities in Hyogo Prefecture were violently shaken by the rupture of a 50km fault at a depth of about 16km. After the quake, which had a peak acceleration of 80 per cent of gravity and lasted less than 20 seconds, there was a moment of silence in which survivors tried to grasp what had happened and to reach out to families and friends. Human losses of 6,343 people and economic losses of over US\$100 billion resulted from a mere 20 seconds of shaking.

The process of recovery started immediately with swift responses by fire stations, emergency medical officers and local government emergency sections. However, the extent and magnitude of damage meant that only families, friends, neighbours and local communities could work immediately and effectively to save the lives of those buried under the collapsed houses and buildings. Official manpower and equipment for rescue were insufficient for such widespread incidents.

Inability to expect and imagine that such a catastrophic quake could attack the modern urbanized city led to:

- Delays in calling external rescue forces due to a failure of the immediate damage assessment system
- Inability to effectively incorporate volunteer workforces into immediate recovery units because of lack of provision in disaster laws
- A very long wait of more than three years for the disaster victims in obtaining monetary support because of no such national system being established previously, and many other problems.

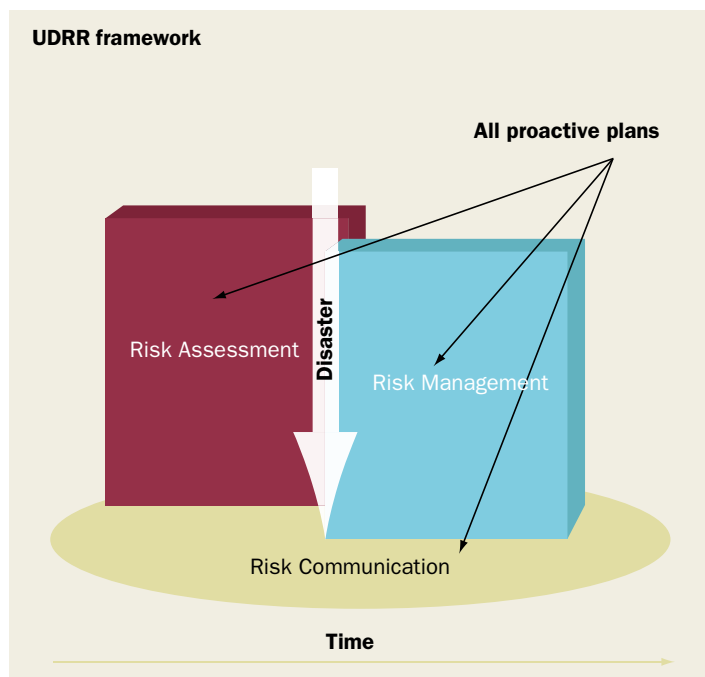
The root cause of the difficulties encountered in the 1995 Kobe earthquake is in highly complicated societal vulnerabilities unique to the densely populated and industrialized urban areas of Kobe and its surroundings in the face of catastrophic disaster. The safety of the urban population depends upon engineered infrastructures and societal and monetary systems for effective functioning, and — most importantly — upon family and community activities in the area. Urban society requires an integration of multi-sectorial, multi-disciplinary, inter-sectorial and inter-disciplinary activities.



Discussing how to build a prototype model for shaking table test at NIED Miki



Collapse of Hanshin Expressway



Source: RCUSS, Kobe University

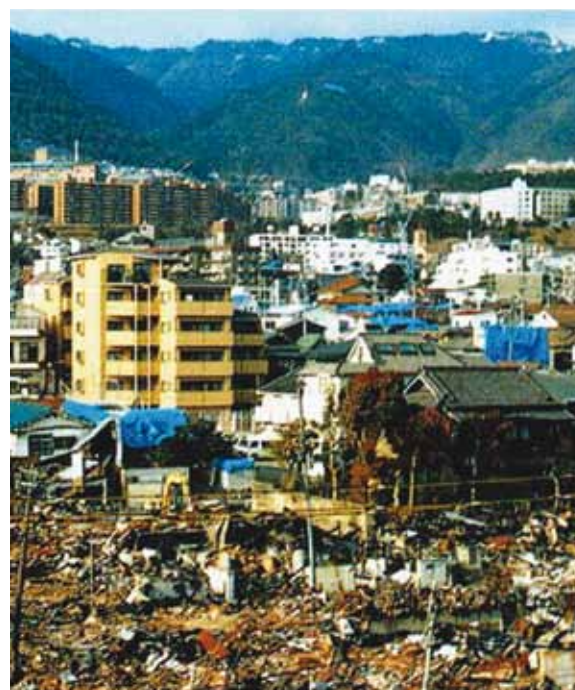


Image: RCUSS Kobe University

Damage near JR Rokko Station, looking towards Kobe University

### Strategy for Urban Disaster Risk Reduction

The earthquake posed a number of multi-faceted urban disaster problems, starting immediately after the event. In 1996, Kobe University (the only national comprehensive university in the epicenter area) decided to establish the Research Center for Urban Safety and Security (RCUSS) to conduct integrated urban disaster research. RCUSS has investigated disaster causes and recoveries in the intervening years while witnessing the recovery processes in Kobe and surrounding cities. The outcome of individual specific research on such vast urban disasters often tends to be fragmentary, but to achieve the goal of creating a safe and secure urban society based on the research outcomes, a systematic and comprehensive strategy for urban disaster risk reduction has to be established.

The lifecycle of disaster — immediate rescue and response, recovery, reconstruction and preparedness — is often used to build a concrete action plan for disaster risk reduction (DRR) strategy. However, for DRR in urban society, one key issue is how to cope with a rapid change of generation or of residents in the urban population. For example, in Kobe after 15 years, already more than one third of the population has not experienced the 1995 earthquake. Without a common understanding regarding how people feel and respond during catastrophe, any action plan for DRR would fail. Thus, understanding or communication across the generations and sectors should form the basis for a good strategy.

The DRR strategy needs to be proactive and holistic, as has been emphasized by the Hyogo Framework for Action. Urban activity is complex and multi-disciplinary and therefore a simple framework is needed for integrating such a wide spectrum of stakeholders. Also, a wide gap still exists between social and technical specialists in dealing with disaster. For example, a very sophisticated numerical method is being used for the seismic response analysis of structures while there remains a need to tackle social and financial issues on retrofitting of existing houses of the elderly or the poor.

RCUSS has proposed a framework for Urban Disaster Risk Reduction (UDRR) strategy to integrate multi-sectorial and multi-disciplinary stakeholders of social and technical DRR specialists by basing communications across generations and stakeholder groups. The UDRR framework consists of three components: Risk Assessment, Risk Management and Risk Communication.

#### *Risk Assessment*

The aim of Risk Assessment is to reduce vulnerability in urban society by examining the most threatening hazards. Vulnerability relates not only to physical and technical aspects but also to societal and financial issues.

#### *Risk Management*

The Risk Management phase involves building and preparing social and technical systems for immediate rescue and response and also for mid- and long-term recovery and reconstruction in the face of most potential disasters. The terminology of disaster management is used to cover a whole spectrum of disaster processes, but here Risk Management defines the process during and after the disaster.

#### *Risk Communication*

In the Risk Communication phase, the primary aim is to foster a culture of communication about disasters through education and training, and also to build a system for communication to share disaster-related information.

### Initiatives by RCUSS

By using the UDRR framework of Risk Assessment, Risk Management and Risk Communication, RCUSS





Regional groups representing Asia, Middle East, North Africa and Latin America were formed in November 2010 from former participants in RCUSS training

has carried out research based on the 1995 Kobe earthquake, and has also provided a training course for UDRR specialists from developing countries in collaboration with Japan International Cooperation Agency Hyogo and other DRR organizations established in Kobe. Each participant has a specific background of DRR on entry but following training, they all understand the importance of an alliance among the different sectors and disciplines in their city.

Participants benefit from lectures and site visits to help them learn about Risk Assessment, Risk Management and Risk Communication during their two-month stay in Kobe. For Risk Assessment, they study the fault rupture mechanism and how to produce seismic hazard and risk maps based on geotechnical information. For the Risk Management aspect, they study disaster management and operations at local government level and the recovery experiences and lessons of local communities affected by the earthquake. By listening to the actual recovery experiences of people who now serve as community leaders in the local area, the participants can share the problems they had to overcome to rebuild their community. Risk Communication study covers the earthquake early warning system and the educational materials that are used by the elementary and junior high schools in Kobe. Stories in the educational material about how children helped their families to bring water from the emergency water service point, or how nearly 1.4 million volunteers came to help out in Kobe from all over Japan, can teach the younger generation the importance of self-help and mutual help in case of emergency.

The training course has produced nearly one hundred UDRR specialists for the period 2004 – 2011, based on disaster research and recovery experiences from the 1995 earthquake. Another important factor is that the training participants clearly under-

stand that the given knowledge is based on the particular case of the Kobe disaster and recovery and there is a limit to how far they can apply this knowledge in their home countries. As each city in the world has different economic, demographic, historical, cultural and other backgrounds, so each has to establish its own UDRR strategy based on its particular situation while using a common framework of Risk Assessment, Risk Management and Risk Communication.

#### **Building for tomorrow**

The Alliance for UDRR (AUDRR) needs to be built by collaboration among stakeholders in different sectors and disciplines in each city. For Kobe, the local AUDRR is established by RCUSS. By having a common framework for UDRR, a local, regional and/or international collaboration among UDRR specialists can be achieved more systematically by identifying and evaluating the vulnerabilities of their cities in each category through a common understanding. The RCUSS UDRR training has produced an international network of former participants in Asia, the Middle East and North Africa, and also in the Latin American regions, with which they share similar climates, cultures and sometimes languages. By promoting collaboration among participants in RCUSS training and/or those interested in the RCUSS framework within each region, it is hoped that a better and more coherent UDRR knowledge and strategy may be developed for each region.

# Strengthening Australia's multiagency approach to disaster management

*Stacey Greene, Manager, Disaster Management, Asia-Pacific Civil-Military Centre of Excellence, Australia*

**I**n 2009 the Australian government's Asia Pacific Civil-Military Centre of Excellence launched a multiagency initiative aimed at improving the coordination of Australia's response to disaster management. The outcome is a document entitled *Strengthening Australia's Conflict and Disaster Management Overseas*, published in late 2010. The document is a 'conceptual framework' designed to assist Australian government departments and agencies to further advance their collaborative management mechanisms for dealing with international conflicts and disasters. This chapter draws upon the content of the conceptual framework document through the lens of disaster management. It particular, it focuses on the fifth Priority outlined in the Hyogo Framework for Action 2005-2015: 'Strengthen disaster preparedness for effective response at all levels'. Preparedness is, of course, a disaster risk reduction exercise in its own right, because a comprehensive, coordinated and prepared response reduces the impacts and losses of a disaster.

Disasters within Australia and the Asia-Pacific region affect the lives of millions of people. Affected countries within the Asia Pacific region sometimes ask Australia to assist with the humanitarian response. Responding effectively to these challenges will only continue to be successful if lessons are learned and progressive steps taken to improve the ways agencies respond to disaster management challenges. Australia has now developed considerable experience in coordinating the country's response to international disasters following the successive experiences of the 2004 Asian tsunami, earthquakes in Indonesia, Samoa, New Zealand and Japan and floods in Pakistan to name a few. These responses have demonstrated that Australia has a robust inter-agency coordination mechanism, but that there are areas in which fine-tuning of the system and its underlying concepts can lead to overall improvements.

Australia is therefore committed to refining its approaches to disaster management to extend collaborative and coordinated planning and response mechanisms. This involves drawing on the combined expertise of all agencies to ensure a shared understanding of disaster management, to utilise resources effectively, and to avoid unnecessary duplication or waste. This commitment demands close engagement between Australia's development, military, police and diplomatic agencies, as well as coordination with the host governments, other contributing countries, the United Nations, and humanitarian and non-government organisations. In effect, Australia's approach is to develop partnerships within the government and between the government and non-government participants in the disaster management process. In Australia, the terminology 'civil-military' is used as the shorthand descriptor of these arrangements.

There are three key issue areas in Australia's approach that will lead to better overall disaster management efforts. The first of these lies in the

acceptance by all agencies of 'guiding principles' that help to explain and strengthen a culture of multiagency collaboration to better enable them to achieve outcomes with the most efficient use of available resources. The second builds on these principles by identifying mechanisms to assist departments and agencies in promoting multiagency understanding of disasters and the needs of the responders. The third highlights the requirements for developing and implementing agreed strategies to help strengthen civil-military effectiveness in disaster management.

## Guiding principles

Australia's approach to disaster management derives from six guiding principles which help direct the work priorities of departments and agencies, and impact positively on decision making. The principles are:

- Employ a collaborative and flexible approach
- Leverage organisational and cultural diversity
- Strengthen proactive multiagency engagement
- Promote a shared understanding
- Deliver comprehensive outcomes
- Commit to continuous improvement.

Commitment to these guiding principles enables a civil-military culture of engagement for disaster management based on trust and mutual respect and promotes coordination and cooperation for the achievement of common objectives. The principles apply throughout the full spectrum of the disaster management cycle.

The range of capabilities within departments and agencies help in understanding the complex and multilayered nature of disaster management. Best use can be made of each agency's set of professional, technical and cultural expertise, and values and perceptions, to provide breadth and resilience to assessment, planning and execution, ensuring disaster response outcomes are optimized. International deployments of Australia's capabilities are thus able to capitalise on the strengths of organizational and cultural diversity, which needs to be considered in the initial planning phase, and maintained throughout each engagement.

A collaborative approach, through which departments and agencies work together to achieve a common goal, is based on shared understanding of common objectives. Shared understanding is achieved through mutually-productive organisational relationships, extensive external networks, and effective utilization of all available informa-



Image: AusAID

South Australian Dr Bill Griggs shakes the hand of a local Samoan mother, Nika Luamuanu, who is helping to clean up Coconut Beach Resort, after the Samoa tsunami. Valma Galuvao, AusAID Senior Program Manager in Samoa, looks on, 2 October 2009

tion sources, including the development of technology platforms to enhance interoperability and information management.

Promoting a shared understanding across government is achieved through:

- A commitment to agreed information management principles
- The development of agreed approaches for managing and sharing information
- Moving from a 'need to know' paradigm to application of a 'need to share' philosophy
- Common language usage, avoiding jargon, acronyms and contested terminology.

Preparedness is also critical to continuous improvement. Activities such as exercises, training and education — designed utilising best practice models and incorporating lessons learned — assist departments and agencies to adapt to changing circumstances, thereby continuously improving Australia's approach to disaster management.

#### **Promoting multiagency understanding**

Australian agencies adopt a four-tracked approach to promoting multiagency understanding of disaster management. They seek to understand:

- The complex nature of disasters, characterized by chaos and uncertainty
- The elements of the disaster management spectrum — prevention and/or mitigation, preparedness, response, and recovery and development
- The contribution that each department and agency brings to disaster management
- The multiple roles and responsibilities of the key actors with whom Australia works — host Governments, the United Nations, regional bodies, allies, NGOs and the private sector.

There has been a significant growth in the frequency and impact of disasters, which cause death and suffering and impede economic growth. Each disaster displays unique characteristics, preventing the preparation of pre-determined or 'templated' plans that can be applied universally. Nevertheless, a good understanding of the nature of disasters provides a sound basis for multiagency training/exercising from which general contingency plans can be constructed, and enables the application of flexible and innovative approaches that optimise outcomes.

The disaster management spectrum covers the continuum of prevention and/or mitigation, preparedness, response, and recovery and development, all of which are interconnected. Each may appear to be the dominant strategy at a specific point in time and to occur sequentially but, in reality, prevention and/or mitigation, preparedness, response, and recovery and development strategies need to be applied continuously.

For instance, prevention and mitigation strategies are also applicable in post-disaster environments. In these situations, it is important that early attention is given to disaster risk reduction mechanisms, based on capacity building programs that are 'owned and operated' by national Governments and communities. Failure to do this risks a repeat of otherwise preventable casualties in future crises. Accordingly, Australia gives increased emphasis to capacity building programs designed to decrease the vulnerability of regional governments and societies to the catastrophic consequences of disasters, and to build their national capacity to respond where required.



Similarly, recovery and development activities provide the foundation for long-term programs focused on the prevention and/or mitigation of disasters. Therefore, planning for recovery and development is best undertaken in conjunction with response planning. This ensures that short-term activities undertaken during the response phase are congruent with longer-term objectives.

Australia's approach to disaster management requires departments and agencies to understand each other's capacities and the capacities of other contributing partners. Australia recognises that its agencies themselves cannot, and should not, work in isolation from each other and that the national effort also should not be isolated but should be part of an international effort. Pre-eminent in this partnership is the Government of the affected country.

**Developing and implementing multiagency strategies**

There are a number of strategies that will help ensure continuous improvement in disaster management by promoting common aims



Image: Defence

Mr Alan March, AusAID's Humanitarian Coordinator, briefs Australian Government staff in Padang, Indonesia, October 2009



Image: Defence

Major General Abdul Qadir Usmani, centre, chats with a local village patient and Sergeant Maria Brown (second from right) during his visit to Camp Bradman, 10 February 2006

and objectives through shared understanding; developing structure and processes that enhance preparedness; and building collaborative relationships and organisational understanding. These initial strategies, investing in preparedness and developing measures of effectiveness, are just the first of what is intended to be a continual development of Australia's national ability to operate effectively in the disaster management field.

Preparedness is central to competent disaster management, enabling strategies for prevention and/or mitigation, response, and recovery and development, all of which lead to disaster risk reduction, to be implemented effectively. Preparedness improves decision making and planning. The benefits for Australia from investing in an ongoing program of civil-military preparedness include:

- Strengthened collaboration and understanding of roles, responsibilities, planning processes, capabilities and modes of operation between departments and agencies, based on trust and mutual respect
- Increased awareness between government and partner nations and organizations (such as the United Nations) involved in disaster management
- Development and refinement of collaborative multi-agency working practices and procedures
- Closer multiagency coordination between the strategic and operational levels.

The development of measures of effectiveness to enable proper evaluation of the benefits of Australia's contribution will need to be specific for each disaster response. Measures of effectiveness also assist in providing the baseline for conducting research and deriving lessons learned, thereby facilitating continuous improvement through organisational learning. Examining the success of civil-military collaboration in disaster management activities, and identifying and sharing key lessons across departments and agencies, assists the development of strategies and mechanisms for enhancing Australia's future approach. This evaluation process can include lessons learned from the experiences of relevant multi-agency organisations, including those of Australia's allies and its international and regional partners.

**Conclusion**

Australia is committed to improving its civil-military capabilities in preventing, mitigating, preparing for and responding to international disasters. It does this by developing common concepts, terminology and understanding and through pre-disaster training and networking.

By strengthening civil-military collaboration at all levels, decision makers, planners and managers will be able to deliver better on-the-ground outcomes in a coordinated and cost-effective manner. This is in itself a positive disaster risk reduction outcome in that it will reduce the impacts and losses of a disaster when they occur, as they surely will.

*The views expressed in this paper are not necessarily those of the Australian Government or any of its agencies*

## Reducing disaster risks through successful partnerships

*Natalie Dale, Maria Tinelli, Sarah Moss and Katherine Nightingale, Christian Aid*

**W**ork on disaster reduction has greatly advanced since the 10-year Hyogo Framework for Action (HFA) was conceived in 2005. But there is still a great need to strengthen risk reduction efforts. In 2010 the Centre for Research on the Epidemiology of Disasters recorded 373 natural disaster events that killed over 296,800 people, affected the lives of 208 million, and cost nearly US\$110 billion.

Christian Aid aims to change the lives of some of the world's poorest people by helping them to challenge the major issues which keep them in poverty. One such issue is disasters, which often affect poor people disproportionately because of greater vulnerability and exposure to natural hazards. Taking just one example, 81 per cent of the people killed by tropical cyclones every year live in low-income countries.

It *should* follow that development work, which reduces poverty, will also reduce vulnerability, but unfortunately this is often not the case. The seemingly common sense of reducing risk is not often included in many projects or development plans. Christian Aid believes development gains can be protected and retained with disaster risk reduction (DRR) involving relatively low financial inputs in comparison to the cost of humanitarian response assistance. Even very poor people can take action to build their resilience to these hazards.

With this in mind, Christian Aid established the Building Disaster Resilient Communities (BDRC) project that for the past five years has been working in



Image: ASONOG

Marco Burgos, Ex COPECO commissioner, during a public forum on accountability for DRR hosted by CAID. Marco Burgos played an important role in promoting the SINAGER law together with ASONOG through the MRGR (National Risk Management Bodies), the national entity in charge of preparedness and emergency response, Honduras



seven countries across Asia, Central America and Africa. It set out to build relationships between communities, civil society and local government, to improve the level of social protection and increase participation in the preparation of local and national development and disaster plans. Governments and civil society must work together to improve national and local disaster policies and laws. This article will share case studies from the Philippines and Honduras, which illustrate the importance of changing the laws to support effective DRR.

Examples from Honduras and the Philippines show the vital importance of strong collaborative relationships between government and civil society to create the laws needed for effective DRR.

### **Honduras**

In Honduras, the legal framework for ensuring DRR and a coordinated response in case of emergencies was still weak and incomplete ten years after the country was devastated by Hurricane Mitch in 1998. The existing National Contingencies Law (1991) and the 1999 reforms focused too narrowly on humanitarian response after the event, rather than addressing prevention and risk management. An institutional basis for DRR already existed in Honduras, but this was not functioning well. There was little support for education on DRR or for civil society organizations (CSOs) to implement community-centred DRR and response. There was a clear need for the law to be strengthened.

In 2006, Christian Aid's partner, the Honduran Association of Non-governmental Organizations (ASONOG), started to advocate for improvements in the disaster law. It worked with the regional roundtables and agreed a three-year plan.

During this time representatives of the regional roundtables, partners and communities were all trained in DRR and advocacy strategies. The regional roundtables were used for 'downward' advocacy to build awareness and strengthen links between civil society and local government. Members of the regional roundtables worked directly with communities, providing DRR education and taking issues from the communities — such as riverbank erosion due to unregulated extraction of sand and stone — to the roundtable discussions.

During year one, ASONOG worked to show that the existing laws did not sufficiently address community needs or address DRR or climate change adaptation, and that a revised law was needed. The regional roundtables met with the national roundtable to define their political position, national advocacy plan and activities. These discussions led to the proposal of a new law.

During year two, two regional roundtables started drafting what became known as the SINAGER Law and advocating directly with government. The western regional roundtable lobbied the national roundtable to take SINAGER on board and present it to congress.

The BDRC project provided additional support and momentum. Christian Aid partners ASONOG and Mennonite Social Action Commission produced training materials and trained 11 partners and four regional roundtables on how to carry out effective advocacy. They then helped the groups organize and plan their advocacy work. ASONOG and BDRC partners participated in five consultation meetings to discuss and analyse draft versions of the SINAGER law and they reviewed and commented on at least ten drafts of the law before it was passed in 2009.

The national roundtable took the SINAGER draft to congress and, together with ASONOG, accompanied its discussion and modifications in 2007 and 2008. The other BDRC partners worked with the regional roundtables to maintain pressure. The BDRC project and Christian Aid partners significantly contributed to the passing

of the SINAGER Law and strengthened disaster structures at all levels in Honduras. It provided step-by-step awareness-raising, organizational training, community involvement and advocacy support over a sustained period, allowing sufficient time for the law to be developed, revised and ratified.

### **Challenges**

The work was not without its challenges: political crises suspended parliamentary activities while the law was being finalized. But during 2008/9, Honduras was affected by one tropical cyclone (Alma); one general flood in the Colón, Comayagua and Copán area, an earthquake in the Roatán, Guanaja and Puerto Cortes areas that affected more than 50,000 people, and a severe drought spell affecting 250,000 people, which helped to raise the profile of disasters and, subsequently, advocacy efforts.

The SINAGER Law was finally passed in August 2009 and implemented in October 2010. The objectives set out in ASONOG's original advocacy plan were achieved, as follows:

- All government institutions are required to consider DRR in their plans and projects
- Local governments must designate a budget for DRR in their constituencies
- The Ministry of Education must incorporate DRR into educational plans
- COPECO must focus on disaster prevention (preparedness and risk reduction) as well as emergency response
- The regional and national civil society roundtables are part of the SINAGER executive committee and they decide how the law will be implemented
- Greater coordination between government bodies responsible for emergency response and COPECO has been seen during recent emergencies.

“You cannot talk about development processes without talking of disaster risk and vulnerability reduction. If you don't factor this in, development gains are lost... you need to tackle tactical and structural issues at the same time. Civil society can help communities with the tactical and practical things they can do to reduce risks, but if the government does not take care of the technical and structural factors, DRR is not effective, as the particular community gains are lost. Local and national level progress are equally important.”

Ramiro Lara, Manager, ASONOG





Image: Allan Vera

Representative Rozzano Rufino Biazon (left) and Teofisto Guingona III (centre), DRR champions and principal authors of the DRRM Bill in the House of Representatives, together with DRRNetPhils' Sharon Taylor (right) participate in the first Bicameral Conference Committee Meeting on the DRRM Bill held in January 2010 at the Philippine Senate

### The Philippines

Prior to 2010, Philippines legislation treated disasters as inevitable and was primarily focused on emergency relief, which was heavily centralized. Therefore very little action was taken by the Government to reduce the risk of disasters or prepare communities for an impending hazard. As a result, many people died or lost valuable assets in the immediate aftermath of a disaster.

In the event of a disaster, the Philippines President would declare a State of Calamity. As government funds for relief efforts could only be mobilized 24 hours after this declaration, vulnerable people had to wait for a disaster to occur before they could get any help.

In 2007, Christian Aid partners engaged government agencies in formulating the Strategic National Action Plan (SNAP) as the country's commitment to DRR; this plan was based on the HFA. SNAP was a roadmap detailing where the Philippines wanted to be in ten years' time. It had a clear direction and set indicators to measure progress. It was presented to congress as a proposal for DRR policy.

The DRR Network of the Philippines (DRRNet) — a network of over 300 actors — was convened in 2008 to advocate for more national and local commitment to DRR and for law

reforms. Christian Aid partners were instrumental in convening DRRNet, which includes members from international and local CSOs, communities, practitioners, academics and government agencies. The Ateneo School of Government provided key support by acting as the secretariat and providing a legal adviser to the network.

The network reached a shared position on reform and identified key non-negotiables such as:

- the mandatory participation of CSOs in national and local DRR policymaking
- civil society being recognized as key actors in supporting the implementation of the law
- a focus on people and community-centred DRR
- decentralization of DRR so that local government, communities and CSOs could have more responsibility and resources for DRR in their areas.

DRRNet targeted key DRR champions in the Senate to advocate for these non-negotiables to be incorporated into the drafts of the new law.

At the same time, the network generated public support by providing clear information and educational materials that campaigned for good DRR to be taken on by congress. This was done through media briefings, news articles, films and documentaries that drove home the urgency of the new law.

Key events in the Philippines helped to raise the profile of disasters and the need for a new DRR law. For example, the flooding of the capital Manila and surrounding areas by Typhoon Ketsana in September 2009 placed national policymakers face-to-face with disasters and public opinion. This combination of public and popular pressure led to political change.

### **Challenges**

There were some challenges to this process. Decision-making was often slow, given the nature of a consensus-based network. Working at all levels and regions across the Philippines often meant that information was slow to arrive. However, the Manila-based members had the benefit of engaging with central government officials on a day-to-day basis and built and utilized informal ties with key leaders in congress.

### **Impacts of the action**

In May 2010 the new Disaster Risk Reduction Management (DRRM) Act was passed in the Philippines. The law has now moved from emergency response as the main focus of disaster management towards prevention, protection and empowerment. It identifies building resilience as a national commitment, and it adopts and adheres to the principles and strategies consistent with international frameworks like the HFA.

The results have been a more decentralized approach to DRR and disaster response, with CSOs, NGOs, communities and the private sector recognized as key stakeholders for implementing the law, in addition to government. This is recognition that effective DRR requires decentralized decision-making structures and strengthened links between local, district and national levels. The impacts of this include:

- The mandatory inclusion of civil society in DRRM councils, which will work with local, regional and national governments for the implementation and monitoring of the DRRM law. This is recognition of the immense and valuable contribution of CSOs in representing and developing the capacities of communities, identifying risks, accessing resources for DRR and relief, and managing volunteers during times of disaster.
- The creation of the National Disaster Risk Reduction and Management Council, which comprises heads of different executive departments of government, government institutions, local government associations, CSOs and the private sector, and is mandated to oversee DRR at a national level. The Office of Civil Defence is the implementing government agency for DRR.
- Local Government Units (LGUs) have been recognized as the frontline of emergency response, poverty reduction and development planning. LGUs are now mandated to initiate DRR work. They have been given the responsibility for implementation of the law, have been provided more flexibility in the allocation of resources to do this, and can be held to account by being penalized if they do not adhere to the law.

The DRRM Act imposes penalties on local government officials if DRR work is not carried out, including fines of 50,000 Pesos to 500,000 Pesos (approximately £700–£7,000) and imprisonment of 6–12 months. Government officials can also be disqualified from public office. This is a wake-up call to local officials who now face serious consequences if they do not put DRR into practice at a local level. The law also gives LGUs ownership and flexibility in DRR programming. An example of this is rather than accessing funds from the national government, which can be a very slow and bureaucratic process, LGUs can now access funds from other supportive LGUs if their local council passes the resolution.

The capacity of local government has significantly increased. Staff receive training in DRR so they understand the complexities of vulnerability and resilience. Local DRR management offices have been established which now set the direction and coordinate DRR work in their jurisdictions.

The DRRM Act is a big step in the right direction for disaster management in the Philippines which establishes political commitment, recognizes the need for more decentralized resources for DRR, and empowers a range of stakeholders at national and local levels to be involved in decision making.

### **Planning and commitment**

Successful DRR is not just about avoiding risks; it is also about building a sustainable culture of safety with the appropriate legal frameworks and policies to support this in the long term. It requires good governance — a collective effort, and is the responsibility of governments, civil society, communities, international development agencies, and private companies alike. This joint approach can be difficult to nurture and often advocacy can be extremely useful in raising awareness and profile of disaster risks and acting as a catalyst for negotiations.

It is important to remember that this takes time and requires planning, commitment and continuity. Major advocacy gains are not accomplished within a typical one to two years project timeframe, for example. And advances are always susceptible to set backs or regression. In the Philippines, as this article goes to press some lawmakers in congress want to repeal the section of the DRRM law (passed in 2010) that mandates a fixed five per cent expenditure on DRR. Therefore the debate rages on, but so do the skills acquired by partners, communities and all of those involved in the advocacy process that are continuing to contribute to good governance for DRR and reducing possible vulnerability to disasters long into the future.

*For the full series of case studies please see *Partnering for Resilience: Reducing disaster risks through successful partnerships*, Christian Aid, April 2011.*

# Building resilience to flood and typhoon hazards in Viet Nam

*Ian Wilderspin, Technical Specialist (Disaster Risk Management), UNDP; Miguel Coulier, UNV and Dr. Nguyen Huu Phuc, Director of the Disaster Management Centre, Ministry of Agriculture and Rural Development, Viet Nam*

**V**iet Nam has addressed many of its development challenges in recent years, reducing its poverty rate from 58 per cent in 1992 to 14.5 per cent in 2008<sup>1</sup> and reporting GDP growth<sup>2</sup> of approximately 6.5 per cent in 2010. Per capita income has increased five-fold in the past four decades,<sup>3</sup> helping lift millions of people out of poverty.<sup>4</sup> All of this constitutes encouraging progress towards achieving the Millennium Development Goals.<sup>5</sup>

However, Viet Nam's location in one of the most typhoon-prone areas of the world makes it vulnerable to a range of hydro-meteorological hazards.<sup>6</sup> From 1990-2009 the country suffered an estimated annual economic loss equivalent to 1.3 per cent of GDP.<sup>7</sup> More than 70 per cent of the population is exposed to risks from multiple natural hazards.<sup>8</sup> Due to rapid development and urbanization, cities are increasingly vulnerable.<sup>9</sup>

There is gradual intensification of storms and typhoons due to climate change in Southeast Asia,<sup>10</sup> with damage exacerbated by increasing population density and economic infrastructure in exposed areas.<sup>11</sup> The Ministry of Natural Resources and Environment (MoNRE)<sup>12</sup> predicts an increase in extreme rainfall and flooding.

## Components of resilience

Viet Nam has made significant progress in reducing vulnerability to disasters through concerted actions addressing the five main components of resilience: governance; risk assessment; knowledge and education; risk management and vulnerability reduction; and disaster preparedness and response.<sup>13</sup>

### Governance

Viet Nam's main disaster risk management (DRM) objectives<sup>14</sup> are outlined in the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. This framework, which focuses mainly on water-related disasters, has a budget of US\$18 billion,<sup>15</sup> of which around US\$13 billion is for structural measures such as reservoirs, dams and dykes, and US\$5 billion for non-structural measures. The strategy outlines different approaches and solutions to natural hazards affecting different regions of the country<sup>16</sup> and addresses community awareness raising and information dissemination; disaster response building; inclusion of DRM in the school curriculum; and training for those involved in DRM. It stresses the importance of building resilience to disasters and promotes the role of mass organizations<sup>17</sup> in disaster response and recovery.

In 2009, the Government approved a community-based disaster risk management (CBDRM) programme.<sup>18</sup> This ambitious

US\$53.5 million<sup>19</sup> programme will be implemented over a twelve-year period in about 6,000 communities and villages frequently affected by disasters.<sup>20</sup> This will require improved capacity at national, provincial and local levels along with coordination, partnership and quality control. For more than a decade, international non-governmental organizations (INGOs) and the Red Cross have pioneered methods, tools and approaches to enhance resilience and reduce vulnerability among some of the most disaster-prone communities. Lessons learnt and good practice<sup>21</sup> developed from such activities form the foundations of the Government's programme. The Disaster Management Centre of the Ministry of Agriculture and Rural Development (MARD) have sought expertise from the non-governmental sector for the implementation of the programme.

Whilst a comprehensive legislative framework exists in the country, it does not specifically cover management of natural hazards.<sup>22</sup> The most prevalent hazards (mainly water-related) as well as earthquake and tsunami<sup>23</sup> are covered under the Ordinance on Flood and Storm Prevention and Control,<sup>24</sup> which stresses the importance of community participation.<sup>25</sup>

Much of the existing legislation lacks clear arrangements for enforcement and the current organizational structures have focused largely on disaster response rather than prevention, although the CBDRM has brought something of a paradigm shift in Government thinking on this. To address these gaps and to improve institutional arrangements for DRM, a comprehensive DRM Law<sup>26</sup> is currently being drafted by a team of legal experts supported by UNDP, working alongside several Government-appointed committees. In close collaboration with NGOs, the Red Cross and mass organizations at national level and involving a comprehensive public consultation process at commune and village level, the law is expected to be promulgated by the National Assembly in 2012.

The Central Committee for Flood and Storm Control (CCFSC) was established in 1946 along with committees at provincial, district and commune levels.<sup>27</sup> The inter-agency committee, comprised of some 22 ministries and agencies, is responsible for the formulation of flood and storm related policies and mitigation measures in Viet Nam.<sup>28</sup> The CCFSC's





Image: Ian Boyd Fox

Dyke construction works in Ben Tre province, March 2011

main tasks include monitoring the planning and implementation of disaster prevention and response plans;<sup>29</sup> providing guidance on disaster response and recovery; early warning dissemination and damage reporting; and mobilization of human resources and logistics for search and rescue, disaster response and recovery.

The CCFSC tends to convene primarily in response to natural disasters. Its ability to focus on and coordinate response among a wide range of ministries is limited due to its position within the MARD. Ministries, provinces and districts are responsible for DRM planning, creating both vertical and horizontal reporting structures through line ministries and local committees for storm and flood control at provincial, district and commune level. Also, for disaster damage and needs reporting, two parallel systems operate: one through the CCFSC structure and the other one through the General Statistics Office, with structures at all administrative levels.

Disaster risk management is integrated within the 2006-2010 Socio-Economic Development Plan (SEDP) to reduce the number of people falling back into poverty due to natural disasters. The new SEDP (2011-2015) offers further scope for increased integration of risk reduction into all levels of development planning. Joint efforts by UNDP, the Ministry of Planning and Investment and several NGOs, notably Oxfam GB at the provincial level, have succeeded in integrating climate change adaptation (CCA) and disaster risk reduction (DRR) into the drafts.<sup>30</sup>

Several networks for DRM and climate change have evolved, including the Disaster Management Working Group,<sup>31</sup> which was initiated in 1999 to improve information exchange amongst DRM stakeholders. In 2008, the Climate Change Working Group was established to provide a forum for NGOs and INGOs to participate in the climate change debate.<sup>32</sup> The UN Programme Coordination Group for Natural Disasters and Emergencies (PCG NDE) is co-chaired by the UNDP and MARD and comprises UN agencies<sup>33</sup> involved with DRM. The objectives of the group are to ensure effective coordination of UN response and assistance and to implement the One UN Plan<sup>34</sup> in a more coordinated and effective manner. The PCG NDE collects information on known and potential hazards and vulnerabilities through regular disaster situation reports.

Over the past few years there have been collaborative efforts between UNDP, UN International Strategy for Disaster Reduction, MARD and MoNRE to establish a National Platform for DRR and CCA, providing a framework to enhance cooperation amongst these stakeholders, including the Viet Nam Red Cross (VNRC) and Viet Nam Women's Union.



Image: Vietnam Red Cross, 2009

Red Cross staff monitoring newly planted mangroves in Ninh Binh province

### Risk assessment

There are numerous examples of hazard, vulnerability and capacity assessments<sup>35</sup> undertaken by INGOs and mass organizations<sup>36</sup> in partnership with local people in disaster prone communities. These assessments have produced comprehensive risk assessment maps for high-risk areas, in some cases including sophisticated GIS data and providing information on population density, major facilities, flooding possibilities and evacuation routes.

There is a need to improve disaster risk and vulnerability indicators and the collation and interpretation of data to allow risk reduction to be integrated into development planning and decision making.<sup>37</sup> A MARD/UNDP CBDRM programme<sup>38</sup> will enable decision makers to improve assessment of the impact of disasters on socio-economic conditions and the dissemination of information to the public and people at risk.

### Knowledge and education

Over the past decade, the VNRC<sup>39</sup> has implemented an extensive disaster preparedness programme for school children. In 2000, a comprehensive, child-friendly text, *An introduction to disaster preparedness for primary school children*,<sup>40</sup> was first published. Subsequently, in partnership with the Ministry of Education and Training (MoET) and the provincial Departments of Education and Training, the VNRC has undertaken activities in schools in many of the most disaster-prone provinces. More than 18,000 primary school teachers have undertaken training, going on to teach approximately 627,000 primary school children. Over this period, Save the Children, SEEDS,<sup>41</sup> UNICEF and UNESCO have initiated work with MoET in endeavours to include DRR on the primary and secondary school curricula.

### Mangroves for protection and resilience

Mangrove afforestation has been undertaken in eight of the most disaster prone northern and central coastal provinces.<sup>49</sup> Funded by the Japanese and Danish Red Cross Societies with funds from local counterparts, the programme has planted a mix of mangrove, Australian pine and bamboo, providing over 100km of protection on sea and river dykes.

A recent independent cost-benefit analysis reported that, on average, 1ha of planted trees costs US\$843/km.<sup>50</sup> To effectively protect a dyke through mangrove afforestation costs US\$84,300, while upgrading a dyke by raising the height by one metre and concretizing it costs between US\$800,000 to US\$1.5 million/km.<sup>51</sup> The programme has facilitated the development of a broad range of social projects and mangrove-related livelihood activities.<sup>52</sup>

### Risk management and vulnerability reduction

Traditionally, the Government has focused on preparedness and response with a strong emphasis on structural measures, such as dykes and seawalls. The country has over 10,600km of 6-9m high river dykes<sup>42</sup> and 2,600km of 3.5-5m high sea dykes that need further expansion and reinforcement. The Government has invested considerably in the dyke system and has ambitious plans for the next decade to expand upon this.<sup>43</sup>

Much of the 3,200km coastline is, or could be, protected by mangrove forest,<sup>44</sup> which mitigates





Image: Dang Van Tao, IFRC, 2011

Children playing on the dyke in Dai Hop commune, Hai Phong province, close to a 7-kilometre stretch of dyke protected by 1,000 hectares of mangroves (planted in 1998)

against the impact of tropical storms, typhoons, sea surge and tsunamis.<sup>45</sup> For example, it was estimated that in Kien Thuy District, a four-metre-high storm surge resulting from Typhoon Damrey (2005), was reduced to a 0.5m wave by extensive restored mangrove forests.<sup>46</sup> Since the mid-nineties, mangrove afforestation programmes have been undertaken by the Government,<sup>47</sup> the VNRC and various INGOs. Mangroves have also improved the ecological environment and ultimately reduced local levels of poverty.<sup>48</sup>

#### *Disaster preparedness and response*

The 'Four on-the-spot' motto<sup>53</sup> (which advocates providing leadership, human resources, means and logistics on the spot) developed from experiences in protecting and strengthening the dyke system in the 1970s. To ensure the safety of the system and reduce the risk of flooding, leaders needed to be able to organize, coordinate and mobilize resources at the local level. The motto has since been expanded into all aspects of DRM and since 2006 it has been a legal requirement.

There are many examples of small-scale projects undertaken by the nongovernmental sector in partnership with local government and the private sector. Combining early warning, preparedness and infrastructure development, one recent example<sup>54</sup> is the work of Challenge to Change (CtC), a small British NGO.<sup>55</sup>

#### **Joint initiatives for ongoing action**

The Government has made significant efforts to reduce disaster risk through legislation, institutional frameworks and a combi-

#### **Safe anchorage for small fishing boats**

In 2009, CtC provided technical support for a broad-based hazard, capacity and vulnerability assessment aimed at improving safe anchorage during storms for small boats in Da Nang. In close collaboration with fishing communities, local government and technical experts, CtC supplied a boat winch in the Tho Quang harbour of Son Tra District, Da Nang. The winch directly benefits over 300 fishermen and has indirect benefits for a further 1,500 people. The project demonstrates how community initiatives for DRR can complement government policies and programmes. In this case, the government early warning system provides warnings 48 hours before a storm, then 24 hours later and each hour thereafter. The winch system goes into action at the first signal.

In 2010, officials from Binh Thuan province visited Son Tra District to learn about the winch design and are now reported to be constructing and installing similar winches. The American Red Cross is also funding a cost-benefit analysis of the winch system, to establish its suitability for scaling up.

nation of structural and non-structural measures. Knowledge enhancement regarding resilience and the need to improve livelihoods of vulnerable households in disaster prone areas is ongoing. The task of helping communities to build resilience, reduce vulnerability and adapt to climate change can best be undertaken through innovative partnerships involving Government, nongovernmental agencies, the private sector and local communities themselves.



# Disaster risk reduction and the building of a disaster-resilient India

*M Shashidhar Reddy, Vice-Chairman, National Disaster Management Authority, Government of India*

**I**ndia ranks second in the world on the basis of population and seventh in terms of land mass, with a wide range of geo-morphological conditions. The country is highly vulnerable to many disasters, which are further compounded by demographic disparities and pressures. Urbanization and the concentration of population in cities means that more people are becoming vulnerable to localized disasters, with the economically and socially weaker segments of the population being the most seriously affected.

India has a progressive and forward-looking development agenda of inclusive growth which can be undermined by disasters. The development process must, therefore, be sensitive toward disaster prevention, preparedness and mitigation. Thus, disaster risk reduction (DRR) is the focus of our developmental agenda.

## India's vision for DRR

The National Policy on Disaster Management (2009) spells out the vision for a disaster-resilient India:

'To build a safe and disaster-resilient India by developing a holistic, proactive, multi-disaster oriented and technology-driven strategy through a culture of prevention, mitigation, preparedness and response.'

The underlying theme of the above is the involvement of communities at every level of decision making, the use of science and

technology in understanding and handling of disasters, and the establishment of sustainable partnerships of all the stakeholders in every endeavour.

## Institutional mechanisms

Though a number of DRR initiatives were undertaken in India in the past and also in wake of the Orissa super-cyclone (1999), Gujarat earthquake (2001) and the Indian Ocean tsunami (2004), the real impetus was provided by the enactment of disaster management legislation (the DM Act) in December 2005, putting in place much-needed institutional mechanisms.

The Act provided for the setting-up of a National Disaster Management Authority (NDMA) under the chairmanship of the Prime Minister, State Disaster Management Authorities under the chairmanship of the Chief Ministers, and District Disaster Management Authorities under the chairmanship of District Magistrates.<sup>1</sup> It also provided for the setting up of the National Institute of Disaster Management (NIDM), the premier institute in the country responsible for training and capacity development of government functionaries and other stakeholders. These activities are supported by many state-level administrative training institutes. The Act mandates the constitution of the National Disaster Response Fund and similar funds at the state level.

One of the most significant provisions of the DM Act has been the constitution of a specialized field organization called the National Disaster Response Force (NDRF) under the NDMA. The NDRF has developed into a well-trained, dedicated force with around 11,000 personnel spread throughout the country. They have state-of-the-art equipment required for various response actions. The NDRF has developed the capability to respond to all kinds of natural and man-made disasters, including chemical, biological, radiological and nuclear (CBRN) emergencies. The NDRF is helping to train similar state-level response forces. Besides being deployed to handle disasters, the forces also get pre-positioned in an impending disaster situation. The NDRF is also playing a major role in enhancing community-based disaster preparedness, particularly in the areas of life-saving skills and hands-on approaches. In a very short timespan, around 100,000 people have been sensitized across the country. NDMA is keen to



NDRF team rescuing school children during Cyclone Aila

Image: NDMA

further expand this as it strongly feels that the community is invariably the first responder, particularly for quick onset disasters.

NDMA is in the process of establishing the National Disaster Response Reserves (NDRR) to cater for the emergency relief needs of 400,000 people, including 150,000 people in the hilly regions, for use in times of serious disasters.

### Guidelines for action

The DM Act has mandated NDMA, among other things, to prepare disaster management guidelines, on the basis of which the national and state plans will be prepared. So far, 27 guidelines have been issued on management of different natural and man-made disasters and some cross-cutting issues. These include guidelines on management of floods; earthquakes; cyclones; urban flooding; chemical (industrial) disasters; biological disasters; tsunamis; landslides; CBRN emergencies; medical preparedness and mass casualty management; and psycho-social and mental health care. Many more guidelines are in various stages of preparation. These guidelines have been formulated with a participative approach involving all stakeholders, drawing upon the enormous scientific, technological, academic and administrative expertise existing in the country and the collective wisdom of civil society.

### Preparedness and mitigation

To give effect to some of the provisions of the guidelines and to bring in a culture of preparedness, mitigation and response, a number of mitigation projects have been conceptualized and these are at various stages of implementation/preparation. Some of these are described below.

*National Cyclone Risk Mitigation Project (NCRMP)* — Phase 1 of this project is being launched this year with World Bank assistance of about US\$319 million, covering two important coastal states. Eventually all the 13 cyclone-prone coastal states and union territories of India will be included. The main objectives are to strengthen structural and non-structural cyclone mitigation efforts. The project has three major components:

- Improvement of the early warning dissemination system
- Investment in mitigation measures, for example construction of cyclone shelters, roads and bridges, saline embankments, shelterbelt plantation and mangrove regeneration
- Technical assistance for hazard risk management and capacity building.

*National Earthquake Risk Mitigation Project (NERMP)* —

NDMA has conceptualized NERMP as a comprehensive project aimed at improving earthquake preparedness in India, creating an enabling environment for the preparation and implementation of earthquake risk management plans and for working toward improved seismic safety of the built environment in India. The overall cost of the project is US\$406.6 million. The project will have a huge social impact by:

- Strengthening earthquake preparedness
- Carrying out capacity building of engineers, architects and masons in earthquake-resistant construction techniques



Image: NDMA

NDRF back in action in the aftermath of Cyclone Aila



- improving compliance with earthquake-resistant building codes
- strengthening the techno-legal regime
- creating an enabling environment for institutional strengthening and research and development.

NERMP also envisages carrying out the seismic strengthening and structural retrofiting of selected hospitals in high-risk districts.

Besides the above, NDMA has conceptualized mitigation projects covering floods, landslides and a project for a dedicated National Disaster Communication Network (NDCN), to ensure failsafe communication. A demonstrative National School Safety Project is being finalized that will empower students, teachers, parents and other stakeholders in areas of school safety, knowledge of disasters and development of life-saving skills.

### Use of science and technology in DRR

In order to move away from reactive and response-centric disaster management, NDMA is progressively inducting the best-known professionals from academia and premier research organizations in the country to use science and technology for the proactive and holistic management of disasters. The single most scientific tool that needs to be deployed for this is vulnerability analysis and risk assessment (VA&RA) of the people, their habitats, and infrastructures etc. with respect to various natural hazards.

VA&RA calls for various scientific and technological inputs such as the preparation of digital base maps at appropriate scales and contour intervals, preparation of upgraded hazard maps, and development of the Geographic Information System (GIS) platform. A further proposal is to develop a knowledge-based National Disaster Management Information System (NDMIS) to perform VA&RA to generate a decision support system at national level so that value-added, actionable information can be communicated over NDCN (being steered by the NDMA) to the right stakeholder at the right time.

### Urban flooding

As in most countries, rapid urbanization is going to be reality in India. It is projected that over the few decades, the urban-rural population ratio will be reversed, with over 1 billion people likely to inhabit urban areas. As urban areas will be centres for economic development, flooding in urban areas will be a major problem, giving the increasing trend towards high-intensity localized rainfall.

NDMA has for the first time formulated separate guidelines for the management of urban flooding. Some of the important recommendations made include establishing a better network for hydro-meteorological observations in general, besides a local network of automatic rainfall gauges for real-time monitoring with a density of one per 4 square kilometres in all urban areas, and the establishment of a technical platform for developing urban flood forecasting capability.

### Weather reconnaissance: Aircraft Probing of Cyclones (APC) facility

Lack of critical observations from the cyclone core environment is causing large track and intensity forecast errors. The establishment of APC facilities for the cyclone core environment can significantly address this critical data gap in cyclone intensity and track forecasting.

An APC facility can also be used for the study of monsoon systems in the South Asian region and research on climate change. This will be a great asset for the entire region. The facility, with a C-130J aircraft, is likely to be established in the next two years.

There are also plans to develop an advanced forecast platform to strengthen existing capability at the India Meteorological Department, enabling increased accuracy and high reliability in terms of onset, landfall, intensity and



Image: NDMA

School children participating in mock drill at Bellary, Karnataka State, 17 June 2009



persistence of the event, longer lead times, location-specific calibration for each hydro-meteorological event and improved forecasting of extreme weather events.

### **Modernization of fire services**

Fire and rescue services constitute an important element in disaster response across the world, and India has been consistently improving these services with a view to building up local capacity to meet disasters of any kind without waiting for outside help. A Government-funded scheme with an outlay of US\$44.5 million has been launched. With the active advocacy of the NDMA, the 13th Finance Commission<sup>2</sup> also granted US\$105 million for revamping the fire and rescue services in selected states.

### **Civil defence**

In the ongoing initiatives for community preparedness and creating public awareness at grassroots level, revamping of civil defence is one of the major programmes addressed by the NDMA. In addition to organizational restructuring, emphasis is also being laid on the training of volunteers to prepare them for their role in community awareness and proactive management of disasters.

### **Training and capacity building**

India has undertaken a number of measures to train and build the capacity of all the stakeholders involved in DRR. The UNDP sponsored Disaster Risk Management Programme was implemented in 176 out of 627 districts from 2003 to 2008 and has now been extended as a new DRR programme which seeks to train community volunteers in different aspects of DRR and strengthen the state disaster management authorities. There is a concomitant Urban Vulnerability Reduction programme to create awareness on earthquakes and other hazards, and masons and engineers are being trained in disaster-resilient construction.

NDMA has consistently focused on the conduct of regular drills throughout India, to generate awareness about the disasters facing the country and the best way of responding to them. NDMA will focus on pre-hospital care and advanced trauma life support, as well as creating certified First Medical Responders at community level in collaboration with other stakeholders.

The 13th Finance Commission has recommended a grant of US\$117 million for building capacity within the administrative machinery for better handling of disaster response and for preparation of district and state-level disaster management plans as envisaged under the DM Act. This grant will help the states to provide essential training and support capacity building of stakeholders and functionaries, preparation of disaster management plans based on hazard, risk and vulnerability analysis, and setting up/strengthening of Emergency Operation Centres.

### **Awareness generation**

Realising that public awareness generation is key for the crystallization of political and administrative will, NDMA has launched a number of public awareness campaigns covering several disasters through electronic and print media. A lot of focus is on safe building construction and creating a high level of impact on the target audience.

### **Mainstreaming disaster management into development plans**

Disaster management is being mainstreamed into development planning, looking critically at each activity being planned not only from the perspective of reducing the disaster vulnerability of that activity, but also from the perspective of minimizing that activity's potential

contribution to the hazard. Every development plan has to incorporate elements of impact assessment, risk reduction and the 'do no harm' approach, with the aim of ensuring that all newly built structures and those under construction are disaster resilient, and that those which have already been constructed are selectively retrofitted in accordance with priority.

NDMA has effectively advocated with the Government of India to incorporate guidelines in the conceptual, appraisal and approval stages of all such projects since 2009. It has intervened to encourage the states to adopt a similar procedure and create Technical Safety Cells to take up disaster-resistant construction activities. Model building laws have been drafted by the Government for implementation by local self-governments so that all building will follow minimum standards of disaster-resilient construction.

The Reserve Bank of India has taken a stellar step in issuing guidelines about disbursement of loans for the housing and infrastructure sectors. The loans will only be made available when the disaster-resilient features are included in the project. This is one of the most important ways to streamline DRR in the developmental agenda.

### **The way forward**

India has made giant strides in the last few decades on many fronts; the policy makers and people are now convinced that progress has to be accelerated and sustained. It is necessary that the country adopts a culture of prevention and preparation. NDMA has built strong partnerships with a number of expert bodies to collate and disseminate relevant information and knowledge to tackle any kind of disaster. The strong commitment of the Government of India is reflected in the fact that the Prime Minister himself heads the NDMA and it has worked closely with all the states and the relevant international organizations. We will endeavour to consolidate these partnerships and work closely with communities to build a safe, resilient India. India has reached a stage where sound legal, institutional and scientific frameworks have been put in place; we now need a social framework to take the message of DRR as a way of life to each and every citizen of the country.



Image: NDMA

DRR in formal education

# Enabling neighbourhoods for disaster response

*Roderick Kühne, Michèle Mercier, Björn Schranz, Swiss Agency for Development and Cooperation*

**T**he Swiss Agency for Development and Cooperation (SDC) is committed to improving countries' safety and preparedness in disaster situations. This is part of the humanitarian aid provided by the Swiss Confederation in a variety of settings around the globe. Two SDC projects, in Morocco and Lebanon, are of particular interest in this context. They demonstrate the power of enabling neighbourhoods for disaster response to help affected populations, save lives, alleviate suffering and protect vulnerable populations. They also indicate the value of SDC's focus on promoting and supporting sustainable development, which in turn improves resilience in communities affected by disaster.

## Neighbourhood disaster response in Morocco

Morocco is prone to natural hazards, especially to floods, landslides and earthquakes that threaten the sustainable development of the country. With a population of over one million, Fez (established in 789) is the third largest city in Morocco, after Casablanca and Rabat. Old Fez has 160,000 inhabitants, and its medieval medina is the historic centre of the city. Many Moroccan cities have similar medinas in which traffic is largely pedestrian, due to the narrowness of their streets. In the medinas, gas explosions, fires and collapsing houses are frequent hazards, even without natural disasters. Weak construction of buildings and difficulty of access make the medinas particularly vulnerable to disasters.

The role of the local population in the first and decisive hours of disaster response is critical: in disaster situations, a high number of injured people are rescued by family members, neighbours or friends before the professional intervention forces arrive. But these spontaneous rescuers lack the most basic rescue knowledge as well as the tools for simple rescue work. In 2008, SDC Morocco therefore launched the *Secouristes Volontaires de Proximité* (SVP), a neighbourhood rescue volunteering project, in close cooperation with the local community of Fez.

## Reducing vulnerability and enhancing local coping capacities

Based on the model and experience of Neighbourhood Disaster Volunteers (NDV) in Turkey, where since 2001 more than 3,000 volunteers have been trained, SDC Morocco and its partners are building up operational, management and technical capacity to save human lives in the first hours following a disaster. Partners include the Civil Defence authorities, local governments (*wilayas*) and civil society (incorporating the population of Fez and the union of local associations of the medinas, *l'Union des associations et amicales de Fès*).

The SVP pilot project in Morocco aims to reduce community vulnerability by building up local capacities among communities living in the medina area, allowing them to respond quickly and adequately to local disasters. These local capacities complement the work of the professional rescue services. The ultimate goal is to protect lives, livelihoods, assets and infrastructure.

## Neighbourhood volunteers in rescue activities

So far, 340 volunteers in eight vicinities have been mobilized and trained in disaster awareness and preparedness, basic fire fighting, basic first aid, search and rescue, psychological support and principles of solidarity. Each team is equipped with a container placed at a safe and accessible location in the neighbourhoods of the medina. The equipment is maintained by volunteers according to a periodic maintenance programme in order to enable quick, effective reaction in disaster situations.

Volunteers participate in training and sensitize other volunteer groups (scouts, students and teachers) in high schools. They also raise awareness of inhabitants and craftsmen in the medina, using a door-to-door approach. A high level of interest among women has been witnessed in the SVP team and during the training phase of the project, with women accounting for 35 per cent of the teams.

To date, the SVP teams have been asked to intervene on highly diverse occasions. For instance, they helped the authorities and the Civil Defence during their rescue intervention in the recent 2008 floods in Fez. Also, they have rescued people on various occasions after the collapse of houses in the medina.

## Sustainable scaling up and sharing of experiences

The SVP project experience, which uses neighbourhood volunteers in rescue activities, is a good practice that has gained national and international recognition. The Governor of Fez has officially declared his commitment to it and emphasized its importance on several occasions. The excellent reputation of the project has led to requests to SDC for additional SVPs in other Moroccan cities. As a result, the experience gained from Fez is being capitalized on, and the project is being scaled up with activities in Fez, Meknès, Moulay Yakoub and Séfrou. Activities include the establishment of a methodology for the training of trainers, with new volunteers being trained and made operational in 11 vicinities and a total of 780 volunteers organized into 19 groups. In future, all vicinities of the medina of Fez will be covered by the volunteer teams, which are equipped in the same way as those already tested in the pilot phase from 2008 to 2010 and will undergo practical manoeuvres with the DPC.

The SVP is an effective and replicable model of development capabilities of local response to disasters, focused on local neighbourhood endeavours. It is based on the following guiding principles:

- Volunteerism
- Proximity-based organization
- Organizational development based on a bottom-up approach
- Mainstreaming of the gender approach in all phases of the project
- Strengthening of partnership and coordination between authorities and civil society.

Sustainability of the project and effective communication in disaster situations are enhanced through good relationships between partners that have taken strong ownership of the process. Knowledge is shared on various levels among volunteers and the disaster risk reduction (DRR) partners. An exchange programme has been set up between SVP Morocco and NDV Turkey in order to share the lessons learnt. An official Information and Communication Centre has been established in the old medina of Fez, hosted by the union of local associations of the medinas, one of the principle partners of SVP.

### Emergency medical services in Lebanon

Since 1945, the LRCS has been mandated by the Ministry of Health to carry out pre-hospital response and comprises 2,600 volunteers providing emergency services from 43 Emergency Medical Service (EMS) stations across Lebanon. LRCS volunteer services include:

- Emergency response and first aid services
- Critical patient transport
- Home and EMS station care
- Mountain rescue
- Mass casualty incidents (e.g. bombings, air strikes, road accidents, building collapses)
- Transportation of blood units and civilian evacuation
- Training for first response among the general population

SDC supports the LRCS in the effort to modernize and regulate the pre-hospital health sector in order to enhance EMS for the population. The ultimate goal is to reduce the loss of lives and the impact of injuries, be it in normal day-to-day emergencies or in exceptional circumstances such as natural disasters. Training of volunteers has thereby been a key element of the project, which started in 2008 and will conclude by the end of 2012. To this end, a new training curriculum in line with international standards and adapted to the Lebanese context was established.

The project consists of four phases. The first phase comprises 140 hours of modular theoretical and practical training for instructors (training of trainers) on medical topics and pedagogy, validated by an examination. Participants are volunteers with at least three years of clinical experience as team leaders. The second phase focuses on transfer of knowledge and skills by trained Lebanese instructors to trainers, based on the reference materials developed and under the supervision of Swiss trainers. In the third phase, transfer of knowledge and skills by trainers to LRCS EMS volunteers takes place under the supervision of Swiss and Lebanese instructors. The final phase is the evaluation of both the Lebanese instructors and trainers and the trainees (LRCS EMS volunteers).

In December 2010, the first batch of 19 volunteer rescue workers received their diplomas as instructors with the Lebanese EMS. The graduation ceremony took place in the presence of the Lebanese medical authorities and their foreign counterparts and represented the culmination of a two-year training cycle under the direction of SDC, in collaboration with the International Committee of the Red Cross, Geneva University Hospital and Geneva Paramedical College.

### Encouraging signs for the future

Projects such as these are integral to SDC's mission to enhance safety and disaster risk reduction in vulnerable communities. According to Dr. Olivier Hagon, Swiss Humanitarian Aid Unit: "The success of this ambitious project owes a great deal to the good reputation enjoyed by the LRCS and its capacity to bring together and pool the energies available."

This experience has also shown that the volunteer status of the young Lebanese rescue workers is in no way synonymous with amateurism. "Thanks to their unwavering enthusiasm, the LRCS volunteers gave proof of their determination to succeed in a perfectly harmonious fusion of volunteer work and professionalism," remarks Béatrice Crettenand, Swiss Humanitarian Aid Unit. Georges Kettaneh, the national director of EMS and in charge of the new training course for volunteer rescue workers, says: "The training programme has strengthened our resolve to ensure that all Lebanese rescue workers, regardless of which part of the country they work in, can rely on the same system, the same resources and the same working methods to carry out emergency missions to the best of their abilities." His assistant, Nabih Jabr, adds: "I have already received lots of calls from volunteers who were not selected the first time, but who were still keen to find out how the course had gone and hope to train as an instructor one day."

The new instructors are now able to replicate the training courses in all branches of the Lebanese EMS throughout the country. With the adaptation to international standards in the domain of traumatology, the progressive establishment of hospital care structures in Lebanon and the ongoing interest of volunteers in contributing to EMS and DRR, these are encouraging signs for the future.



Image: A. Dahmani, SVP Fez.

SVP intervention after the collapse of a house in Fez on 2 November 2010, involving rescue and recovery in collaboration with the DPC



# You can't use information you don't have: the role of data in reducing risk

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**I**n order to make better decisions in any context, people need access to timely, relevant, understandable information. Without it, intentionally achieving desired outcomes is difficult, whatever the goal. If risk reduction and management decisions are based on irrelevant, incorrect or incomprehensible information, people — and the systems in which they are embedded — suffer.

Policy makers, disaster managers and the public make decisions that affect disaster outcomes in every phase of the disaster management (DM) cycle. For instance:

- What should we build? Where? How? Should we get rid of the mangroves?
- What kind of scenario should we use in our exercise?
- Do we need to issue a warning? How?
- Do we need to evacuate?
- Where should we establish mass care facilities?
- Who needs assistance?
- What do we need to change?

The answers to these questions depend in part on the information individuals and organizations have access to at the time. Data that

are not easily understood, integrated and applied are not easily factored into decision making. It is impossible to use information you do not have or cannot process. The purpose and goals of questions determine what information is required. The ways in which goals and decisions are framed determine what, and who, gets 'counted'. If data on a particular population, system, resource or relationship are not available when decisions are being made, those elements are likely to become invisible and unaccounted for. The result may be increased and more inequitable impacts and a smaller range of perceived options. Additionally, if available data are not timely, accurate and of an appropriate scale and format, decisions and actions may not reflect actual conditions, and losses and suffering will increase accordingly.

## Data collection: making the invisible visible

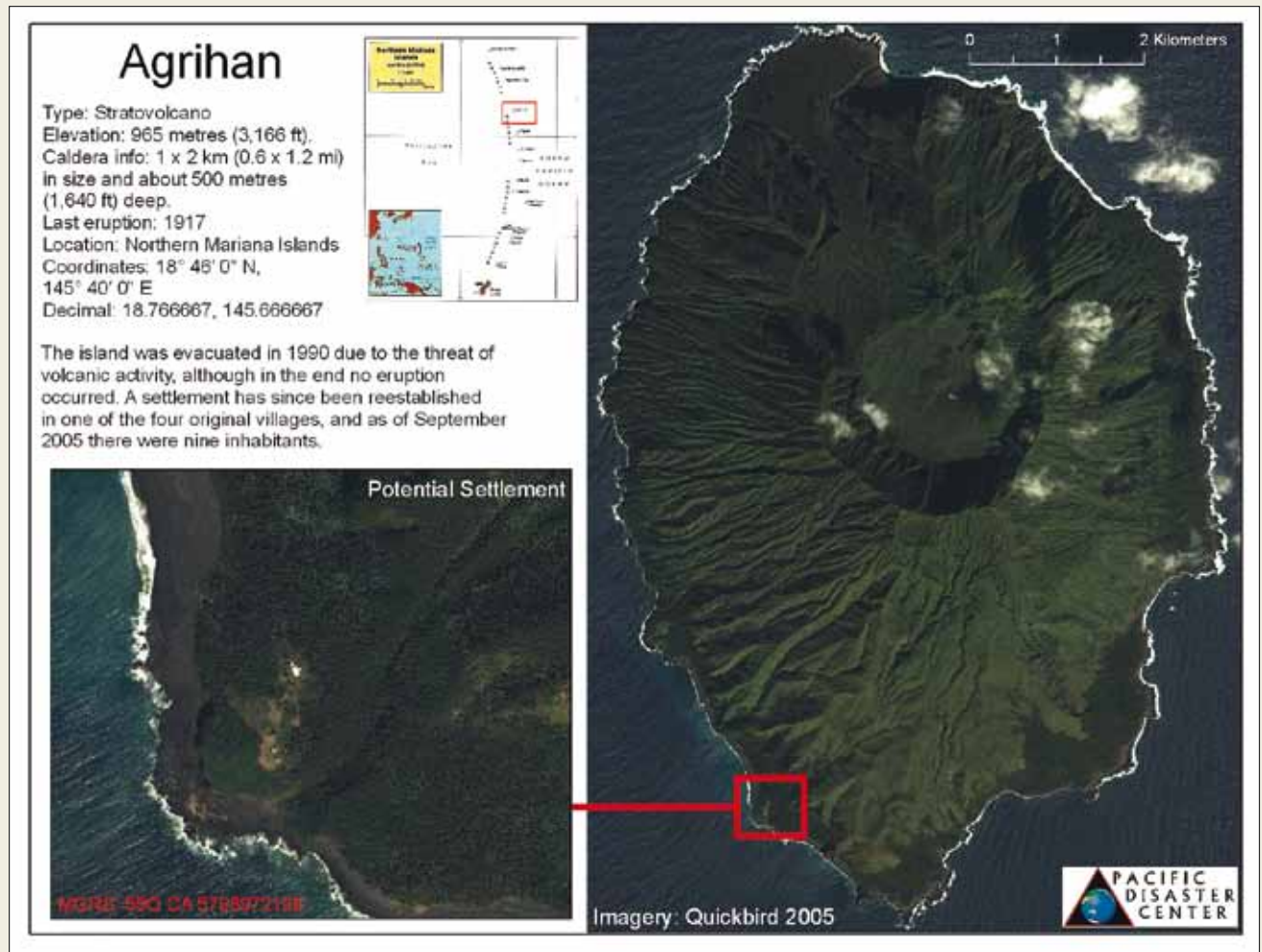
### *Creating the frame*

Data collection is a means of making the invisible visible. But how do we know what we don't know? In order to analyse, communicate and address disaster risk, we



Search and rescue teams locate a remote, little known settlement in the path of super-typhoon Choi-wan, 2009

**Relevant information and open communication helped search and rescue teams locate a remote, little-known settlement in the path of super-typhoon Choi-wan, 2009**



Source: PDC 2009

need to understand the components of disaster, for example, what factors affect the level of disruption, suffering and loss a community experiences. Understanding these factors and the ways in which they interact and overlap within a particular place is the key to effectively reducing and managing disaster risk. How disasters and disaster risk are characterized guides data collection and influences subsequent assessments and decisions.

DRR is about transforming 'conventional wisdom' from a view of disasters as acts of nature towards a more comprehensive understanding of disasters as the result of complex interactions within human-environment systems operating at multiple scales. Injecting human factors enables us to act, influencing interactions in ways that reduce short-term impacts and long-term risks. Studies over the last half century have helped to uncover some of the drivers of disaster losses, while international campaigns have helped to establish more consistent characterization of disaster risk components, and have emphasized physical, social, economic and environmental dimensions.<sup>1</sup>

At the most basic level, DM and DRR decisions require information on

- The physical characteristics of relevant hazards
- The systems, assets and resources of interest that may be exposed to these hazards
- Characteristics that make those elements more susceptible to impact and less able to cope.

Loss and impact data enable monitoring and allow analysts to explore relationships between disaster components and outcomes.

*Collecting the data*

While they do have limitations, information and communication technologies (ICTs) can facilitate data collection and management before, during and after an event. Because actionable information is often geospatial, a geographic information system (GIS) provides critical support, helping to make DRR and DM actions more effective and efficient. Location and attribute data on losses, hazards and elements of interest can be collected in a number of ways and can





Image: L. Hillman 2008

Participants in the ASEAN Rapid Damage and Needs Analysis (DANA) Training practice using a GPS device. The training was facilitated by PDC

be obtained from both primary and secondary sources. Secondary collection frequently represents a form of data sharing, and access to data has been greatly augmented by the Internet.

Environmental data are often collected by sensors or other devices that measure field conditions such as rainfall, river levels, wind speeds and wave heights. These data help establish the spatial patterns, temporal trends, event probabilities and seasonal variations relevant to developing risk assessments and profiles. The data also support event description, analysis, and the development of early warning protocols. Readings may be manually recorded and reported, stored and retrieved periodically by agents in the field, or reported automatically by means of telemetry systems.

Satellite imagery and aerial photography can also provide information on the physical environment. With remote sensing and GIS software, imagery can be used to identify relevant social, environmental and economic patterns represented in the physical landscape. Images can be used to create building inventories without hand tracing or surveying every structure.<sup>2</sup> Series of imagery products can be used to monitor changes on

the earth's surface. This provides context and indicators of vulnerability and risk. In 2009, Pacific Data Center (PDC) used satellite imagery to identify potential settlements on remote Pacific islands in the path of super typhoon Choi-wan, contributing to the successful evacuation of the isolated population prior to landfall. In the wake of a hazard event such as a flood or landslide, images can also assist in delineating the impact area and help support hazard assessment. In a post-event context, imagery comparisons provide a rough estimate of initial damage.<sup>3</sup>

Like imagery, portable global positioning systems (GPS)<sup>4</sup> and GIS-enabled devices can be used to identify locations of elements of interest. A handheld GIS makes it possible to record relevant attributes in the field. Many phones now come with cameras and GPS applications, which allow contextualization and documentation through location-tagged visuals. After an event, portable GPS, GIS and phone applications facili-



PDC's Disaster Alert application for the iPad. Disaster Alert is also available for Android devices



Source: PDC 2010

tate damage assessments and loss estimations, which can then be used to support response and recovery activities.

The collection methods described above do not readily capture local drivers of risk. One way to ensure that local knowledge is incorporated into decision making is through participatory mapping and GIS exercises,<sup>5</sup> or vulnerability and capacity assessments.<sup>6</sup> These processes allow participants to tell their own stories and can strengthen horizontal and vertical relationships while supporting DRR and DM activities at the community level. The outputs of these exercises may not be digital. However, digitizing data related to local knowledge and experiences (whether spatial or not) makes that information more easily updated, more accessible, more easily included in analysis and analysis outputs, and thus more 'visible' to decision makers and disaster managers.

Web-based collaboration tools and wikis can also facilitate the collection of digital data in data-poor areas. While access to these tools may be limited in certain regions and wikis pose challenges related to data validity and verification, they have had some success in generating useful data at relatively low cost. Ushahidi, Crisis Commons and OpenStreetMap<sup>7</sup> have been invaluable in

responding to the 12 January 2010 earthquake in Haiti and the recent Japanese earthquake and associated events.

While most visible in response activities, Web 2.0 initiatives support pre-event DRR and DM activities as well. In 2010, The Guardian reported that at the end of January, there were 239 people rebuilding the map of Haiti<sup>8</sup> to reflect current conditions. In addition to contributing to search and rescue and response activities, this newly collected and processed information will support risk assessment, recovery and development efforts. Another example, Map Kibera,<sup>9</sup> combines the advantages of participatory mapping and wiki-mapping to make informal settlements, and the people who live in them, more visible. Map Kibera began mapping critical base data as well as themes of health, security, education and water/sanitation in Nairobi in 2009. While not specifically collected for disaster management, this information can be leveraged for risk assessment and

other DRR and DM activities. The project is already being used to identify and share patterns of local security risks.

### **Data compilation, integration and sharing: making the visible accessible**

Those analysing and using information for DRR or DM decision making are unlikely to be involved in direct data collection or processing. Most risk-related information they use will have already been collected and processed, but it is not often found in one place. Hydrometeorological departments probably have information on storms and flooding, but may not have data on earthquakes. Information on population and socio-economic characteristics, land use/land cover data and critical infrastructure data will likely all be housed within different agencies. As a result, secondary data collection and integration can become very time- and labour-intensive, decreasing visibility and delaying decisions.

One of the advantages of digital information is that it is much easier to bring it together in one place. Web-enabled database and GIS applications are increasingly being used to integrate, compile and disseminate disaster risk information. Global data portals and online data warehouses such as the PDC Global Hazards Information Network, CRED/EM-DAT, CIESEN Columbia University World Data Center, the Prevention Web Global Risk Data Platform and the World Bank Indicators site make information more readily available.

In addition to expanding access, web-based applications add value and support both awareness and decision making. Social media approaches have been described above. Tools such as the Global Risk Data Platform<sup>10</sup> make the results of complex analyses available in a form that is easy to understand and explore. Similarly, PDC's Global Hazards Atlas<sup>11</sup> allows users to interact with information such as historical events, hazard layers and population data. The Atlas also visualizes dynamic data such as active hazards, forecasts and observational data, enabling users to monitor current conditions within a broader situational context. These data are in turn made available via spatial information sharing protocols, such as WMS and WFS.

The configuration of these tools and representation of data layers can be used to highlight key findings or relationships. Web-based applications also allow users to interact with information that is important to them without needing to be experts in either subject matter or technology. Because of this, however, particular care must be taken in the representation and documentation of information.

### **Data considerations**

Data availability, quality and consistency are some of the biggest challenges to accessing relevant information and making the invisible visible in the decision making process. It is not uncommon for monitoring networks and historical records to be sparse, or wholly unavailable for certain phenomena. Primary collection of qualitative and quantitative social and environmental data is expensive in terms of both labour and capital. While analyses and decisions are only as good as the data that goes into them, collection efforts must be balanced with priorities, purpose, and internal and external human, technical and financial resources.

Data sharing helps reduce the burden, but there are challenges here as well. Institutional and technical structures do not always support the free exchange of information. This affects the coordi-

nation required for comprehensive DM. In order for information to effectively support DM and DRR activities, those who need to use it must be able to do so.

While ICTs can help make marginalized groups more visible to decision makers, if Internet penetration or capacity is low, then they will not be effective in the collection or wide dissemination of risk information. These technologies also require specialized skill sets. The use of ICTs to collect, analyse, integrate and share risk information must not increase differential access to information or representation in decision outputs but should instead facilitate individual and collective action to reduce disaster risk. Training and education can help, but will not eliminate inequities.

### **Responding to the challenge**

PDC is actively working to overcome these challenges and put relevant, understandable, actionable information into the hands of those who need it. The organization works with stakeholders around the world to help them frame their data collection efforts, identify intended outcomes and uses, outline data and implementation requirements and gaps, and develop strategies and solutions to help them fill those gaps. PDC works with other information providers and stakeholders to help establish common information sharing policies that will help reduce replication of effort and cost, and more effectively support inter-agency and cross-boundary DRR and DM activities. It provides training on data collection, management, analysis methods and tools, in addition to training on integrating spatial data into decision making processes.

As an organization that uses ICT to enhance the accessibility of risk information for decision makers, disaster managers and the public, PDC was among the first to make its early warning, hazard exposure and other information products available via the Web and Internet-based mapping applications. It publishes the same information via social networks such as Facebook and Twitter and is now taking advantage of smart phones and similar devices to provide early warning content on interactive maps through free downloadable apps for Android and iPhones/iPads.

Other solutions provided by PDC include early warning and decision support platforms with additional functionality and protection that can be used to support a variety of mitigation, preparedness, response and recovery activities. The platforms are integrated with various modelling applications, and equipped with state-of-the-art visualization tools. These platforms also include tools that facilitate information sharing across agencies and boundaries.

PDC is committed to promoting DRR through enhancement of evidence-based decision making capabilities. It provides support for DRR by helping disaster managers, policy makers and the public access and understand the information they need, when they need it.

# Sentinel Asia — space and ICT technologies towards disaster risk reduction across the Asia-Pacific region

*Kazuya Kaku, Japan Aerospace Exploration Agency*

**The Sentinel Asia (SA) initiative was established in 2005 as a collaboration between space agencies and disaster management agencies, applying remote sensing and Web-GIS technologies for disaster management in the Asia-Pacific region. A step-by-step approach for the implementation of this dissemination system has been adopted, aiming to contribute to disaster risk reduction across the region.**

Asia has been seriously damaged by natural disasters over the last 34 years. The effects of disasters are compounded by the high population level (close to three billion). Disasters occurring in Asia comprise 37 per cent of the worldwide total. The region has sustained 61 per cent of global fatalities and is home to 89 per cent of the total victims associated with such disasters. (*Natural Disasters Data Book 2008*)

The Asia-Pacific Regional Space Agency Forum (APRSAF) proposed SA in 2005 to showcase the value and impact of Earth observation technologies, combined with near real-time Internet dissemination methods and Web-GIS mapping tools for disaster management support in the

Asia-Pacific region. APRSAF was established in 1993 in response to the declaration adopted by the Asia-Pacific International Space Year Conference (APIC) in 1992, to enhance the development of each country's space programme and to exchange views on future cooperation around space activities in the Asia-Pacific region.

## **A collaborative concept**

The SA initiative aims to:

- Improve safety in society through information and communication technology (ICT) and space technology
- Boost the speed and accuracy of disaster preparedness and early warnings
- Minimize the number of victims and social/economic losses.

Its architecture is designed to operate initially as an Internet-based, node-distributed information distribu-



Joint Project Team Meeting in Manila, the Philippines, in July 2010

Image: JAXA





Field surveys for validation of hazard map by PHIVOLCS and JAXA



Image: JAXA

tion backbone, eventually distributing relevant satellite and in situ spatial information on multiple hazards in the Asia-Pacific region.

A step-by-step approach for SA was adopted as follows:

- Step 1: Implementation of the backbone SA data dissemination system as a pilot project, to showcase the value and impact of the technology using standard Internet dissemination systems (2006-2007)
- Step 2: Expansion of Step 1 with new satellite communication systems and enhancement of activities based on experiences in Step 1 and new requirements (2008-2012)
- Step 3: Establishment of a comprehensive disaster management support system (2013 onwards).

**SA Step 1** has achieved its overall goals and the SA website has operated since October 2006, serving as a good demonstration project to share disaster-related information obtained by several earth observation satellites. SA has moved to Step 2 from 2008, enhancing and strengthening its activities based on lessons obtained by Step 1.

#### Framework

SA is promoted with cooperation amongst the space community (APRSF), the international community (United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), United Nations Office for Outer Space Affairs (UNOOSA), the Association of Southeast Asian Nations (ASEAN), the Asian Institute of Technology (AIT) and others), and the disaster reduction community (the Asian Disaster Reduction Center (ADRC) and its member organizations). To support the implementation of the SA project, a Joint Project Team (JPT) was organized. Membership of the JPT is open to all disaster prevention organizations and regional/international organizations that are prepared to contribute their experiences and technical capabilities and wish to participate in technical aspects of disaster information sharing activities. The JPT consists of 62 organizations from 24 countries/regions and international organizations. The Japan

Aerospace Exploration Agency (JAXA) is a secretariat of the JPT.

The main activities of SA are as follows:

*Emergency observation in case of major disasters* by Earth observation satellites via observation requests of JPT and ADRC members. In case of major disasters in the Asia-Pacific region, emergency observation requests of JPT members and ADRC members are passed to space agencies through the ADRC.

*Working group (WG) activities focusing on specific disasters*, such as wildfires, floods and glacial lake outburst flood (GLOF). Wildfires are a major and recurring phenomenon affecting many countries in the region. The effects of wildfires have substantial bearing on global warming and wildfire management is an urgent task in the mitigation of global warming.

Flooding affects many countries in the Asia-Pacific region. The WG will contribute to the mitigation of flood disasters in Asia by utilising satellite, GIS, and information network technologies to share information on flood risks and disasters among national and international organizations, including the Sentinel Asia information-sharing platform.

To expand Step 1's focus on wildfires and floods, the GLOF Monitoring WG was initiated at the second JPT meeting of Step 2 held in Bali, Indonesia, in July 2009. Focusing on projects conducted by ADRC in Bhutan, and Keio University in Nepal, it will use satellite images of glacial lakes to monitor and establish early warning systems in risk areas and generate hazard risk mapping for glacial outburst flooding. Information will be shared through the SA infrastructure, along with local awareness and knowledge transfer through capacity building.



Image: JAXA

The 6th Sentinel Asia System Operation Training by JAXA, hosted by GISTDA in Thailand, in July 2010

*Capacity building* for the use of satellite images and human resources development for disaster management. This will involve developing human resources and a human network to utilize the information provided by SA.

Some issues arising in Step 1 will need more work to resolve:

*Data transmission* — There are narrow-band areas in Asia where it is hard to see information via the Internet, particularly Web-GIS.

*Value-added information* — Users of disaster management organizations request easily comprehensible interpretations from satellite images rather than satellite data, while users of space agencies and institutes request GeoTIFF data and/or raw data for their analysis.

*Robust and user-friendly information-sharing platform* — Construction of the Step 1 website system caused suspension of operation several times due to server maintenance and other issues.

*Human network* — A good human network between the space and disaster management communities has been recognized to be the most fundamental underpinning of the project.

## **Sentinel Asia Step 2**

Taking the lessons learned from Step 1 into account, SA Step 2 has been enhanced and expanded as follows:

### *Participation of various satellites in emergency observation*

In addition to Earth observation satellites such as the Advanced Land Observing Satellite (ALOS) of JAXA, MTSAT-1R of JMA and Indian Remote Sensing Satellites (IRS) of the Indian Space Research Organization (ISRO), new Earth observation satellites such as the Korean Multi-purpose Satellite (KOMPSAT) of the Korea Aerospace Research Institute (KARI), Thai Earth Observation System (THEOS) of the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand, and FORMOSAT of the National Applied Research Laboratories (NARL) of Taiwan have joined. These organizations are called the Data Provider Node (DPN) of SA, and the satellites are called 'Sentinel Asia Constellation'.

### *Improvement of access to information*

In addition to information sharing via the Internet in Step 1, the wideband Internetworking Engineering Test and Demonstration Satellite (WINDS) satellite communications has been introduced to facilitate access to disaster-related information. Regional servers mirroring the central server in Japan have already been set up in Thailand, the Philippines, Taiwan, Mongolia, Nepal, Vietnam, Fiji and Indonesia. Any of those servers can be accessed by users for the purpose of viewing the SA website or downloading data. During disasters, large volumes of satellite imagery can be distributed to organizations handling emergency situations as well as those analysing satellite imagery, using WINDS satellite communications and the Internet.

### *Information-sharing platform*

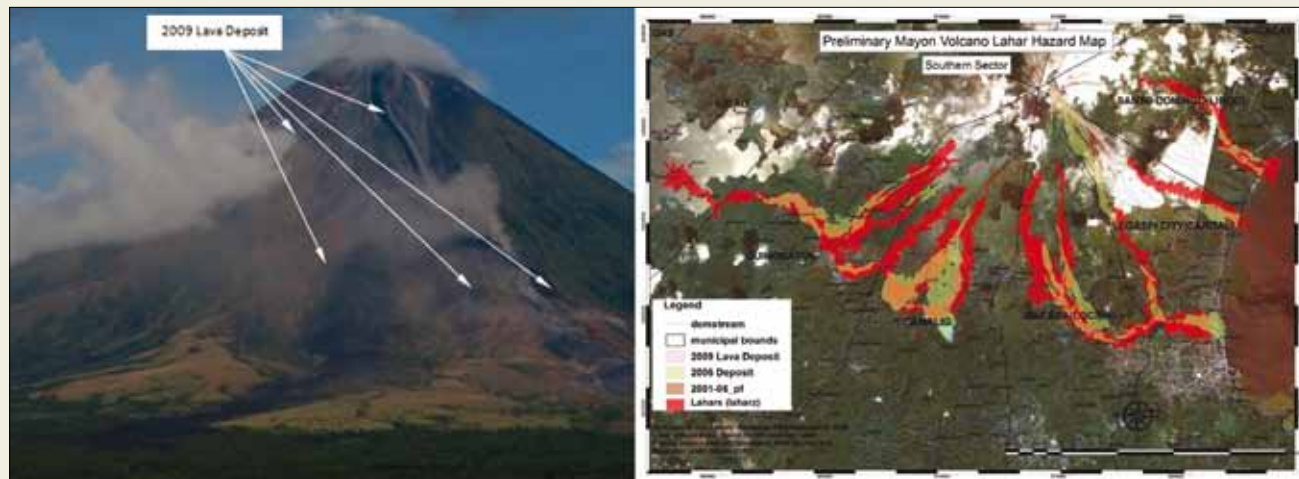
A new Step 2 information-sharing platform has been developed by JAXA. This is a Web-GIS with centralized data at JAXA in Japan, while the Step 1 information-sharing platform was constructed using Digital Asia Web-GIS of Keio University with dispersed data at each data provider. The Step 2 platform is a robust system with redundant construction and centralized data management at JAXA. It has also a function to limit data viewing according to the data policy of the data provider.

### *Value-added information*

A new framework of satellite data analysis, the Data Analysis Node (DAN) of SA, has been organized to provide analysed images and easily comprehensible interpretations from images. AIT, ADRC, International Center for Integrated Mountain



### Example of Disaster Risk Reduction



Eruption of the Mayon Volcano in the Philippines in December 2009 and lahar hazard map used for an evacuation alarm to alert residents

Source: PHIVOLCS

Development (ICIMOD), the Centre for Remote Imaging, Sensing and Processing (CRISP) of National University of Singapore, the Central Asian Institute of Applied Geosciences (CAIAG) of Kyrgyz, China Earthquake Administration, the National Institute of Aeronautics and Space (LAPAN) of Indonesia, Ministry of Natural Resources and Environment (MONRE) of Vietnam, the National Center of Space Researches and Technologies (NCSRT) of Kazakhstan, the Survey Department of Sri Lanka, Ministry of Disaster Management of Sri Lanka, Agency for the Assessment and Application of Technology (BPPT) of Indonesia, and Manila Observatory of the Philippines have joined the framework. In case of emergency observation, the DAN members analyse the satellite data (raw data in principle) provided by the DPN together with their own data, such as local maps, and make value-added products.

The following steps will need to be followed to make the best use of data:

- Cooperation for disaster risk reduction in the preparedness phase in addition to post-disaster phase activities
- Regional cooperation including end-users
- Human resources development and human network.

#### Expansion of activities into disaster risk reduction

In addition to disaster management in the response phase, mitigation and preparedness activities are planned. Hazard maps, a fire danger rating system (FDRS) for wildfire alert, and an early warning system for GLOF are being studied.

#### Regional cooperation

For the purpose of utilizing information provided by Sentinel Asia, regional cooperation focusing on specific countries/areas is essential. For example, in the case of wildfire management, a JICA/JST project has been initiated for wildfire and carbon management in peatland in Kalimantan, Indonesia.

We have already started an activity, Sentinel Asia Success Story (SASS) — a cooperation with the Philippines to create hazard maps using ALOS data. During the eruption of the Mayon Volcano in

December 2009, this SASS framework worked very well. The lahar hazard map, prepared beforehand by SASS, was updated by the Philippine Institute of Volcanology and Seismology (PHIVOLCS) using ALOS imagery observed after the eruption, and the updated hazard map was used for an evacuation alarm to residents.

#### Working together with other initiatives

Collaboration for emergency observation in the Asia-Pacific region between SA and the International Charter for Space and Major Disasters (IC) was agreed at the JPT meeting held in Bali, Indonesia in July 2009. In the event of an activation of SA emergency observation, SA can also activate the IC in order to increase the satellite resources to observe disaster-affected areas.

#### Human networks

For the purpose of building and strengthening human networks, SA system operation training is to be held by JAXA once or twice a year in cooperation with AIT, ADRC, ISRO, GISTDA, NARL and others.

Sentinel Asia has been developed steadily since operations began in October 2006. Based on the valuable lessons learned in Step 1, SA has moved to Step 2, enhancing and strengthening its activities. A good human network is the foundation of the project.

Wildfires and floods are global issues that call for a cooperative approach by the international community. SA is a dedicated initiative for the Asia-Pacific region, but its concept can be extended to a new idea of Sentinel Earth — a kind of 'Aufhebung' from existing initiatives. Using current space-based disaster management initiatives, Sentinel Earth has the potential not only to cooperate and create synergy among existing initiatives, but also to initiate new activities for areas not covered by them.



# One horn of the cow: an innovative GIS-based surveillance and early warning system in pastoral areas of Sahel

*Frédéric Ham, Thierry Métais, Patricia Hoorelbeke, Erwann Fillol, Amador Gomez and Philippe Crahay, Action Contre la Faim International*

**R**ain marks the beginning of the year for the pastoralists in Sahel. This region is characterized by a short rainy season taking place generally from July to October, and a dry season the rest of the year. Pastoral livelihoods consist of extensive breeding systems, in which mobility allows the best use of available grazing and water sources and market opportunities. The rains determine the pasture and surface water availability in pastoral areas throughout the year. These two essential resources for pastoralists and their herds are replenished during the rainy season and progressively depleted during the dry season that follows. In Sahel, rainfall varies considerably from one year to another and from one area to another, as illustrated by the Touareg proverb: ‘In Sahel, rain falls on one horn of the cow, but not the other’.

In such a context of high spatio-temporal rainfall and resources variability, the mobility of pastoralists is a crucial strategy. Mobility is shaped too by others factors, such as markets, customary and

institutional access rules, diseases, security conditions or conflicts.<sup>1</sup>

Poor rainfall leads to pasture and water shortages in Sahelian drylands, which negatively affect animal production and can eventually result in the death of livestock or entire herds. This in turn leads to deterioration of the food and nutrition security of pastoral populations, as they lose precious sources of nutritious food, such as milk, and their main source of income. The situation is particularly critical when large areas are affected by droughts, when two successive low-quality rainy seasons take place, or when mobility to areas with more resources is restricted.

The Sahel region experienced large shifts in rainfall patterns over recent decades, with severe consequences for livelihoods. The droughts and famines during the 1970s and 1980s were associated with some of the sharpest declines in rainfall in recorded history.<sup>2</sup> More



Mobility allows the best use of available grazing, water sources and market opportunities

Source: ACF Niger



Source: Samuel Hauenstein Swan

Crises can be prevented by timely and reliable drought risk information

recently, the poor rainy seasons of 2004-5 in Mali and Niger and in 2009-10 in Eastern Sahel contributed to major livelihood and food crises among vulnerable households. The Famine Early Warning System Network (FEWSNET) estimated that 20 per cent of pastoralists in Niger lost 80-100 per cent of their livestock in 2010. Future climate patterns in Sahel are unclear for now, but climate change models suggest increasing variability and unpredictability in the pastoral areas.

Past droughts were traditionally addressed through a sharp increase in humanitarian assistance, focusing mainly on life-saving and food assistance. From reactive post-crisis responses, local, national and international institutions in West Africa are moving towards more proactive disaster prevention work. Early warning systems represent one pillar of these disaster risk reduction (DRR) strategies.

### **The GIS-based surveillance and early warning system in Sahel**

In West Africa, the existing food security surveillance and early warning systems mainly focus on sedentary populations and Sahelian pastoral areas and remain relatively inadequate. Developing efficient systems in these areas represents a serious challenge because of their natural and social specificities. In fact these vast areas are characterized by a low demographic density, a high spatio-temporal variability of rains and resource patterns and the mobility of pastoral households.

The Action Contre la Faim (ACF) International and its partners have progressively developed an innovative pastoral surveillance and early warning system at national and regional levels. The aim of this system is to prevent humanitarian, food and nutrition crises in Sahelian pastoral areas through the provision of timely and reliable

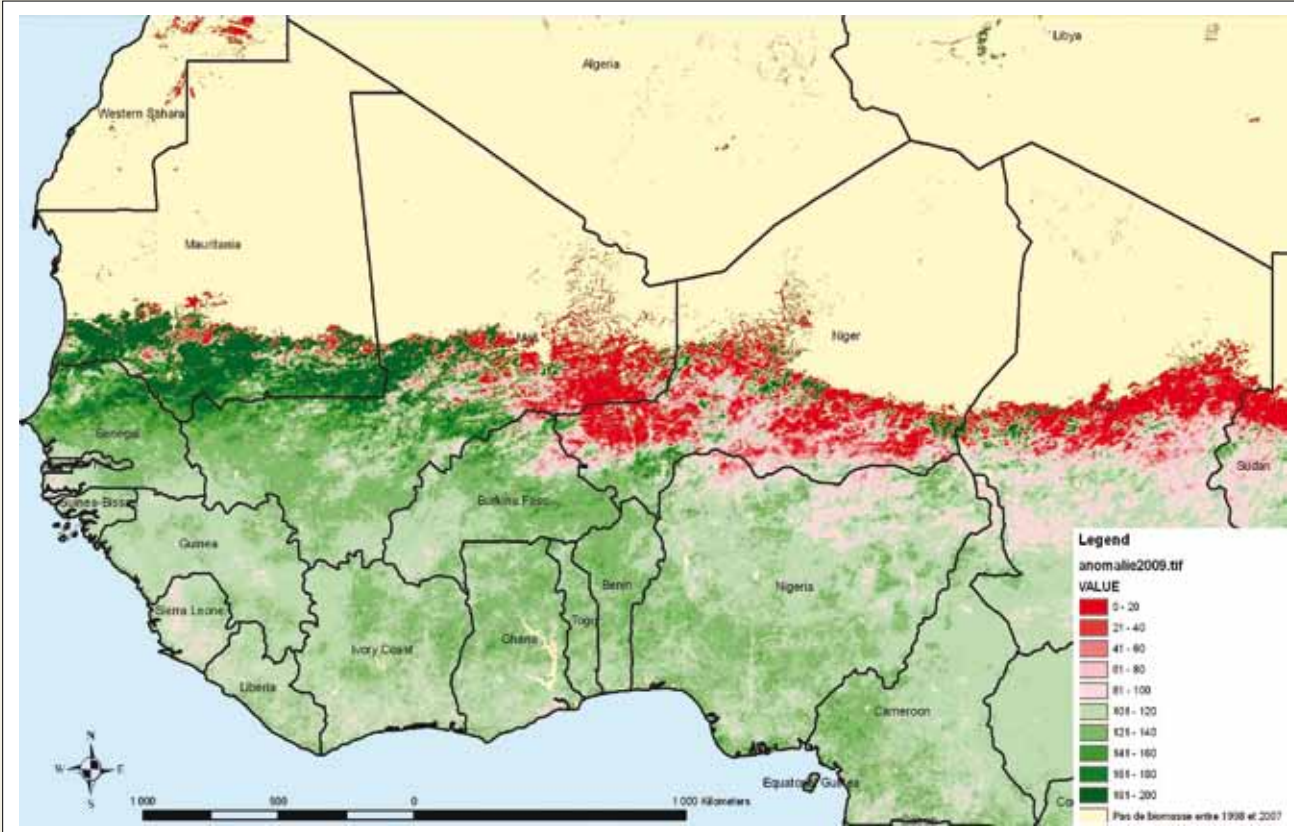
drought risk information to local, national and international stakeholders.

The system was first implemented in Mali and Niger in collaboration with national governmental agencies and international institutions, and it is now being extended to Mauritania, Burkina Faso and Chad. It contributes to the second Priority for Action of the Hyogo Framework for Action 2005-2015, which is to *identify, assess and monitor disaster risks — and enhance early warning*.

The ACF pastoral surveillance and early warning system monitors the relative abundance or scarcity of biomass (a proxy-indicator of pasture availability) and of surface-water bodies at national and regional level, using remote sensing data and geographic information systems (GIS) technologies. Remote sensing data used are free and near real-time downloadable through the internet, and they require field tests and field checks. The ACF GIS-based system can also take into account other 'layers' of information on top of biomass and water, namely the movements of pastoralists and their concentration and transition areas. These data are generally collected at local levels, in areas of interest, through field assessments and brainstorming with pastoral experts.

GIS technologies represent powerful tools to analyse the availability and evolution of essential pastoral resources at national and regional levels. In fact they allow the timely and efficient monitoring of vast areas, where high spatio-temporal resource vari-

### Biomass anomaly, rainy season 2009. West African Sahel



Source: ACF International and VITO

ability prevails. The ACF pastoral surveillance and early warning system has benefited from a series of local-level assessments and studies aimed at achieving a better understanding of pastoral vulnerabilities.

The GIS-based surveillance and early warning system has been progressively improved over the years — and it is still being improved today. The ACF system can provide useful indications of the vulnerability of pastoral populations or warn of possible disasters and food shortages resulting from drought. It can also be used to target the most drought-affected populations. The National Early Warning System (SAP) in Mali and Niger and the Livestock Ministry are now the main users of the system (<http://www.sapmali.net>).

During the 2004-2005 crisis affecting Mali and Niger, the system was used to support the Mali SAP in identifying the most vulnerable areas and to assist operational agencies (such as the United Nations World Food Programme and non-governmental organizations) to target the most vulnerable areas in an appropriate way. In 2009-2010, ACF again supported the Mali SAP in targeting the vulnerable areas. The maps produced have been overlaid with data on movement patterns gathered from local partners and associations. At this time, the security context in Sahel worsened, and using satellite imagery has been considered as a suitable option to avoid threats while collecting ground data. In both cases, the surveillance system has proved its efficiency and allowed a quicker and sharper response to support vulnerable people and livestock, thus avoiding food and nutrition crises.

#### Collaborative efforts towards an early warning system and DRR

The ACF system has been progressively developed and implemented in partnership with multiple partners including local, national, regional and international governmental institutions and research centres. These partners include the breeders associations and corporate bodies, National Early Warning System (*Systèmes d'Alerte Précoce* or SAP) and the Livestock Ministries in Mali and Niger (at present the main users of the system); the Agrhyment centre in Niamey (Niger); the Institute of Research and development (IRD) in Bamako (Mali) and the Research Group for Rural Development (GRDR) in Nouakchott (Mauritanie).

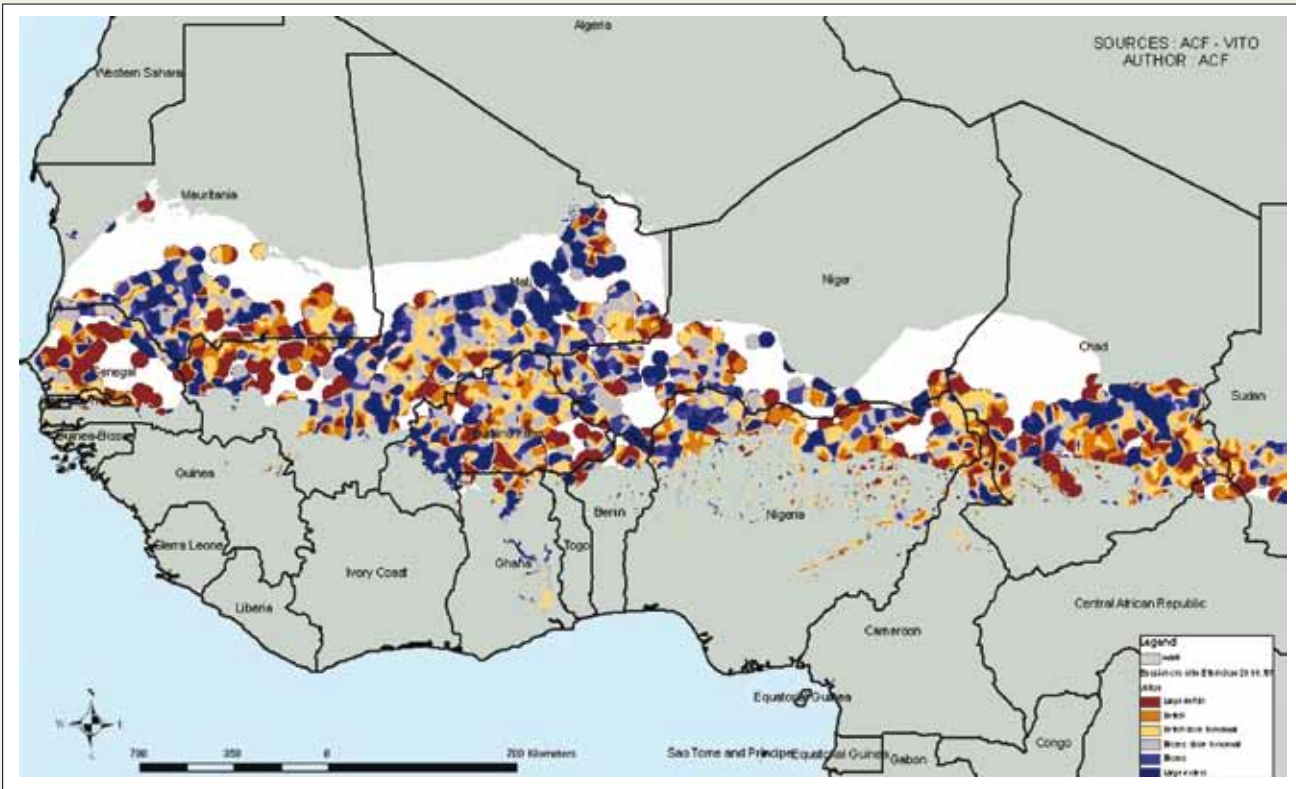
ACF is at present building more partnerships, in Sahelian countries and also at international level, for example with the University of Louvain La Neuve (Belgium) and University of Geneva (Switzerland), the Joint Research Centre of the European Commission in Ispra, Italy and the *Vlaamse Instelling voor Technologisch Onderzoek* (VITO) company in Belgium (which produces digital data and makes them available to users on the internet).

#### Future developments

The GIS-based surveillance and early warning system can be improved, particularly since currently, existing tools and methods only provide macro-level analyses,



**Surface water anomaly, 11 September 2010. West African Sahel**



Source: ACF International and VITO

and thus fall short in providing an understanding of pastoral vulnerabilities linked to relevant and sustainable responses at the local level. The two priority axes for improvements include the following.

*Improving pastoral analysis frameworks in Mali, Niger, Mauritania, Chad and Burkina Faso*

This axis targets the five project countries in the Sahel, and specifically entails the adaptation and development of the technical component of the GIS tools, such as satellite imaging and information tools, and ensuring full operational coverage of all technical components within the five Sahel countries (these include pastoral movement mapping, transition and concentration areas, water points and villages, and social movements). The existing analytical frameworks are mainly focused on evaluation of available pastoral resources, and while they enable early warning, they are unable to transform the information into actionable preparedness and response plans. Planning an appropriate humanitarian response in these countries requires a sound knowledge of the affected populations, the degree to which they are affected, and what their coping strategies will be. Developing new tools and improving existing ones, including gathering additional qualitative information, will allow for a more clearly defined and robust approach to planning for preparedness and response to humanitarian crises.

*Initiating the handover of improved tools to national and sub-regional bodies in charge of DRR and early warning systems*

The second axis focuses on providing the following resources to national and sub-regional services:

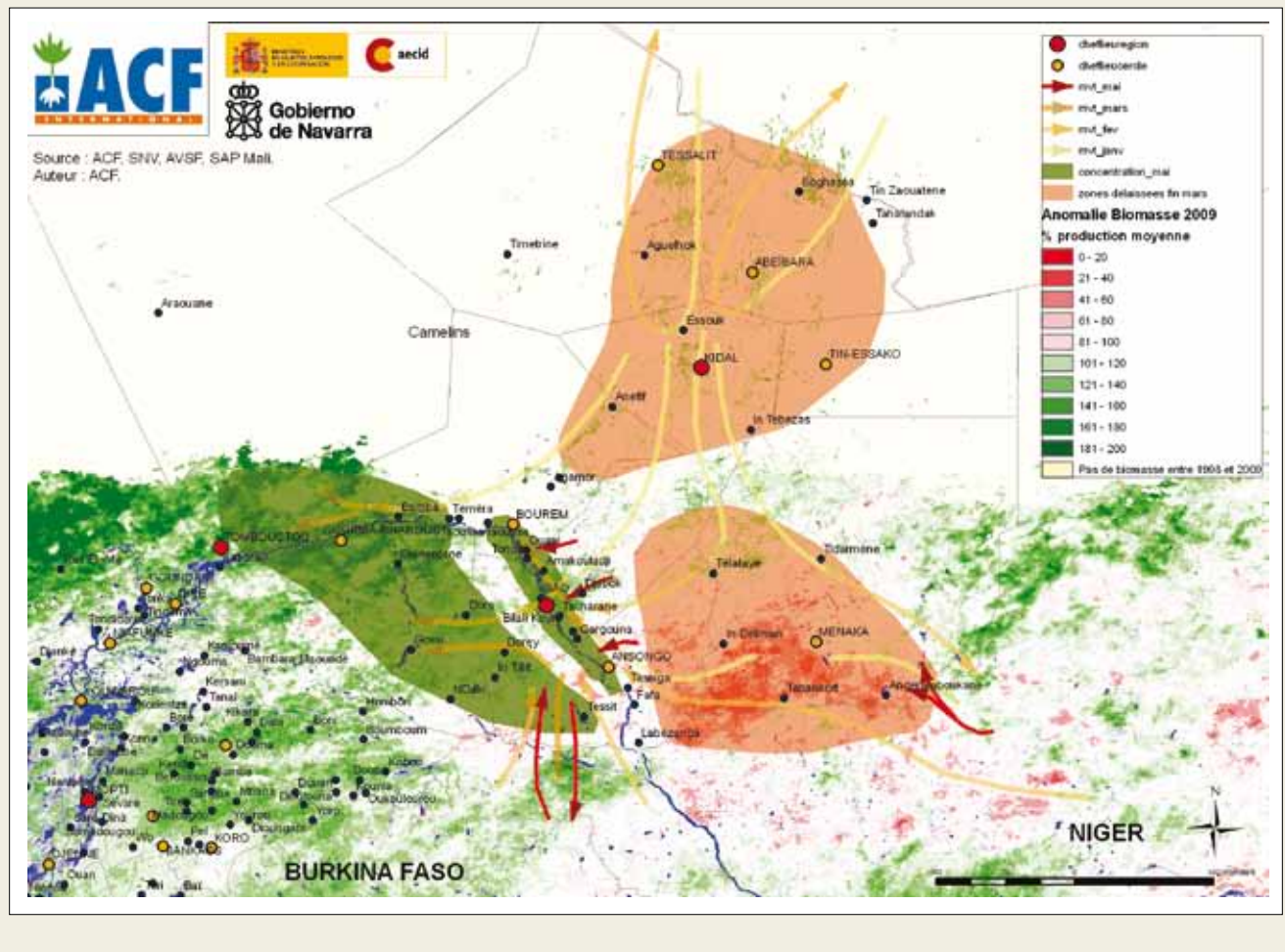
**Components of the ACF pastoral surveillance and early warning system**

The ACF pastoral surveillance and early warning system involves two computer-based tools developed by ACF, integrating satellite images with water and vegetation data. The Biogenerator tool allows the calculation of available vegetation, and the Hydrogenerator tool analyses surface water bodies and their evolution throughout the year. Both tools allow for a semi-automated biomass and surface water monitoring, which directly relates to the vulnerability of pastoral populations on a regional scale, hence contributing to improved early warning for pastoral areas.

- The tools and methods to lead in the surveillance, development, and management of pastoral areas
- Simplified tools and proven methodologies for improved access to essential information relevant for monitoring and evaluating pastoral resources, providing recommendations, and planning interventions.

The active involvement and participation of affected communities and stakeholders remains critical for the development of the tool itself, and specifically for transforming early information into real action and positive impacts at field level.

## Movements and vulnerable zones in the regions of Gao and Kidal, May 2010



Source: ACF International, SAP Mali, SNV and AVSF

### Biomass monitoring

In the north Sahelian context, the pasture growing period finishes a few weeks after the end of the rainy season. After that, it's possible to set up the pasture balance of the area for the current year. A computer-based tool developed by ACF and called the Biogenerator uses satellite images to estimate biomass production throughout the whole studied territory at the end of the rainy season. The result is the total dry matter production of the considered year, expressed in kilograms of dry matter per hectare. In addition, the tool produces anomaly maps that show the difference between the current year biomass production and the mean value calculated on the available time series data (1998-2011). Areas highlighted in red represent areas with lesser biomass availability, and those in green represent areas with higher biomass availability comparative to the mean value.

### Surface water monitoring

In the pastoral context in Sahel, water is a fundamental resource for breeders and cattle. Depending on the area, wells, boreholes, water ponds or rivers can provide the required water to animals and people. Water is not systematically available next to the grazing places, in which case cattle have to realize short-cycle movements to get the required water. The Hydrogenerator, developed between

2009 and 2010 by ACF, considers surface water bodies and their evolution throughout the year. The tool realizes a decadal sum of detected cells and represents a cumulative surface water detection map for the period between 2000 and 2010. For one given year, the tool also produces a surface water accessibility map which helps to characterize pastoral zones, considering distance to water sources and their relative influence on a 30-kilometre buffer ring around the detected cells.

### Concentration area mapping

Pastoral movements and concentration areas may vary considerably in response to available resources. However, 'usual' movements can be determined and compared to the actual movements of the considered year in order to get a better understanding the possible adaptive strategies of breeders, and to anticipate the difficulties people could face some time later. These mapping activities have been realized empirically in Mali and Niger thanks to the expertise of pastoralists, scientists and experts in Sahelian pastoral systems. Participatory mapping workshops led to the validation of these works in 2010.

# Responding to climate change: community capacity-building for comprehensive disaster reduction

Zhang Xiaoning, Secretariat of the Office of the State Committee and  
Yang Peiguo, Department for Science and Technology Standards, National Disaster Reduction Centre of China

**C**ommunity is at the forefront of disaster prevention and reduction, with a key role to play in risk prevention and response to disasters. Therefore, enhancing the capacity of communities to prevent and reduce disasters is a matter of great importance. The Chinese Government attaches great significance to the work of communities to prevent and reduce disasters, and is permanently committed to the overall improvement of the communities' capacity for comprehensive disaster prevention and reduction.

Global climate change has led to the frequent occurrence of natural disasters caused by extreme weather and climate events. In addition,

community disaster reduction work in China now faces a more complex environment. Due to the weak infrastructure in place for disaster prevention and reduction, the need to enhance public awareness on disaster reduction, and the wide gap in the resources invested in community disaster reduction, community capacity-building for disaster prevention and reduction in China remains a challenging task.

In recent years, the Chinese Government has followed the guidelines for disaster reduction identified in the Hyogo Framework for Action, and has been carrying out work with a close focus on improving the capacity of community disaster reduction, achieving great results.

## National development policies

Work on community disaster reduction has been incorporated into national development policies. In recent years, documents issued by the Chinese Government have listed community disaster work as an important element. These documents include the following:

- Opinions of the State Council on strengthening and improving community services
- Opinions of the State Council on comprehensively strengthening emergency response
- Eleventh Five-Year National Plan for comprehensive disaster reduction
- Opinions of the General Office of the State Council on strengthening the competence of grass-roots emergency response personnel.

The documents require governments at all levels and various relevant departments to strengthen the community contingency plan, the competence of personnel and infrastructure, in order to improve disaster reduction work.

## Community disaster reduction projects

A large number of community disaster reduction projects have been implemented under the Chinese government. Focusing on community capacity-building for disaster reduction, the Chinese Government has



Earthquake drill in a school

Image: Makou community in Sichuan province





Image: Haikougang community in Hainan province

Drills help local children understand what to do in the event of disaster

implemented a series of projects for community disaster reduction. Examples of these projects include the following.

*Project for the renovation of decrepit buildings for poverty-stricken people in rural areas* — since 2005, RMB17.5 billion has been invested and 5.8 million units have been renovated or built for poverty-stricken people in rural areas, benefiting 1.8 million households or 6.5 million individuals.

*Project for the renovation of decrepit buildings for primary and secondary schools* — from 2001 to 2005, the central department for finance has earmarked a fund of RMB9 billion for the renovation of decrepit buildings for more than 40,000 primary and secondary schools in rural areas. Since 2006, the nationwide maintenance and renovation of buildings for primary and secondary schools at the stage of compulsory education in rural areas has been included in the funding system for compulsory education in rural areas.

*Project for the safety of buildings in primary and secondary schools* — since 2009, efforts have been made in anti-seismic consolidation and capacity-building for comprehensive disaster prevention in primary and secondary schools throughout the country, to ensure that school buildings meet the seismic safety standard for key seismic-proof buildings and the safety requirements for the prevention of disasters and risks of landslides, rock falls, mud-rock flows, tropical cyclones, fires etc.

*Project for the fortification of construction and engineering facilities* — efforts have been made in improving the seismic safety evaluation and management system for major construction projects; in promoting the implementation of seismic safety projects for rural residences; and in the construction, renovation or reinforcement of about 2.45 million units of earthquake-proof housing.

### **National demonstrating communities for comprehensive disaster reduction**

The State Committee for Disaster Reduction has issued a set of ‘Standards for national demonstrating communities for comprehensive disaster reduction’ to elaborate the indicators for disaster reduction and promote the work on community disaster reduction. The standards take into account the current situation of disasters and actual conditions of communities with a focus on the working system for community disaster reduction; investigation of potential disaster risks; contingency plans for comprehensive disaster prevention and reduction; the construction of disaster reduction facilities and shelters; publicity, education and rehearsal of disaster prevention and reduction; and the development of disaster reduction volunteers. As of 2010, a total of 1,562 ‘national demonstrating communities for comprehensive disaster reduction’ have been created, greatly enhancing the capacity of communities for disaster reduction.

### **Publicity and education**

A community-focused programme of publicity and education on disaster prevention and reduction has been carried out. In 2009, the Chinese Government designated 12 May as the National Day for Disaster Prevention and Reduction. It has carried out activities to publicise and provide education about mass



Image: Huaxia community in Guangdong province

Sharing information on disaster risk reduction

disaster prevention and reduction, focusing on the National Day for Disaster Prevention and Reduction and the International Day for Disaster Reduction.

The theme of 'Disaster reduction from communities' was identified for the National Day for Disaster Prevention and Reduction in 2010. A wide range of publicity, education and rehearsal activities on disaster prevention and reduction were carried out on a large scale in communities throughout the country, effectively enhancing public awareness about disaster prevention and reduction, skills for disaster prevention and self-help.

### Future focus

Disaster reduction is an important measure in adapting to climate change, and community disaster reduction is a top priority in the work on disaster reduction. In the coming years, the Chinese Government will continue to improve the capacity of communities for disaster reduction, focusing on the following aspects.

*Place more responsibilities for community disaster reduction on governments at all levels* — efforts will be made to strengthen awareness of the importance of community disaster reduction, implement the various measures for the work in this respect, increase investment in disaster reduction in economically backward communities, strengthen the construction of facilities and equipment for community disaster reduction, and create at least 5,000 national demonstrating communities for disaster reduction in 2011-2015.

*Continue to improve the working mechanism for comprehensive coordination of community disaster reduction* — the role of village (neighbourhood) committees will be given full play. Their sound organic systems and solid foundation of work will be used, and these committees will be directed

and supported to work with other community organizations, garrisons, social service institutions and social work institutions in community disaster reduction. This will form a good coordination mechanism for comprehensive disaster reduction in communities and ensure the organization and leadership of the work on community disaster reduction.

*Actively promote the development of organizations and volunteers for community disaster reduction* — measures such as service outsourcing or purchase will be adopted to foster and support civil organizations engaging in disaster reduction and relief, and direct them to participate in community capacity building for disaster reduction. Development of volunteers for community disaster reduction will be strengthened and volunteer activities related to community disaster reduction will be carried out to improve the vitality of the community disaster reduction.

*Vigorously carry out publicity and education on community disaster reduction* — efforts will be made to form a mechanism for publicity and education and to develop it into a regular work. More attention will be paid to the needs of the people to:

- Carry out publicity, education and rehearsals for disaster prevention and reduction in popular forms
- Promote general households to be equipped with materials for disaster prevention and reduction
- Spread knowledge of disaster prevention and reduction as well as risk prevention and self-help, so as to minimum the risks for and losses in disasters.



# Assessing future risks: climate change adaptation based on the Hyogo Framework for Action

*Dag Olav Høgvold, Senior Adviser at the Norwegian Climate Adaptation Programme and HFA Focal Point, Directorate for Civil Protection and Emergency Planning, Norway*

**T**he Norwegian Climate Adaptation Programme, established in 2007 and coordinated by an interministerial group headed by the Ministry of the Environment, recently launched an online guide for climate change adaptation (2010), targeted towards municipal planners and decision makers. The guide suggests that local strategies for climate change adaptation should follow the five priorities set forth in the Hyogo Framework for Action (HFA).

## Adopting the Hyogo Framework for Action

An important goal for Norway's climate adaptation strategy is the integration of adaptation into existing planning processes, adjusted to needs at the local level. The principles of subsidiarity, similarity and responsibility, cornerstones of Norway's work on disaster risk reduction, also

apply to climate change adaptation: the impacts of climate change should be handled as locally as possible, within existing organizational structures, and should not lead to any changes in responsibility.

Municipalities play a key role in the implementation of disaster risk reduction policies, as they are responsible for preparedness as well as prevention and have access to the tools and mechanisms required to fulfil these duties. The need for climate change adaptation to be integrated into municipal plans and strategies is outlined in a green paper on adaptation presented by the Norwegian government in 2010.

The close links between disaster risk reduction and climate change adaptation makes the HFA a very relevant



Image: Dag Olav Høgvold

Spring tide in Tønsberg, Norway



set of hands-on guidelines for adaptation at local level. Adopting its five priorities, and applying them to climate change adaptation, gives local planners a suitable framework for an overall strategy on climate change adaptation.

### **Priority 1: Integrating climate change adaptation into planning processes**

The first priority of the HFA is to ensure political and administrative commitment for disaster risk reduction at national and local levels. The same goes for climate change adaptation: in order for an adaptation strategy to be successful, political awareness and commitment are essential. Communities may see climate change and its impacts as affecting only people in other parts of the world, and political leaders may even deny the fact that the climate is changing. Raising awareness among planners and decision makers is a necessary first step for adaptation.

Although the goal is to integrate climate change adaptation into existing plans, priorities must be set and commitments made on a much longer-term basis than is the norm, encompassing a time span of 50 or even 100 years. This requires consistency over time, independent of shifting political leadership and social changes. Just as for disaster risk reduction, the goal should be for adaptation to be integrated into planning processes on a permanent basis.

### **Priority 2: Risk identification: assessing climate vulnerability**

Traditional risk and vulnerability assessments define the current risk level, given today's climate. The difficulty lies in assessing how climate change will affect the risk level over time. In most cases, climate change will probably increase the risk level, but by how much?

In many cases, knowledge about the *direction* of climate change is sufficient. Technical engineers may request more detailed projections in order to determine the dimensions for drainage systems or flood

barriers, but adapting to more frequent and extreme precipitation also implies finding new ways to prevent flooding, or treating the extra water as a resource, not a problem. The use of spatial planning as a tool for adaptation allows for non-technological solutions such as green spaces in urban areas, water retention structures, open waterways, utilization of vegetation to absorb water and the construction of new buildings and infrastructure on less vulnerable sites.

More detailed projections are sometimes needed, for example when it comes to rising sea levels. In 2008, the Norwegian Climate Adaptation Programme issued a report on expected sea levels in Norway for the years 2050 to 2100 (revised version 2009). The report provides projections for all coastal municipalities, taking account of uncertainties and including predicted storm surges. In following up this report, the programme secretariat has devised an approach that covers:

*Risk and vulnerability analysis related to the current sea level and storm surge level* — This gives an indication of the current risk factors for existing buildings and structures, as well as for planned developments, independent of future climate change.

*Overview of the consequences of rising sea levels and future storm surges* — This involves visualizing different sea levels on a thematic map, incorporating local knowledge about wave height, sea currents, wind directions and topography. It identifies areas that will definitely be flooded on a permanent basis, those likely to be



Image: Trond Isaksen

Island and cloud, Northern Norway



Image: Erik Bleiken

Winter, Oslo Fjord, Norway

frequently flooded, and those that will be affected by storm surges. The overall picture can be compared with maps showing existing buildings, infrastructure and installations in the affected areas.

*Definition of required measures* — Both existing buildings and infrastructure and potential new areas to be developed should be considered. For existing structures, strategies might involve relocation, technical installations or retrofitting, warning systems and evacuation procedures. In this phase, risk is assessed with reference to the types of buildings and installations that will be affected. For example, a storage facility does not require the same risk precautions as a school or a hospital.

Norway's Planning and Building Act enables the definition of zones that require special attention. Building restrictions can be applied to such areas for which local authorities find it necessary to carry out more thorough risk assessments, or where special building codes may apply in order to maintain safety. Flood risk, landslide risk, threatened biodiversity and cultural heritage can all be used to define these zones.

### **Priority 3: Using available knowledge**

It is important to be aware that climate projections provide *knowledge*, not *answers*. Projections must be combined with local knowledge (for example, about the potential impact of heavy precipitation). In a city, which areas will be flooded? Which areas can absorb the water through vegetation and soil? Are there areas exposed to landslides? Will planned new areas affect the risk level? If research shows that precipitation can be expected to increase dramatically over the coming decades, planners must include what they already know about such local impacts. Similarly, knowledge about expected sea level rises must be combined with local data regarding sea currents, wave heights and other factors.

Municipal planners must have detailed knowledge about their own institutional and political frameworks if risk and vulnerability analyses

are to take into account which parts of the organization are the most critical, and which ones are most exposed to risk. Planning processes, legislation, institutional setup, social structures and social demands affect the outcome of adaptation strategies. When integrating the different types of knowledge needed to develop and implement adaptation strategies, climate projections are just one piece of the puzzle.

The website *klimatilpasning.no* has been developed to give municipal planners the background knowledge they need to get started. The Norwegian Climate Adaptation Programme uses the website as its main communication channel for disseminating research results and sharing experiences. It includes information about relevant legislation and policies and guidance material, such as the online guide on adaptation. Together with a general course on adaptation, also provided by the programme, the website is an important tool for local planners.

### **Priority 4: Reducing risk factors that lead to higher climate vulnerability**

Climate vulnerability is not only caused by climate change but is in many cases a result of human activity, which itself increases risk. For example, waterfront urban development can represent a larger risk than the rising sea level, and development on hillsides can trigger landslides, regardless of the amount of precipitation or other types of extreme weather.

Policy instruments in existing plans and legislation must be used to reduce vulnerability, and thereby prevent undesirable effects of climate change. There is currently no overall legal framework on adaptation in



Image: Erik Bleiken

Climate projections are an important part of preparedness

Norway, but several laws and regulations applying to planning processes incorporate climate change adaptation measures. In terms of local planning, these include the Planning and Building Act (2009), the Civil Protection and Civil Defense Act (2010) and the Technical Regulations under the Planning and Building Act (2010).

The Planning and Building Act provides important planning tools and a set of measures that can be used to ensure that climate change is taken into account in the development of new land. It requires municipalities to carry out risk and vulnerability assessments as part of the planning process. The law enables municipalities to define zones that require special consideration, as mentioned above. The flexibility of this arrangement allows for the inclusion of areas that are not currently exposed to risk but may be in the future as a result of climate change.

The Civil Protection and Civil Defense Act underlines the responsibility of municipalities to ensure the safety and wellbeing of their citizens, and to have warning systems and evacuation procedures in place.

The Technical Regulations under the Planning and Building Act concerns the physical design and location of buildings and infrastructure, providing directives for how various types of buildings should be adjusted to different flood levels. When assessing how climate change will affect the risk level for flooding, landslides or higher sea levels, the standards for construction and buildings give very concrete instructions on how to ensure safety.

#### **Priority 5: Strengthening disaster preparedness and response**

A systematic approach to climate change adaptation may not in itself be sufficient. Extreme weather events will continue to occur and communities have to be prepared for them. With climate change, such events may increase, both in scope and frequency, and they may take place in new areas. Having a system for disaster preparedness is therefore essential and cannot be disconnected from an overall strategy on climate change adaptation.

Stakeholders in disaster response need to take climate change into account. Local variations may result in different impacts of climate change. Disaster response agencies may thus face new types of risk in the future, combined with more of the events they experience today, and should take local variations into account in their planning.

#### **Invest today for a safer tomorrow**

The World Bank and the United Nations (2010) emphasize the role of prevention, but argue that effective preventive measures are not always easy to establish. The causes leading to disasters can be many and complex and it may be easier to focus on the symptom (for example a landslide) than on the actual causes (lack of planning, deforestation, poor construction, etc.). Preventive measures (especially the inclusion of disaster risk reduction and climate change adaptation in processes such as spatial planning) are therefore essential to avoid future disasters.

A systematic approach to climate change adaptation is a practical way of enhancing the prevention aspect. By taking the priorities of the HFA as a starting point for climate change adaptation, it can be seen how closely linked these two issues are. In addition to extreme events and disasters, adaptation also covers gradual changes that will affect communities over time, but it follows the same underlying principles as disaster risk reduction. Both are about preventing the undesired consequences of natural hazards, and the main challenge is to integrate them both into all levels of community planning. This requires investment, time and efforts – but it will lead to more resilient communities in the future, in a changed climate.



# Actions for disaster risk reduction through climate change adaptation in Asia and the Pacific

*Dugkeun Park, Senior Analyst, National Emergency Management Agency, Republic of Korea*

**C**ommunities are increasingly exposed to natural hazards in the Asia-Pacific countries and practical resolutions are urgently required for this region, the most vulnerable in the world to climate-induced disasters, including weather-related crises.

From 25-28 October 2010, the National Emergency Management Agency (NEMA) of the Republic of Korea hosted the 4th Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) in Incheon Metropolitan City with the support of the United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat, the Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank and AusAid.

More than 900 people participated in the event, including the prime ministers of Bhutan and the Republic of Korea, 53 ministers and high-level officials from the Asia-Pacific nations, including Japan, China, India, Maldives and Malaysia, and experts from UN agencies and non-governmental organizations.

During the conference, the Incheon Declaration, Regional Roadmap (REMAP) and action plan were deliberated, agreed and

adopted. These were the first regional agreements in the world for disaster risk reduction (DRR) through climate change adaptation (CCA).

The first AMCDRR was held in China, the second in India and the third in Malaysia, with the fifth planned for Indonesia. As the only biennial ministerial conference in the Asia-Pacific region, its purpose is to enhance regional disaster management cooperation and implementation of the Hyogo Framework for Action (HFA) adopted by 168 nations in 2005 for global DRR.

The main theme of the Korean conference, 'DRR through CCA', was chosen to propose Asia's initiatives for climate change adaptation. There is an urgent need to harness international cooperation targeting emerging disasters worsened by possible climate change, not fighting against nature, but adapting to the changing environment.

To share information and technologies for climate change adaptation, it is necessary to establish tangible and practical strategies for DRR in our region. The discussions in the 4th AMCDRR were conducted in three sub-sessions under the main theme:



High-level conferences bring together experts in disaster management to consider the Asia-Pacific region's preparedness for disaster (left: Ms Margareta Wahlström, UN Special Representative for DRR, right: Dr Yeon-Soo Park, Chair of the 4th AMCDRR and Administrator of NEMA)

- Raising awareness and building capacity for DRR and CCA
- Developing and sharing information, technology and lessons learned in climate and disaster risk management
- Promoting integration of DRR and CCA into development for green growth.

Through the Declaration, all participants fully realized the necessity for simultaneous commitment to DRR, CCA and poverty reduction, as stated by the UN Secretary General at the 2009 Global Platform. In promoting development policies, the participating nations and ministers also promised their best efforts for full consideration of DRR and CCA, as well as implementation of HFA.

For this reason, the decision was taken to promote six major key points to improve safety in the Asia-Pacific region with DRR through CCA. As well as the three sub-topics, three additional items were included in the Declaration: promoting implementation of the HFA until 2015, encouraging investment in DRR and CCA, and making every effort to promote resilient cities.

The 4th AMCDRR ensured the continuity of the conference by developing the REMAP and action plan for the implementation of the Declaration. Eighty specific actions were proposed and compiled for the action plan in the REMAP and for the implementation of the Incheon Declaration, and dozens of projects are being formulated, inviting the participation of leading countries/agencies and potential donors.

Some of the actions proposed include strengthening education and training programmes, building a platform for sharing information and technology focusing on DRR and CCA, and making policy guidelines for development, integrating DRR and CCA.

#### **Declaration, Regional Roadmap and action plans**

The Incheon Declaration on DRR in Asia and the Pacific 2010 recognized the increasing impact of disasters in the region in the past two years. These include cyclone Aila in Bangladesh, Bhutan and India; typhoon Morakot in Taiwan Province of China; back-to-back typhoons

Ketsana and Parma in the Philippines, Vietnam, Lao People's Democratic Republic and Cambodia; the earthquake in Padang, Indonesia; the earthquake in Samoa and Tonga and the subsequent tsunami disaster in the Pacific; tropical cyclones Mick and Thomas in Fiji; tropical cyclone Pat in the Cook Islands; the Gaua volcanic eruption in Vanuatu; the heat waves and rampant wildfires in Australia and the Russian Federation; the 'dzud' (extremely severe winter) in Mongolia; the earthquake in Qinghai Province in China; the floods and landslides in Pakistan, China, India and Bhutan; the cloudburst in India and glacial lake outburst floods in Nepal and Bhutan; the earthquake in Christchurch, New Zealand; and the earthquake and tsunami in Mentawai, Indonesia.

To raise awareness and build capacity for DRR and CCA, the Incheon Declaration called on various DRR stakeholders to improve understanding of DRR as delivering evidence-based adaptation actions and strengthening knowledge of climate hazards, vulnerabilities and risks in key socio-ecological systems.

On developing and sharing information, technology, sound practices and lessons learned in climate and disaster risk management, a decision was taken to collect sound practices and lessons learned and to conduct harmonized regional and sub-regional high level meetings to share experiences and promote integration of DRR and CCA.

To promote integration of DRR and CCA into development for green growth, the Declaration also called on various DRR stakeholders to promote the adoption of standard hazard profiles for use by all national and regional stakeholders in development planning processes and to enhance linkages between DRR and CCA institutions at the national level.

All actors were urged to devote the remaining five years of the HFA to implementing its principles in line



Image: NEMA

Participants in the 4th Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) in Incheon Metropolitan City, October 2010



Image: NEMA

The prime ministers of Bhutan and the Republic of Korea attended the 4th Asian Ministerial Conference on Disaster Risk Reduction, along with 53 ministers and high-level officials from various nations

with the five priorities for action and to identifying practical measures to increase commitment, resourcing and efforts for further implementation. States and regional organizations should explore and implement adjustment of directions and priorities needed to take up new opportunities for DRR in relation to climate change.

To promote investments in DRR and CCA, participants were urged to build capacities to track DRR investments and to evaluate the costs and benefits of DRR and consider greater investments in disaster reduction in the region. It was suggested that local implementation of the HFA should be improved by way of encouraging cities and local governments to sign up for global campaigns such as 'Making Cities Resilient: My city is getting ready!'.

Following the Incheon Declaration, the Incheon REMAP and action plan on DRR through CCA in Asia and the Pacific will focus on a comprehensive climate risk management approach. The roadmap is divided into certain priority initiatives that can be achieved in the next two years and others that can be undertaken in the next five years. Any of these initiatives can start at any time during the period of the roadmap. The objective of the roadmap is to establish climate resilient disaster risk management (DRM) systems that contribute to sustainable development at regional, national, sub-national and community levels by 2015.

The development of the action plan was initiated along with the REMAP. The action plan was shared with the UNISDR Asia Partnership (IAP) members and national governments for inputs and suggestions. Substantive discussions held at the 4th AMCDRR further helped refine the strategies and the expected outcomes in the REMAP, which led to changes in the proposed action plan.

The action plan, like the REMAP, is divided into three broad initiatives that can be achieved in the next two to five years. It is further

categorized as per key items (outcomes), sub-items (outputs), projects (activities), location, funds and duration of implementation. Any of the initiatives or activities may be initiated by any of the organizations or countries at any given time during the period of the roadmap.

#### **Maintaining the focus**

During the conference, the ministers invited NEMA, Republic of Korea, in coordination with the Asia and Pacific regional office of the UNISDR and members of the IAP, to carry its messages to the Third Session of the Global Platform on DRR in May 2011 and beyond.

Recommendations from the Declaration will be considered where appropriate within existing policies, strategies and action plans for effectively mainstreaming DRR and CCA into development. International organizations and regional institutions are called upon to provide technical, operational and programmatic support to accelerate the implementation of the HFA in Asia and the Pacific countries, especially national action plans on DRR.

The detailed action plan will be finalised at the IAP Partnership meetings in Jakarta in 2011, and renewed and reported every six months at future meetings. The target dates for the platform and policy guideline are June and October 2011 respectively, and the promotion of the Incheon Declaration, REMAP and action plan will be reported at the 5th AMCDRR in Indonesia in 2012. Through these processes, it is expected that ministers' efforts will contribute to improving the outlook for DRR in the Asia-Pacific nations.



## Karnali, Nepal: the hidden disasters

*Christophe Belperron, Country Representative, Mission East, Nepal*

**N**epal is one of the 20 most disaster-prone countries in the world. The country is exposed to multiple hazards, most prominently earthquakes, floods, landslides, windstorms, hailstorm, fire, glacial lake outburst floods (GLOFs) and avalanches.

Nepal is divided into three ecological belts. The Terai, a flat plain, 70 metres above sea level, where most of the population lives, is mainly affected by large-scale flooding following the monsoon period. The hills, ranging from 100-3,000 metres above sea level, suffer from landslides, mudflows and sometimes epidemic outbreaks, though usually of medium to small scale. Finally, the mountains, from 3,000-8,000 metres altitude, are scarcely populated, but affected with frequent small-scale hazards such as landslide, avalanche, rock fall, and potentially GLOF in certain districts.

The work of Mission East, a Danish NGO, in Nepal, is focused on poverty alleviation in one of the most remote areas of the country,

the Karnali region. Karnali is highly affected by food insecurity, water scarcity and the absence of public services for its isolated communities, living away from any transportation infrastructure and accessible only by walking paths that demand many days of hiking before reaching the communities.

Mission East has instigated disaster risk reduction (DRR) work to complement its poverty alleviation activities after we realized that, in some districts of the region, two-thirds of disaster events are not reported. The difficulty of accessing the region is one cause, but also, the frontier between a disaster and a 'usual' accident of life is unclear in the context of extreme poverty and vulnerability. In its strict definition, a 'disaster' is a serious disruption of the functioning of the society exceeding the ability of the affected people to cope with their own resources. In Humla, one of the five districts of Karnali,



Image: Christophe Belperron

Fatalistic attitudes in the face of natural hazards has decreased



Image: Christophe Bejperron

Living conditions in Humla are extremely hard



Image: Christophe Bejperron

Gothi village, Humla district

the scale of damage is often limited and the district's geographical isolation is so important that affected people have no other choice but to find themselves local resources to aid recovery. So we cannot call the many events that strike the region a 'disaster', compared to larger scale disasters that affect hundreds or thousands of people. However when such events are so regular that the cumulative effect poses a threat to the whole community's development, can we not describe them as a 'disaster'? Because living conditions in Humla are extremely hard, communities do not always inform the authorities, even when cases of death or destruction have occurred. What is linked to a disaster and what is not is thus hard to determine.

In this context, Mission East concluded that, in this inaccessible part of the country, the population was confronted by a 'hidden disaster'. So the organization decided to implement a community-based approach to disaster risk reduction.

Numerous hazards — such as landslides, avalanches, mudflows, lethal epidemic diseases, and fires — occur every year but still remain unrecorded. Disasters such as landslides and mudflows mostly affect assets such as land and livestock, while humans (especially small children and infants with disabilities) are mainly affected by epidemic diseases, due to poor hygiene conditions and limited access to healthcare. Abnormal melting of the snow cap at high altitude can cause an increase in seasonal flooding and destruction of the meagre arable lands that high altitude communities possess. Large-scale threats also exist. Droughts or earthquakes can create a catastrophic situation due to the difficulty accessing the area.

Migration is an important coping mechanism in the region. Men migrate to India to find seasonal work and relieve households from food

insecurity. Although this has been stabilized, thanks to the distribution of food by the government and World Food Programme, this improvement could be jeopardized if the adverse effects of natural disaster increase due to the effect of climate change and its consequences (drought, food/water scarcity, epidemic disease). Because living conditions are extreme, each and every individual is expected to contribute to help keep the community alive. Because of migration, women carry an important share of this work-

#### Community Development report

In 2008, in the community of Majhpatal (Humla district), Mission East, with an important contribution from the community, implemented an ambitious project aiming at connecting water flow from at least eight different sources along a nearly five kilometre long canal. Hundreds of people reportedly showed up to work on the construction site. The project came to fruition and water flowed for about a month until a large landslide completely disrupted the flow. The landslide proved a crushing blow to the community, which had laboured intensively to get the system operating. Members of the community complained that they had done too much work with no impact — "pani chuinchha, janchha" ('the water leaks and goes away'). But this landslide did not affect life or dwellings and it was not reported to District Headquarters.

*From an evaluation report on "Community Development leading to Sustainable Food Security in Humla district, Mid West Nepal", June 2009*





Image: Christophe Belperron

Disasters such as landslides and mudflows mostly affect assets such as land and livestock

load. People affected by impairments owe their survival to close family members and are excluded from the community's social life. They will be the first to be left behind during a disaster.

Addressing disaster in Humla with an inclusive approach is not an easy task. The communities are too isolated to benefit from central support and resources at district level are too far away — accessible only by long days of hard walk — to be rapidly deployed. Disasters are numerous but on too small a scale to attract the attention of the central government.

Each single village in Humla is at risk from natural hazards. Building disaster-resilient communities in Humla could not be a standalone approach. If we estimate the cost/benefit ratio of 3.5 for similar community-based DRR approaches in the lowlands of Nepal (that is, for every Euro spent, there are EUR3.5 of economic benefits), then the cost of deploying emergency equipment and resources, setting up early warning systems, and even building mitigation work in mountain villages is unaffordable, because of the absence of transportation facilities. In such conditions, the best way identified by Mission East to address disaster in a sustainable and financially acceptable way is through mainstreaming inclusive DRR into local development practices and natural resources management.

Encouraging local authorities, civil society and communities to integrate elements of disaster risk reduction in their construction efforts, land-use approach and natural resources management, and involving vulnerable groups such as women, stigmatized castes and people with disabilities to take part in such action will ensure a durable effect. Creating or strengthening local DRR knowledge and capacities at community level should start by enhancing self-help and solidarity mechanisms between villages, reducing stigma on the

most vulnerable and excluded groups, and tackling the attitude of fatalism and despair.

Finally, improving communications between district and community level, even if difficult to implement, is essential to reduce the isolation of the population. Nevertheless, the lack of government representation at local level and political instability remain major obstacles to Humla engaging in a sustainable process of increasing resilience.

However, after more than a year of efforts by Mission East in that direction, some positive effects are already visible. Local peoples' fatalistic attitude in the face of natural hazards has decreased and local authorities, previously helpless to mitigate the adverse effects of landslides and mudflows, now realize there are ways to organize the community into groups for disaster management. The role of women as key agents in mitigating risk has started to be recognized by the male population. But one year is way too short to demonstrate a durable effect in an environment with an illiteracy rate of, in some parts, 70 per cent of the population, and where immediate needs such as access to food, water and health are not even met.

Long term, a community-based approach is essential and the role of the central government, to allocate more resources to the remote districts, is vital. Although isolated, this region and its communities need to be part of a national strategy for disaster management. Mission East is also striving to bring attention at a central level





Image: Christophe Bejperron

Traditional healer of Humla



Image: Christophe Bejperron

New constructions at risk from natural disasters

to the need to find adapted solutions to the problem of hidden disasters in isolated areas of the Himalayas.

*This text is adapted from a report published by Mission East in 2010 on vulnerability, hazard and disaster in southern Humla*

**Mission East field report, October 2010**

Sita Fadera is a 31 year old woman from the village of Fadera in Humla district. Like many other women in remote rural communities in Nepal, she does not participate in community decisions, as women's voices are rarely heard by male-dominated decision making structures.

Mission East's social inclusion team involved Sita in the newly created Disaster Management Committee (DMC), an institution responsible for disaster preparedness, mitigation and response. At the time, almost all local men discouraged Sita's involvement, thinking that she did not have enough capacity to contribute as a DMC member. But her willingness to learn saw her easily grasp the concept of risk management and, thanks to regular interaction with the project's social inclusion team, she was able to understand her potential, and later took on the role of member secretary, a vital position for the DMC. She was finally elected for the position. It was a real challenge for Sita to dedicate enough time to DMC, given it was almost impossible to get support from her family members. Sita managed to find the time required by working additional time at home before dawn and after dusk.

Sita feels there should be more efforts to break social barriers to enable women to participate in social activities and develop leadership. She now has a firm commitment to contribute to help women create an appropriate environment and enhance their participation. It is hoped that women in southern Humla can learn from Sita's struggle and experiences, and benefit from it.

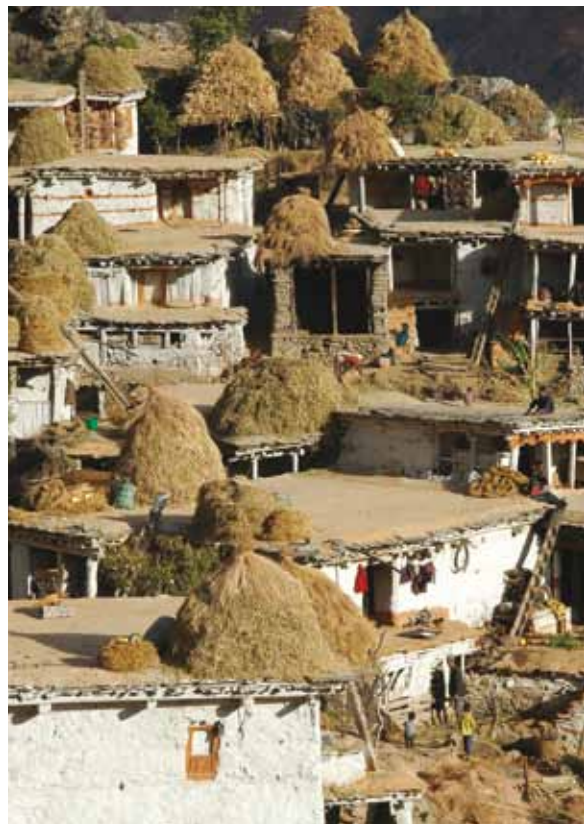


Image: Christophe Bejperron

Shreenagar village, traditional habitat

# Community-based disaster risk reduction in East Java

*Eko Teguh Paripurno and Arif Rianto Budi Nugroho, Disaster Research and Management, National Development University 'Veteran', Yogyakarta, Indonesia*

**M**ount Kelud, which is located on the borders of the Malang, Kediri, and Blitar regencies of East Java province in Indonesia is an active andesitic stratovolcano. In 1586, Mount Kelud erupted with a death toll of 10,000, and, during the twentieth century, five eruptions occurred, in 1901, 1919, 1951, 1966, and 1990 with a total death toll of around 5,400. Eruptions of Mount Kelud potentially threaten three regencies, and lava flows threaten two. These primary and secondary risk mean that, within a 10km radius, Mount Kelud, is potentially a risk to 1,777,864 people. Meanwhile, all these communities are at a low level of preparedness. Mount Kelud is usually seen as a tourist destination, and the threat of disasters has been neglected. The change, during the 2007 incident from an explosive to an effusive eruption is still causing threats for some villages around. This condition implies two threat scenarios: firstly, if the dome of lava grows quickly, the threat changes from an explosive eruption to the dome avalanche, as happened during the recent eruption of Mount Merapi. Secondly, if the dome of lava should be obstructed or stopped, the volume of the crater lake would be larger than before, because the water sewer of the bottom crater lake would be obstructed.

## Lesson 1: Village-level disaster risk assessment

Village-level disaster risk analysis consists of a series of activities: firstly, workshop training on disaster risk, and secondly, participative disaster risk mapping. The workshop training has transformed the level of participants' understanding of:

- The concept and paradigm of disaster risk reduction
- The threat of Mount Kelud's eruptions, analysis of the vulnerability of communities to them, and their capacity to deal with them
- Disaster risk reduction in relation to Mount Kelud
- Disaster management
- The concept of disaster risk reduction and community-based disaster management.

The participative disaster risk-mapping is carried out after the workshop training on community-based disaster risk analysis. The result is a 'map' of the village's disaster risks. To move towards participative village disaster risk mapping, based on a geographical informa-



Image: DREaM UPN

Participatory mapping using global information system for village preparedness team





Image: DREAM UPN

Student first aid training

tion system (GIS), we then carry out GIS training for disaster risk map arranging. Community representatives from 12 villages, plus teachers' representatives are involved in this training. The training then goes into a further phase, which seeks to deepen the skills of participants at regency level, in order to increase their ability at using GPS, decide the element, mapping model, schedule and location of the activities, and also the future needs. The activity starts with the group making and choosing the location, and setting a time limit. The goals of this activity are to combine the mapping result, share results in order to find the other elements, and make corrections..

### **Lesson 2: Disseminating the knowledge of PRBBK**

This is aimed at strengthening the capacity for disaster risk recovery (known as PRB in Indonesia) in the community through activities such as, firstly Training for Community Based on Disaster Risk Management (PRBBK) and Emergency Care and Handling of the Patients (PPGD) for the community and, secondly, training facilitators of PPGD. PRBBK and PPGD training was conducted in 12 villages with 419 participants.

Training the community in PPGD and PRBBK has strengthened the disaster management capacity of the communities of the Mount Kelud region. PPGD ability is an important skill that must be known and studied continuously. On the other hand, in PPGD the understanding between communities and medical principals must be understandable. With this training, we expect the ability of the medical community to be transmitted to others. Facilitator training has produced 53 skilled local facilitators. Furthermore, the facilitators have been able to disseminate their knowledge to 419 people (77 women and 329 men), the participants in the PRBBK training. All those who participated in the PRBBK training have now been organized into Standby Village Teams.

### **Lesson 3: Standby Village Teams**

The establishment and strengthening of these Village Standby Teams has been done through a series of activities and closely related with the previous activity, PPGD and PRBBK village workshop training. The process used to form these standby teams incorporates standby team workshops, field rehearsal and simulation. This activity has sharpened the knowledge of Village Preparedness Teams about volcanology, and strengthened their commitment to building awareness of DRR in their villages.

The workshop was attended by the whole team of 12 villages and was held at the Observation Post of Mount Kelud, Margomulyo hamlet, Sugihwaras village, Ngancar sub-district, Kediri District. The rehearsals are carried out order to establish a brotherhood between the village standby teams around Mount Kelud, to increase the capacity of the standby teams in PPGD by holding exercises together, and to provide clear information about the condition of Kelud.

The capacity of the 419 standby team members is further enhanced by standby team workshops, field rehearsal, and simulation. Until now, the standby team has been able to coordinate a simulation in five villages with the participants of every village in general, followed by 125-200 local residents, including vulnerable groups, both pregnant women, children, and elderly people.

### **Results**

This programme has resulted in significant changes in beliefs, attitudes, behaviours, practices, ideas and





Image: DREaM UPN

No string puppet show training for disaster risk reduction programme at school

people's confidence in understanding the substance of disaster risk in the eruption of Mount Kelud. The important changes in public confidence in the face of such risk come from the certainty that disaster is not just a fate, but a result of our inability to manage threats and vulnerabilities. So, to reduce the risks that come from a volcanic eruption, communities should change their behaviours and practices.

The changes in behaviours and practices related to disaster risk reduction came about both directly and indirectly. On the society side, preparedness for disaster risk reduction in the shape of the Village Standby Teams has already materialized. These teams have joined together as 'Anchors Kelud', Redi Community Network (Mountain) Kelud.

The community's enthusiasm for rehearsal action has already been showed. This enthusiasm can also be seen in the changes in behaviour and practice of village officials and other actors who deal directly or indirectly with disaster management. In the community radio station, for example, changes in behaviour and practices have meant that information on risk reduction has been incorporated into radio broadcasts. These changes are for the long term and there is some indication that their adoption will be widespread. From village to district administration level, the behaviour changes are demonstrated by their involvement in community dynamics.

Strong and significant changes have occurred in the community, but on the other side, local government has not changed significantly as yet, because the programme has not yet targeted those

institutions. In the future, we plan that district government agencies will be the main target group.

The issue of human rights, particularly political injustices that lead to gender issues and conflicts have become part of cross-sectoral concern in the region of Mount Kelud. Based on the 'glasses' of disaster risk reduction, these phenomena play a real role in the vulnerability of society. In fact, all forms of vulnerability are closely related and can create new forms.

The substance of disaster risk analysis (the threats, vulnerabilities and capacities) were explained in any activities at district level workshops and training in the villages and schools in the disaster-prone region (KRB) of Mount Kelud. Risk analysis can be enlightening for the government and society, because the analysis of disaster risks, such as poverty, social injustice, political, gender and the environment always appears as the main and basic cause of vulnerability, so the risk analysis itself can be used as a tool for resolving the problem.

Strengthening the understanding of this risk reduction has a positive impact on other issues that occur in the community, such as control and access issue to land due to differences in political attitudes. There are a few examples of this, such as the preparation of the GIS-based disaster risk map.

# Sustainable livelihoods: tribal island ecosystems

*Professor Janki Andharia, Jamsetji Tata Centre for Disaster Management, Tata Institute of Social Sciences, India*

**D**isasters have an enormous impact on people's livelihoods — and their livelihoods also often determine their abilities to cope with disasters. Regeneration and enhancement of livelihoods in post-disaster situations remains a fundamental challenge, especially on small islands. In a country like India, it is essential to focus on issues of equity, social justice and ecological security in the process. A critical objective in the post-disaster transition phase is to restore livelihoods in a way that reduces vulnerability and makes communities more resilient when faced with possible new disasters.

## **Vulnerability of small islands and their indigenous communities**

Small islands are particularly vulnerable to a number of natural hazards, which are further aggravated due to human efforts at development. Moreover, islands have large coastal zones which make them increasingly vulnerable to coastal erosion, floods and some of the most devastating hydrometeorological and geological disasters such as cyclones and earthquakes. Many islands are of volcanic origin and are located on plate boundaries, as a result of which they experience frequent earthquakes. Islands also tend to have fragile environments and economies and the Andaman and Nicobar Islands (A and NIs) are a case in point.

During the earthquake and tsunami of 26 December 2004, the southern group of islands — the Nicobar Islands, declared a Tribal Reserve — was worst affected in terms of human casualties and loss of forest, plantations and public amenities. The destruction on the islands was compounded by their relative isolation in both geographic and administrative terms. It was against this backdrop that the Tata Institute of Social Sciences (TISS) took up the challenge of working on relief support, assessments and local capacity building in close collaboration with the local authorities of the islands.

Located in the Bay of Bengal, the A and NIs cover an area of 8,249 sq km. They lie in a Zone V seismic category, experiencing intense tectonic activity and therefore highly prone to earthquakes. These 572 islands of volcanic origin are formed by a sub-marine mountain range and are located between the latitudes 6° to 14° North and longitudes 92° to 94° East. The Indian Ocean is dominated by the presence of mid-ocean ridges where the Indo-Australian and African plates are moving away from the Antarctica plate along the ridges. On average, the Indo-Australian plate moves below the Eurasian plate at around 70 mm per year. Along the Andaman-Sumatra Sunda trench, the Indian plate is subducting below the Burmese plate. Often, however, the plates become locked and move very little for many years, causing pressure to build up. When the accumulated pressure is suddenly released, a major earthquake results. This is what happened in December 2004 below Sumatra.

The A and NIs experience vulnerability caused by their small size, insularity and remoteness (they are over 1,000 km from the Indian land mass). The capital, Port Blair, is 1,255 km from Kolkata and 1,190 km from Chennai. On the other hand, the northern end of the islands lies just 193 km away from Cape Negrais in Myanmar and Sumatra, the closest landmass, is 145 km away from the Nicobar group of islands at the southern end. Of the total 572 islands, only 36 are inhabited. Citizens face problems including high external transport costs, time delays in importing goods, reduced quality of information flow and poor governance and monitoring mechanisms. The islands experience chronic difficulties maintaining adequate water and energy supplies.

The original inhabitants of the A and NIs are the Onge, Sentinelese, Jarawa and Great Andamanese of Negroid descent in the Andaman Islands, and the Shompen and Nicobarese of Mongoloid descent in the Nicobar Islands. The communities have lived here for 20,000 years, but their collective population (excluding the Nicobarese) has decreased to 500 in the last 150 years as a result of colonial policies and the modernization activities of independent India. Outbreaks of measles and other diseases have wiped out large numbers of these tribes.

Tribal communities live in highly diversified and varied environments, adopting simple technologies. Typically, use of natural resources is largely sustainable with no over-exploitation. The communities live in a synergistic and symbiotic relationship with nature. (The Nicobarese, for instance, despite being coastal communities, do not carry out fishing as a source of commercial livelihood, but only for subsistence.) Their deep relationship with nature has helped maintain their ecological environment despite centuries of habitation.

## **Sustainable livelihoods**

Indigenous communities depend on habitats such as forests for sustenance, but livelihood patterns are changing as access to environmental resources is decreasing. Therefore there is a need to look not only at the physical environment, but also at the mediating factors that impact livelihood patterns and their sustainability. These include social relations, institutions and organizations and the axes of inequalities in society (significance of caste, class, gender, religion, age and ethnicity) that inhibit or facilitate the exercise of choice by individuals or households. Interplay of these factors produces a



Image: JTCDM, TISS



Image: JTCDM, TISS

Reconstruction of livelihoods is a major challenge in isolated tribal communities such as those in the Nicobar Islands in the Bay of Bengal

layered, nuanced landscape of access and choices available to a person or a community.

Changing institutional frameworks and macro-policies impact the livelihoods of indigenous communities in many direct and indirect ways. For example, the withdrawal of the state from the education, health and public distribution system, or the emphasis on user fees, demand generation, partnership and privatization, effectively restricts access of the poor to these services. Similarly, the mechanization of operations demands a new repertoire of negotiation skills at community and state levels.

The idea of sustainable livelihoods was engendered in the A and NIs during the post-tsunami intervention after a detailed study and through intensive citizenship training of the Nicobari youth. In the process, the communities learnt about democracy and began to assert many of their concerns. The tribal communities also learnt to value their own culture, as well as their livelihoods, which offer rich models of sustainability.

Post-disaster situations often bring an enormous volume of resources, offering the potential to transform a society in fundamental ways. Formal approaches of governments often focus on the 'replacement of asset loss' policy. However, livelihood recovery cannot be an add-on or an issue to be looked in isolation. As many communities living in disaster-prone areas already face significant development challenges, strategies for livelihood restoration must be part of a more comprehensive social and economic development approach. In other words interventions should not only address the loss but also put the affected community on a trajectory that secures livelihoods and prepares them to face futures disasters with greater levels of preparedness. Disaster impacts can be mitigated by appropriate planning and adequate preparedness. The nature of planning should be context-

specific. It should also empower the local population to enhance its value base and improve sustainability, both of which need to be viewed as part of a long-term disaster risk reduction strategy.

It is useful to study an example of how a sustainability perspective was built and skills developed around planning for restoration of livelihoods in the A and NIs in the post-disaster context. This will help those involved in disaster management to develop a response strategy to rebuild lives and livelihoods in a manner that paves the way for long-term sustainable development and empowerment of marginalized peoples.

### Meeting the needs of island communities

Prior to the tsunami, the Nicobarese lived along the coast, subsisting on fishing, hunting and gathering forest produce. They maintained plantations of bananas, pandanus and coconut and engaged in some forms of horticulture, growing fruits such as mango, pineapple and jackfruit. They reared pigs and chicken and sold copra (dried coconut kernel) as well as exchanging their produce for commodities such as rice, sugar and cloth.

During the earthquake and tsunami, productive land on several of the islands was submerged and plantations destroyed, including roads and jetties which played a significant role in the transportation of essential goods. Livelihoods were severely affected as the Nicobarese grappled with the changes in their habitats and livelihoods systems and the nature of relief provided by the government.





Image: JTCDM, TISS



Image: JTCDM, TISS

Nicobarese of Chowra Island rebuilding their livelihoods, including banana transportation and copra making

In order to build the capacities of the community to understand their circumstances and negotiate the sudden influx of relief and rehabilitation schemes in a manner that helped create environmentally sustainable and culturally sensitive livelihood options, two key interventions were undertaken by TISS. The first was to create a cadre of trained workers and the second was to set up community-based island knowledge centres.

The overarching aim of these interventions was to help local communities access information on their terms and to develop a critical understanding of their environment, culture, economy and livelihoods, especially in the altered conditions brought about by the tsunami.

### Framework of the training programme

#### *Critical awareness*

This implied developing a consciousness of community-based institutions, societal power relations and forms of exclusion and marginalization. It involved relating to perceptions of 'self' and 'others' (outsiders, mainlanders, settlers etc.). This component facilitated personal and collective reflections on social and political conditions and what was offered through government post-tsunami rehabilitation programmes.

#### *Indigenous knowledge base*

Participants focused on environment and natural resources use and management, existing skills and trades, exchange systems, organization of the local economy, traditional social institutions and leadership and modern political institutions. They considered memories and experiences of adversity and coping mechanisms.

#### *Information and Education Component*

This part of the programme dealt with government, state and non-state institutions, development schemes and welfare programmes,

financial aid and capacity building, and covered key subjects such as health, education and law.

#### *Knowledge and skill component*

This component was primarily concerned with sustainable development practice built on individuals' own perspective of development, sustainable livelihoods, welfare and rights. It built on process skills (communication, community organizing, participatory planning, natural resource mapping, etc.) and organizational skills. All these enabled the development of a more robust perspective on sustainable livelihoods and development and also the critical ability to decide and assert what was desirable from communities' own standpoint and to negotiate ideas of development which might have been imposed from above by the government.

The education programme showed the value of interventions that not only rebuild, but prepare communities for future disasters while promoting sustainable development. It is not only essential to mitigate the risk of disasters, but to also find lasting ways of coping with them. In disaster situations of both natural and human origin, the impacts can be mitigated to a large extent by appropriate planning and adequate preparedness. This requires a coherent and strategic response, informed by a longer-term approach to disaster risk reduction and appropriate planning and management. Such an approach would address the needs of specific vulnerable categories such as tribal communities.

# Building a bridge between the insurance industry and Government

*Frans Y. Sahusilawane, President Director, PT Asuransi MAIPARK Indonesia*

**D**ue to its unique geological and geographical characteristics, Indonesia is prone to a range of natural disasters, such as earthquakes, volcanic eruptions, landslides and tsunamis. Most of its people are insufficiently prepared to cope with these crises.

The great Indian Ocean tsunami that hit Aceh on 24 December 2004, killing more than 200,000 people, was a reminder of the urgent need to have holistic disaster mitigation systems in place.

As devastating incidents with huge losses have continued to occur in Indonesia in recent years, the government has begun to seek new strategies for disaster management. The old responsive paradigm has gradually become more anticipative. Previously, the common practice following an incident was to focus on post-disaster activities only. Recently, pre-disaster mitigation activities have been in place to support the goal of creating more disaster-resilient communities.

In 2007, a law on disaster management was passed, marking an important step for Indonesia as it provides a legal basis for all stakeholders, clearly stating roles and responsibilities for the private sector and society.

## **Establishment of MAIPARK**

In the late 1990s, a series of major earthquakes hit Iran, China, Turkey and Taiwan, causing a high number of casualties and vast economic as well as insured losses. Prompted by these events, the Indonesian insurance commissioner and the country's insurance industry association conducted field research to study the preparedness of insurance companies to deal with a possible serious earthquake and how to best handle the risk. The results of the one-year study showed a serious lack of the knowledge, technical capabilities and prudence necessary to properly handle earthquake catastrophe risk.

Realizing that knowledge and technical capabilities are the foundation necessary to build up competence in dealing with earthquake and other natural catastrophe risks, the government and the insurance association led the industry to set up a consortium on earthquake risk. The Indonesian Earthquake Reinsurance Pool (IERP) consortium was established at the end of 2002 and started its operations in January 2003, with the aim of providing a market vehicle for central statistics and analysis as well as a pooling of expertise.

In order for IERP to comply with government regulations regarding joint action by insurance industry players to deal with natural disasters and other special risks, at the end of 2003 it was transformed into a legal entity, PT Asuransi MAIPARK Indonesia (MAIPARK).

MAIPARK was established to deal with all natural disasters and other special risks, starting with earthquakes and their consequences. The mission statement of the organization promises:

- To promote discipline and proper handling of earthquake insurance in Indonesia
- To set a benchmark for earthquake insurance pricing in the country
- To collate statistics and create a national database
- To build sound national reinsurance capacities for earthquake insurance.

With the stated goal of enabling the Indonesian insurance industry to become a knowledge-based industry, MAIPARK also represents the industry in dealing with various aspects of earthquake and natural disaster management at the national level.

## **Catastrophe model for the insurance industry and government**

MAIPARK started to build national database in 2004 through compulsory cessions on earthquake insurance received from all insurance companies. After four years of work on the database, in 2007 MAIPARK undertook the groundbreaking construction of a an Indonesian Cat-Model for earthquakes. The project was finished within two years at a marginal cost. The earthquake catalogue that forms the main basis of the Cat-Model has a register of more than 54,000 earthquake events dating back as far as 1599.

The database is constantly updated with information from research and surveys. Catalogue data has been collected from the United States Geological Survey (USGS), the Potsdam Geoforschung Zentrum in Germany, the Meteorological Center in Japan, and the Geophysical Meteorological Climatology Agency of Indonesia, along with historical earthquake records. With the Cat-Model, MAIPARK is able to estimate the size of economic and insured losses caused by an earthquake within hours of its occurrence.

In 2008, the model was presented at the annual convention of the Indonesian Geophysicists Association. Discussions have taken place with experts from various bodies, among others from the Bandung Institute of Technology and Kyoto University on behalf of the World Bank.



Image: MAIPARK

Frans Y. Sahusilawane, CEO of MAIPARK, leads the emergency response team distributing large platoon tents for refugee camps and emergency schools after the West Java Earthquake, September 2009

### **Earthquake five-zone risk map and tariff reference**

MAIPARK reviewed and introduced a five-zone risk map for Indonesia along with a new earthquake insurance premium tariff to replace the former three-zone risk map and tariff. In March 2010, this system was officially adopted by the Indonesian General Insurance Association, which represents 87 member companies.

The Indonesian insurance industry's initiatives to deal with earthquake risk so far have attracted the attention of the government, international institutions and insurance industries at both regional and international levels. The Indonesian government and the World Bank are discussing plans to use MAIPARK's Earthquake Model to assist government in managing fiscal risk to the country's state budget through insurance or other mechanisms.

MAIPARK's Cat-Model is being introduced in the wider insurance and reinsurance market through collaboration with Catalytics who provide catastrophe modelling software, thus providing opportunities for insurance and reinsurance companies to assess, analyse and manage their earthquake exposure in Indonesia at a relatively low cost.

### **Education and corporate social responsibility**

To improve the competence of the insurance industry in dealing with earthquakes and related risks, MAIPARK organizes regular geological field excursions for insurance underwriters to explain geological phenomena related to risk management. This activity allows for the sharing of knowledge with insurance companies and the promotion of prudent underwriting of disaster risk, particularly for earthquakes and volcanic eruptions.

Following the Yogya earthquake of 2006, which claimed 5,716 lives and destroyed 156,662 houses, in 2008 MAIPARK (in cooperation with the Gesellschaft für Technische Zusammenarbeit GmbH) conducted disaster awareness training, promoting risk perception

and prevention to grassroots communities in Bantul and other affected areas. In total, 12,000 participants from 292 villages in the region received training in what is now considered the top resource for building disaster-resilient communities in Indonesia.

### **Disaster relief operations**

In the event of major disasters, MAIPARK always takes part in the national emergency response and is a partner of the National Agency for Disaster Management (BNPB) for disaster response activities, with a particular focus on earthquakes. After the West Java earthquake of September 2009, the body worked in coordination with BNPB to distribute aid for earthquake victims in the form of food, clothing, medicines and large tents to replace damaged school buildings so that educational activities would not be interrupted.

Likewise, when Merapi volcano in Yogyakarta erupted in October 2010, MAIPARK immediately sent emergency response teams to distribute aid consisting of items such as clothing, food, medicines, milk and baby food. In addition to the main refugee camps, this aid initiative reached remote camps like Muntilan, Magelang, Borobudur and Klaten.

### **Surveys and research**

The research and development division of MAIPARK continually conducts geological surveys and research in various part of Indonesia. Whenever an earthquake occurs, a survey team is sent to appraise damage, injuries and fatalities, as well as to study accompany-





Image: MAIPARK

Documentation of Disaster Awareness Training conducted by MAIPARK in the rural area in Bantul District, Yogyakarta Province, mid 2008

ing geological issues such as new fractures and faults, geological offsets, indications of liquefaction and accompanying subsurface phenomena. This information is added to the database and the Cat-Model.

In April and May 2010, MAIPARK's research and development team made the astonishing discovery of a huge seismic gap in the Indian Ocean, south of Java, with important implications for the Indonesian mitigation programme (including insurance). This discovery has allowed the organization to provide the BNPB with information about impending dangers to the inhabitants of the southern part of Java. A set of simulations enabled the forecast of economic as well as insured losses.

MAIPARK shares knowledge and research findings through seminars, workshops, field excursions, websites and its three-monthly Waspada Bulletin, first published in 2007 to increase public awareness concerning natural disasters and mitigation strategies. Widely acknowledged as essential reading on geology, geophysics and natural disasters, Waspada is quoted by the Indonesian Institute of Sciences on its website.

#### **Preparation of the National Disaster Insurance Scheme**

The increasing frequency and severity of natural disasters during the last decade has had a significant impact on the national budget. In both 2006 and 2007, the Indonesian government's post-disaster spending exceeded \$1 billion. Similar spending occurred between 2009 and 2011 due to the West Java and West Sumatra earthquakes of 2009 and the Merapi volcanic eruption of 2010.

Such high levels of unplanned risk financing can clearly have a significant impact on the state budget of a small national economy. Leveraging its expertise and international network, MAIPARK has

prepared a national catastrophe insurance scheme in close cooperation with the leading international reinsurance companies and brokers, offering an economic solution for the fiscal risk to the state budget.

While special catastrophe risk insurance or reinsurance companies in other countries are usually formed in response to a calamity, the Indonesian insurance industry has demonstrated its proactive capabilities with the establishment of IERP and its transformation to MAIPARK.

During less than ten years of operation, MAIPARK has been able to make significant changes to the way in which the Indonesian insurance industry deals with earthquake risk. It has spearheaded the development of a knowledge-based industry in earthquake risk management, and has shown the ability of the industry to participate in public-private-partnership (PPPs) to manage natural disaster risks.

#### **Priorities for the future**

In view of its location in an earthquake-prone area and the Ring of Fire, Indonesia should consider moving from unplanned risk financing to a planned regime by making use of the various risk financing techniques available. Public-private insurance partnerships are a particularly useful way of managing natural disaster risk effectively and efficiently. With the coordination provided by MAIPARK, the Indonesian insurance industry is able to provide the government with the best insurance solutions available worldwide.

# Reducing disaster risk through microinsurance: new evidence from communities in South Asia

Mihir R. Bhatt, All India Disaster Mitigation Institute, and Lawrence Hall

**R**educing disaster risk through the use of microinsurance is not a new idea or a new initiative, but how does it actually perform when operated at grassroots level? Where is the evidence?

New and field survey-based evidence from the frontlines in South Asia. There is broad and growing discussion on financial disaster safety nets, such as those provided by microinsurance, and the role that they can play as a resource for the poor in the aftermath of a disaster. Recent research and experience has pointed to the importance of such programmes in assisting the poor to avoid poverty traps and reduce their vulnerability to hazards. Despite its theoretical potential, very little is known about how microinsurance actually benefits households and communities after disasters. Much of the current work on disaster microinsurance has focused on supply-side issues, such as insurance pricing and implementation questions, whereas the demand side and potential benefits to the insured have gone largely unexamined.

This article attempts to address this and offers the first large cross-country assessment, based on first-hand observation, of the impact of disaster microinsurance in the South Asia region. Communities across South Asia are vulnerable to disaster and include many households both with and without disaster microinsurance, making



Women work long hours to pay for microinsurance instalments

this a particularly useful area for rigorous comparative analysis.

The overall aim of the study *Impact Assessment of Disaster Microinsurance for Pro-Poor Risk Management: Evidence from South Asia* is to advance the discussion of disaster microinsurance from anecdotal knowledge to specific evidence-based recommendations by assessing and understanding the impacts of products on clients. Key areas covered include:

- Client satisfaction in products and services
- Client awareness, understanding and perceptions of risk, products, and needs
- Current disaster coping mechanisms and risk management behaviour
- Delivery mechanisms tailored for this low-income market
- The potential for vulnerability reduction, including poverty and disaster risk reduction (DRR) as well as enhancements in human welfare.

These areas have not previously been systematically looked into.

The study was initiated as a part of the Regional Risk Transfer Initiative, an effort led by the All India Disaster Mitigation Institute (AIDMI) to expand and strengthen microinsurance options for the poor in South Asia. It has been supported through funding from the ProVention Consortium and executed in partnership with the International Institute for Applied Systems Analysis. The study was led by Rakhi Bhavnani and Mehul Pandya, and guided by Reinhard Mechler and Ian O'Donnell.

## Methodology

To investigate the impact of disaster microinsurance, an original dataset was generated across South Asia through primary data collection, based on stratified sampling of responses received from a control group (or 'non-clients') as well as microinsurance clients of the following five organizations offering disaster microinsurance products:

- Basix (India)
- Self-Employment Women's Association (SEWA India)
- AIDMI (India)
- Yasiru (Sri Lanka)
- Proshika (Bangladesh).

Seven disaster products were evaluated: one for Yasiru, AIDMI, and SEWA, while two different products were surveyed for Basix and Proshika.

Survey questionnaires were administered in local languages by 85 local and trained volunteers and representatives of the participating organizations, from October 2008 to September 2009. A total of 2,171 surveys were completed, with 1,640 client evaluations and 531 responses from non-insured clients across India, Bangladesh and Sri Lanka.

While this study references the larger and growing body of literature on disaster microinsurance and findings from previous qualitative reviews, the analysis it offers is based solely on the findings from the survey of the five participating organizations.

### **Lessons learned**

Overall, the results of the study show that people have an interest in, and are willing to pay for disaster microinsurance programmes in South Asia. The knowledge that they were covered in case of disaster was a big factor in their decision to purchase insurance. The majority of people also seemed happy with the amount of money they had to pay. Nearly 77 per cent of people surveyed said that the cost of microinsurance was adequate, whereas a little less than 7 per cent indicated that the amount they pay is too much. The products are reaching poor clients, many of whom are below the poverty line, highly in debt, and unable to cope after a disaster.

However, the findings have also revealed some problems with the process: funds are often late in reaching clients, with 26 per cent of people stating that they received their money after two months, and 30 per cent stating that it took as long as three months. Though this delay is common in many financial and welfare services in South Asia, it was especially pinching to recent victims of large natural disasters. This delay can negatively influence the way that money is spent when or if it does finally arrive. There are also reported difficulties with the claim process, with 85 per cent of people saying that the process was hard to understand and that they required help (89 per cent said that they subsequently received adequate help from the organizations, which illustrates the importance of the role of civil society organizations (CSOs) at local level in DRR). There were also reports of inadequate total coverage. A total of 272 people stated that the money they received from an insurance claim was not sufficient.

As a result of these problems, a number of individuals have had to borrow additional funds from moneylenders, friends and family. Clients usually have high existing levels of debt, which are only exacerbated after disasters. In other words, disasters wipe out the repayment capacity of the indebted poor. This calls for a review of modification in product offerings, safety nets, and other risk managing financial services in combination with disaster microinsurance. In addition, there is a need to review products and potential clients in communities to ensure that although 'the poor' are being served, the 'poorer than poor' are not being excluded due to costs and information barriers. For this there are neither any studies available, nor are any pilots funded.

Though the insurance agencies claimed that their plans helped people get back to work faster, increased investment activities and increased human welfare, the study did not completely corroborate these claims. Study analysis found no significant change in workdays lost or welfare (measured through levels of savings and debt). However, this is not to say that microinsurance has no long-term developmental impact; the study was just unable to see any significant changes in the surveyed group in this round.

In terms of long-term risk reduction, a number of indicators tell us that the clients are aware of some of the risks they face and may be proactively engaging in decreasing some of the vulnerabilities themselves. Indeed, 387 people (24 per cent of the total) identified the need to reinforce parts of their home, and 68 per cent of these also stated that they had done this over the past ten years to reduce the impact of disasters. This evidence shows that clients perceive some amount of personal risk, although it is difficult to ascertain the extent of their knowledge since this study did not allow for in-depth probing of this issue. The extent of knowledge can be useful and valuable for future product design. It is clear, however, that disaster recovery is a 'window of opportunity'; one that brings positive changes for the future. The study found that after disasters, clients had greater improvements in shelter — additional roofing, better walls, stronger pillars, and new toilets — than non-clients.

The importance of trust cannot be underestimated. Findings show that if an organization has a positive reputation, there is a far higher chance that clients will not just sign up, but will also renew each year. Of the people surveyed, 88 per cent said that they would renew their disaster insurance policy in the future. Of those people, 40 per cent said that this was solely because they had a good perception of the insurance agency such as SEWA or BASIX, Yasiru or Proshika. Historically, low levels of insurance penetration in the region can be attributed to the negative reputation of insurance companies, and low levels of cover and long delays in payment to the beneficiary. Rapport with the community, trust networks and improved claims processes are essential for the further development of disaster microinsurance in South Asia.

Finally, the key to reducing risk seems to be awareness and information. The study signalled high demand for disaster microinsurance after non-insured clients had been given information showing the relevance and pricing of such products, as well as the power of organizations to reach more clients. Knowledge of disaster insurance was generally low considering the significant role that disasters play in the everyday life of the communities interviewed. The majority of people in the control group (69 per cent) had heard about some type of insurance before, whereas 21 per cent had not, and another 10 per cent had heard only a little. Over half of the respondents (52 per cent) did not know what disaster insurance was. An overwhelming majority (80 per cent) of clients felt that because of this lack of knowledge, disaster microinsurance should be promoted to many more people.

### **Recommendations for the future**

With disaster microinsurance in its infancy in the region, a number of things are required — many of which are beyond the scope of the study. The promotion of regulatory and developmental systems in countries that do not have a legal apparatus for microinsurance, an increase in the number of reinsurance options,





Image: source

Small businesses were among the first users of microinsurance coverage against natural disaster in South Asia

and diversifying delivery models are some of the important areas outlined in academic literature and in policy arenas. Organization of the poor is becoming more important in this regard.

However, the aim of this study was to provide specific recommendations based on evidence. Therefore, the recommendations that follow are based solely on the findings of data analysed through this empirical review. While they are limited to the thematic areas covered by the study, they are extremely pertinent to the successful servicing of disaster microinsurance for the poor.

The following six priority activities and interventions are recommended based on the findings of this study.

*Utilize the client community to increase awareness and grow* — microinsurance organizations should work to create innovative ways to involve the community in outreach and create awareness about disaster microinsurance. Client satisfaction is high and an overwhelming majority is ready to refer friends to the programme. Client-to-client and non-client-to-client information links and communications are important. For this donors and national governments must invest more resources at community level.

*Use disaster microinsurance as an entry point for further risk reduction* — microinsurance is not a panacea for DRR. There is a need to promote long-term DRR in conjunction with microinsurance and use strong outreach and community links to support existing microinsurance organizations. This will help to develop programmes focused on risk education, structural mitigation (i.e. retrofitting), preparedness, and enhanced coping mechanisms. There is a need for investment in both microinsurance and microinsurance organizations. Private sector and national governments must jointly initiate risk transfer and mitigation, both projects to pilot in South Asia. The World Bank and Asian Development Bank can provide initial technical assistance and seed money.

*Regularly review the different organizations' claims processes to ensure that money is getting to clients in the most effective and efficient way possible* — this includes examining services to help with claims, pre-positioning claim kits, support for the timely review of claims, and information management of decisions. Faster processing should be incentivized. The private sector, authorities, and CSOs need to pilot tripartite mechanisms for performance improvement.

*Promote increased participation by women in disaster microinsurance programmes* — this includes a review of products, services and modifications based on the specific needs of women — as victims of disasters or as vulnerable to disasters — in the region. Women's organizations and national authorities must find ways to better cover women before, after, and between disasters.

*Look for the biggest critic* — the impact of disaster microinsurance cannot be determined solely through client surveys, but must be also gauged through a survey of people who have dropped out of the programme, had claims rejected, and who will not renew membership in the future. With programmes in their infancy in the region, a critical component for growth is being opened to hear what has worked and what hasn't, in an effort to fix problems. Investments in national and regional fora will be timely in South Asia. Independent, client-focused studies such as these should be initiated regularly and long-term, to turn criticism into design input.

*Use impact assessments for future product development* — impact measurement is a critical component of microinsurance research and development in South Asia and other regions. There is a need to develop future product offerings based on the rigorous empirical findings from a wider range of and longer trend of impact assessments in South Asia. Investments must be made by donors and the United Nations in such regional, long-term, and focused impact studies.

Investment in evidence-based policy-making delivers results for better and more effective DRR. Though such investments need dedicated teams and a committed institutional base to collect evidence, it is not so difficult to find such conditions in South Asia. The results are of immediate and long-term use to everyone working on DRR. AIDMI is developing a regional series of such and follow up studies from the frontline.

# Community managed disaster risk reduction programmes of Caritas India

Sunil T. Mammen, Caritas India

**T**he concept of disaster risk reduction (DRR) has become an important part of development efforts throughout India, which is highly prone to all sorts of hazards. In the recent past, the country has witnessed several disasters, including the 2004 tsunami. Recurring hazards like cyclones, floods, landslides and tsunamis have prompted both Government and non-governmental agencies to implement disaster risk reduction programmes in a variety of ways to mitigate risks and vulnerabilities.

Emergency response has been a key strength of Caritas India, which responds to various types of emergencies through its partners. Because disasters disrupt development initiatives and use up available resources, thus making communities more vulnerable, disaster preparedness is an integral part of our wider strategy and of our community based disaster preparedness (CBDP) programme launched in 2001. The realization that preparedness is just one important component of the whole gamut of DRR and that communities need to work towards finding solutions to potential risks associated with their lives and assets prompted initiation of the community managed disaster risk reduction (CMDRR) approach taken by Caritas India.

## Finding the connection

The CMDRR approach begins by acknowledging the relationship between hazards and development and offers solutions at the outset. We believe that this approach is essential to make our disaster response effective, accountable and able to cater to the vital needs of disaster victims in a way that protects their right to life with dignity. Inspired by the effectiveness of CBDP/CMDRR as a methodology for motivating communities to take informed decisions and timely actions for risk reduction in the context of natural disasters, Caritas India launched its programme in West Bengal and gradually broadened its work to include other regions of India. Currently, 58 Caritas India partners are implementing CMDRR programmes in 60 districts across 12 states and two Union Territories, covering 2,588 highly vulnerable villages and serving 462,091 families.

## East Zone

*West Bengal and Orissa states:* The DRR programme started in 2001 in West Bengal state following the floods of



Children in Masandap understand community managed disaster risk reduction

Image: Caritas India



Banana rafts are used as transportation during floods

Image: Caritas India



2000, which had shaken the rural economy of the state and destroyed many lives and properties. In 2002, Caritas India initiated a small pilot project in four districts of the state for a community-based disaster preparedness programme, which paved the way for a larger programme in 2004 involving 825 electoral wards in eight districts of West Bengal, implemented by nine partners. This was scaled up between 2007 and 2010 as a CBDP programme with responsibility for 1,500 wards.

**South Zone**

*Andhra Pradesh:* After the 1996 cyclone that affected East Godavari District, Caritas Germany helped Eluru Social Service Centre to set up a community-based disaster preparedness and health programme. This project to assist people in the cyclone-affected villages of the Konaseema area was implemented from August 2004 onwards in 90 villages, covering 13,867 families in the coastal belt of Andhra Pradesh. In 2006, the programme was extended to 12 districts in the region with 16 partners in 420 villages.

*Kerala:* A relief and rehabilitation programme was initiated in ten districts of Kerala state in 2006 following a tsunami which affected the coastal villages.

*Tamil Nadu:* In 2006, Caritas India introduced a community-based disaster preparedness programme with eight partners in 452 villages of Tamil Nadu, focused on building self-determining, independent, self-reliant and resilient communities.

**North East Zone**

Caritas India introduced a CBDP programme in April 2004 with four partners from Assam. This effort was aimed at influencing people at community and family level and sensitizing local institutions, groups and Government departments to the realities on the ground. The linkages

with Government and local institutions enabled behavioural change in the community and revived traditional preparedness mechanisms that sustain the process of DRR. Village groups developed nurseries of suitable plant species in many places and saplings were planted on riverbanks, with the promotion of traditional creeper plants like Kalamilata.

**North Zone**

*Uttar Pradesh:* Because of the vulnerability of Gorakhpur to flooding, Caritas India and PGSS took up a joint DRR venture in 10 villages of the Brahmapur block of the district in 2005. The programme took the step of including man-made disasters, arguing for the inclusion of encephalitis (a brain fever causing hundreds of deaths every year in the region) in this category.

*Bihar:* The implementation of this programme started in April 2008 in 185 villages in eight districts of Bihar. The community has internalized the true spirit of the programme, in the sense of increased capacity and reduced dependency on external support in the context of natural disasters.

**West Zone**

*Maharashtra:* A preparedness programme was initiated following torrential rains on 26 July 2005 in which many people lost their lives or livelihoods. The DRR project in Kalyan, aimed at developing mechanisms to mitigate the loss of lives and assets, was implemented in the flood-prone areas of 21 villages of Kalyan and Ambernath Blocks.

*Gujarat:* This project was implemented by seven centres in 21 villages of Surendranagar and Rajkot districts in



Image: Caritas India

Community-based disaster preparedness



Image: Caritas India

Flood resistant house, Bettiah



2006. The main goal of this DRR programme was to help villagers reduce the negative impacts of disaster.

### Outcomes of the DRR programmes

The target communities internalized the DRR concept and gained a clear understanding of the importance of the process. Community-owned contingency plans have been developed in all the target villages and people are following them during disasters. Human and cattle losses have been reduced due to community preparedness and people are better able to survive during disasters like floods and cyclones.

Good linkages have been established with Government functionaries, who interact regularly with the community. Government assistance now reaches communities without any delay, as the Task Force Committees are helping the Government conduct damage assistance.

Women's self-help groups have played an important role in saving money and food, and all vulnerable villages have now developed this kind of mechanism. Communities in the target areas are capable of critically assessing their situations and making decisions on their priorities. Specific local sustainable measures have been developed to address water and sanitation issues through creating a replicable model in each village.

A revolving fund has helped families raise their income levels through activities like dairy farming, small business, sheep and goat rearing, and selling of fish and coconuts. In all the villages, basic task forces were formed in the programme areas. In addition, a list of vulnerable persons was made by each community and shared with the coordination group members in each ward for reference during a flood, allowing the community to think about their actions during a disaster in an organized manner. People also now feel that their responsibility is not only to their family but also towards the community.

Participation of both men and women was very high during Participatory Learning Action (PLA) activities. Through the PLA, people learned about their own areas and made action plans for

disaster preparedness. As a whole, the villagers learned to work together. Families showed interest in storing sufficient food and fuel and vegetables were dried and kept in packets for the disaster season as a common practice. Communities also took charge of boat repairing in their areas through their own funds.

Most of the houses in the project area are made of mud and are thus especially vulnerable to disaster. Measures like raising plinths, installing protection walls and covering roofs with low cost local materials have been initiated. Many of the latrines are now installed at a higher level than floodwaters and people are also storing their firewood and family assets in higher places, identified through vulnerability and risk assessments.

The communities have taken remarkable initiatives in disaster preparedness activities leading to development plans. The measures identified in the plans have been implemented by the stakeholders and progress is monitored regularly.

Measures such as installing raised hand pumps and other proper sanitation facilities have led to improved quality of life in the area. People are now more aware of safe drinking water, hygienic practices and sanitation during floods. They also know how to prepare oral rehydration therapy (ORS) for diarrhea.

### The role played by task force members during cyclone Nisha

Cyclone Nisha affected the coastal and inland villages in the state of Tamil Nadu to a significant extent. Most of the villages were cut off and access to some places was very difficult. People were stranded and left without access to basic amenities.



Learning to save yourself



Celebration of International Women's Day

Task force members carried out the following emergency operations in all the villages before, during and after the cyclone:

- Provided early warning of the cyclone through village information centres
- Evacuated people and assets to safer places
- Helped in the distribution of food packets, water and other emergency relief provided by the Government and voluntary organizations
- Cut tree branches and cleared debris
- Carried out rescue operations in floodwater
- Helped in the provision of medicine and the spraying of bleach powder.

### **Task force and community action in the wake of cyclone Aila in West Bengal**

The impact of DRR is reflected in a sense of togetherness that was prominent during the post-Aila period in West Bengal. Task force and community members took an active role in various activities. These included collecting all dead animals and fish from the affected area for burial, spreading bleach powder after the disaster to keep the environment clean and disinfecting wells. In total, 27 breached embankments were repaired.

Health and first aid task force groups collected ORS packets and distributed them among the families in affected areas, having already conducted training in how to prepare the solutions when required. Panchayat and Government health staff cooperated on the distribution of halogen tablets to purify drinking water. Other activities undertaken included re-excavation of the drainage system and ponds for desalinization.

Task force members helped in the initial needs assessment and took an active role in supporting the distribution of relief materials by the State Government. By sharing information with community-based organizations and Panchayathi Raj institutions, they enabled timely coordination of activities.

CMDRR is an experiment by partners across various states and villages of India. We intend to create a few good models, which in turn will become examples for others to emulate.



Image: Caritas India

Raised platform and tube well



Image: Caritas India

Community flood shelter built by Caritas



# Including people in risk governance for disasters and climate change

*Duryog Nivaran, South Asia. Contributors: Ramona Miranda, Buddika Hapuarachchi and Vishaka Hidellage, Practical Action; Mihir Bhatt, All India Disaster Management Institute; Abdul Shakoor Sindhi, Rural Development Policy Institute, Pakistan; and Louise Platt, Independent Researcher*

**I**n a region that has recorded every known type of hydro-meteorological and geological disaster, South Asians are frequently exposed to risk that is as much to do with poor economic development and a lack of good governance as with exposure to natural hazards.

In 1998, South Asian network for disaster risk reduction Duryog Nivaran (DN) began to lobby for understanding that many disasters are not natural, but the result of failed development and poor governance. At the time, the dominant view of disasters was as 'events' that should be responded to. Over the past 12 years, this alternative view has won ground in the region, validated repeatedly through disasters where death and damage have reflected the development and governance status of the country or region rather than the intensity of the hazard.



Indigenous risk education. A raft made locally using used oil barrels/drums

Image: RDPI

South Asia is at risk from floods, drought, heavy precipitation, landslides and cyclones. It is also exposed to devastating but less frequent tsunamis and glacial lake outbursts threats. Covering just 3 per cent<sup>1</sup> of the world's land surface with around one fifth of the world's population, the region experiences 38 per cent of disaster related deaths. Between 1990 and 2008, more than 750 million people, 50 per cent of the region's population, were affected by natural disasters, leaving almost 60,000 dead and resulting in about \$45 billion in damages.<sup>2</sup>

## Governance issues in South Asia

'South Asia is a region which is not only confronting a challenge of human development but also facing a crisis of governance.'<sup>3</sup> The Worldwide Governance Indicator reveals that South Asia is one of the most poorly governed regions in the world.<sup>4</sup> The development trajectory of South Asia continues to see upward movement in economic growth and per capita income yet 70 per cent of the population is poor<sup>5</sup> thanks to economic and social exclusion and socially non-responsive governance. These factors worsen the impact of disasters on vulnerable groups.<sup>6</sup>

Disaster risk began to be recognized in the early 2000s, but dependence of South Asian states on global economic processes and financing systems, compounded by the political instability of governments in the region, resulted in development continuing to be haphazard.

Political instability, corruption and conflicts have resulted in a focus on immediate issues rather than a long-term view, and despite recurrent floods and droughts in the region, 'disaster management' was limited to relief rather than mitigation.

## Maldevelopment exacerbating risk

Despite increasing urbanization, most of the region's population is still vulnerable to the increasing frequency of weather-related hazards and environmental degradation. Further, most of the region's population is still dependent on nature based livelihoods, rendering large expanses of land and people vulnerable to the increasing frequency of weather-related hazards and environmental degradation. There are many examples of development





Image: RDPI

A flooded 'flood relief camp' installed by the local government. It shows the level of disaster response education of the government authorities

projects, especially large infrastructure initiatives such as river diversions, expressways and dams, actually exacerbating disasters.<sup>7</sup>

In the state of Orissa, eastern India, large-scale deforestation for settlements and agriculture has led to silted rivers, downstream flooding, eroded riverbanks and greater exposure to cyclones for coastal people. In the Himalayan regions of Nepal, road construction is commonly associated with slope destabilization and landslides. Despite the risks, settlements spring up along roadways on unstable ground. Two expressways under construction in Sri Lanka have exposed local communities to repeated flooding during monsoons.

Sometimes even structures that were meant to save people from disaster increase vulnerability. In Bangladesh, sea walls created to keep out storm surges acted as a barrier to storm water drainage during a cyclone, increasing flood levels during the storm. In Pakistan, flood protection embankments have created a false sense of security and encouraged poor settlement patterns in the Kaccha area and abandonment of traditional flood preparedness strategies.<sup>8</sup>

The lack of an interface between development and disaster management leads to vicious circles of failed development and increasing risk where even a low level hazard can play havoc with vulnerable people, weak livelihoods and fragile structures.<sup>9</sup>

The 2009 Global Assessment Report on Disaster Risk Reduction (GAR)<sup>10</sup> reports underperformance of the priority for action (PFA) 4 of the Hyogo framework, aimed at reducing underlying vulnerabilities while improving sustainable livelihood patterns, capacity and empowerment. In South Asia, this can be seen as an indicator of inadequate commitment and slow progress towards sustainable development. Poor people are excluded from risk reduction measures as a result of ineffective state institutions, corruption, poor accountability and a lack of political will.

### Governing for risk reduction

In 2005, following the Indian Ocean tsunami and Kashmir earthquake, the leaders of South Asian countries met in Dhaka, Bangladesh and made a commitment to better disaster preparedness. A year later, in New Delhi, government officials and civil society in the region debated collaborative risk reduction. The resulting Delhi Declaration requires governments to consider the links between disasters and development and to prioritize preparedness and the reduction of vulnerability.

However, the intrinsic connections between poverty and disaster risk, and the emerging threat of climate change, are yet to be fully understood. Planning for poverty reduction, disaster risk reduction (DRR) and climate change is handled by separate bodies. Other problems include limited public sector resources for governing risk reduction, no real harmonization between national and local authorities, and minimal potential for decentralization of planning.

South Asia needs overall risk reduction plans which are incorporated into its periodic planning processes, investments and infrastructure. Land use planning, zoning and identification of specific risk zones, conservation planning, insurance governance are all aspects of the overall risk reduction.

Monitoring is vital to ensure delivery and compliance. This cannot be carried out at the national level alone, as the information required for planning, implementation and monitoring requires local level involvement.



Image: Practical Action

Villagers renovating a traditional irrigation and flood protection system in Kathiraweli, Sri Lanka

**Effective risk governance at local level**

People’s livelihoods play a major role in deciding their vulnerability or resilience to disasters and challenges posed by the environment. Similar hazard exposure will have very different effects on the live-

lihoods of residents in an area, depending on the nature of local governance and institutional capacity.

The Views from the Frontline Survey 2009<sup>11</sup> and GAR<sup>12</sup> state that inadequate involvement at the meso

Image: AIDMI



**Co-governance with community institutions to reduce vulnerability and conflicts**

Pollution in Panama, a lagoon in Ampara, Eastern Province Sri Lanka which supports about 150 socially marginalized fisher families, caused a drop in productivity that led to harmful fishing patterns and conflicts. In 2006 a project<sup>13</sup> mobilized lagoon fishers and other stakeholders to form a community-based fisheries management system. The lagoon management committee (LMC) implemented plans prepared through a process of consensus. A self-regulatory system was introduced to improve regular fishing practice. Actions of the LMC were monitored through the government district development forums. Legislation was enacted, giving the fisher community the right to co-govern with government authorities. The empowered lagoon fishers now effectively participate in decision making at operational, policy and judicial levels.<sup>14</sup>

In India, community responsibility for the natural resource base is also legally recognized and supported in watershed management.<sup>15</sup> Local level DRR was launched by Kalvi Kendra in the coastal Villupuram District, Tamil Nadu, to facilitate tsunami recovery. The villages formed a committee to coordinate response and improve long-term local risk pooling and insurance. In the 2010 floods, local committees like these were able to respond and protect communities.<sup>16</sup>



level (primarily local government) is a major barrier to developing resilient communities.

DN has long advocated integrating DRR in local and regional development planning. The Adaptive Livelihoods Framework developed through the experience of our member organizations places risk governance at the core of building adaptive, resilient livelihood assets for communities.

A decentralized disaster risk management (DDRM) approach brings together community leadership and local authorities (both devolved governance and decentralized government mechanisms). Local government bodies may recognize the value of securing the participation of local people, but often lack the political will and the know-how to do so. Strengthening local level planning and implementing processes allows for more practical consideration of local priorities.

In an ideal scenario, local governments would play a key role in gathering and analysing local data for effective planning, natural resources management, development prioritizing through consultation, risk screening and risk reduction by encouraging proper land use and livelihood choices, and mobilizing resources for sustainable development. Local government could become the key repository and disseminator of risk-related information generated by technical agencies to the wider public.

Decentralization in South Asia started in the 1940s in India, with other nations following suit, but there has been a lack of political will for genuine decentralization, with resources available at the local level often ignored in favour of dependence on central funds and resources. It is important to take stock of resources within local government structures and other stakeholders, through the use of DDRM as a planning and implementing approach.

The inclusion of disaster risk and climate change in development plans will make local development more effective in the long run. The need for such integration has been clearly demonstrated in grassroots-level risk reduction projects that have achieved moderate success when implemented through civil society partners, but tremendous impact when replicated through local government channels.

Strong community institutions have an essential role in getting local level vulnerabilities recognized within local and national development. Such organizations represent diversity within communities, ensuring marginalized and highly vulnerable groups are represented.<sup>17</sup>

There is also evidence from India that local community-managed DRR initiatives work best where the local level (village council) and district authorities are well governed in terms of four criteria: accountability, participation, learning and performance.<sup>18</sup>

These examples show the benefits to South Asian countries of moving towards overall risk reduction plans. Response governance and road maps for DRR should be complemented by risk governance, which involves macro- and micro-level planning and active risk reduction measures and monitoring. It is crucial that the macro planning processes, the projections of increasing disasters with the changing climate, is enriched with communities' coping strategies and knowledge of their environments, thus helping to build adaptive capacities in macro-planning processes for climate-related disaster management.

### **Community action to address risk and protect livelihoods**

Recurrent flooding (12-20 times a year) occurs in and around the coastal areas of Wanduruppa and Ambalantota in south Sri Lanka due to a natural sand barrier across the river mouth. With facilitation from a non-governmental organization<sup>19</sup> and the local authority, the community devised and implemented a flood risk management plan. Risk was assessed through both participatory and scientific means. The community institution formed in the process represented the community of ten villages affected by the flooding. The flood mitigation mechanism agreed built on traditional community practices of managing floods. A fund to support this system was made available, operating under the supervision of the local authority. In 2008, the community had to clear the sand barrier 15 times to avoid floods and they drew on the fund only twice. The Urban Development Authority continues to work with the communities to develop disaster risk sensitive land use plans.<sup>20</sup>

On June 5, 2010, Cyclone Phet hit the coastal zone of Sindh and Balochistan provinces of Pakistan. The District Coordination Officer (DCO) set up a committee comprising core members of the District Disaster Management Authority. Early warnings of the cyclone were confirmed by Pakistan Met Department and support was requested from Indus Consortium (IC) for evacuation and establishment of emergency camps. The DCO visited all areas at risk and personally supervised the evacuation of the local population from these areas. IC, in collaboration with the Thatta district administration, established and managed ten emergency camps for evacuees, involving staff, volunteers and children and youth groups formed earlier under IC's Child Centered Disaster Risk Management Program. The Pakistan National Volunteer Movement team also provided relief supplies.

Thanks to these measures, timely actions were taken to safeguard the community prior to the cyclone making a landfall in the district and no deaths resulted from the disaster. The episode established a good example of CSO-Government (at different tiers) close working and coordination for reducing the disaster risk and response.<sup>21</sup>

### **Reviving traditional risk management practices**

In Kathiriveli in the eastern part of Sri Lanka, the Thamaravillu tank (an artificially created lake) receives water from Verugal Aru Main River via a canal. During the rainy season, the water level of the river rises around six to seven feet. The irrigation scheme was designed to handle normal monsoon rains, severe floods and droughts. Decades of neglect due to conflict had inflicted damage on this sophisticated water management system. Prior to the recent floods, villagers had begun participating in a project to renovate the system. Although work was not completed, the community of Kathiriveli withstood the flooding for a whole week before being inundated. This allowed them to evacuate the area with less damage than neighbouring villages.



Image: Practical Action

Community clearing the sand barrier based on agreed timing by farmers, fishermen, and the local authorities



# Notes and References

## Education for sustainable development and education for disaster risk reduction: a winning combination

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- 5 IPCC Fourth Assessment Report. Available from [www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_wg2\\_report\\_impacts\\_adaptation\\_and\\_vulnerability.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm) (Last consulted on 18 March 2011).
- 6 Available from [www.unisdr.org/eng/about\\_isdr/isdr-publications/joint-pub/Environment\\_and\\_disaster\\_risk.pdf](http://www.unisdr.org/eng/about_isdr/isdr-publications/joint-pub/Environment_and_disaster_risk.pdf) and <http://www.unisdr.org/eng/risk-reduction/sustainable-development/Environmental-Degradation-and-Disaster-Risk.pdf> (Last consulted on 18 March 2011).
- 7 Available from <http://unesdoc.unesco.org/images/0014/001486/148654e.pdf> (Last consulted on 18 March 2011).
- 8 Available from [www.unisdr.org/eng/library/lib-terminology-eng%20home.htm](http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm) (Last consulted on 18 March 2011).
- 9 Available from [www.crin.org/docs/ISDR\\_let\\_teach.pdf](http://www.crin.org/docs/ISDR_let_teach.pdf) (Last consulted on 18 March 2011).
- 10 Some valuable and interesting projects have already been undertaken since the beginning of the Decade. See [www2.unescobkk.org/elib/publications/103/disaster.pdf](http://www2.unescobkk.org/elib/publications/103/disaster.pdf) (Last consulted on 18 March 2011).
- 11 See the contribution of Seiji Suwa in [www.unesco.org/ulis/cgi-bin/ulis.pl?catno=159067&set=4D7F3EF0\\_1\\_431&gp=1&lin=1&ll=1](http://www.unesco.org/ulis/cgi-bin/ulis.pl?catno=159067&set=4D7F3EF0_1_431&gp=1&lin=1&ll=1) (Last consulted on 18 March 2011).

## International Recovery Platform: better rebuilding for resilient recovery

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- 6 Cosgrave (2008).
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- 8 BRAC (2000). Flood Relief and Rehabilitation Project, July 1998-July 1999. Phase ending report. Dhaka, BRAC.
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- 12 Cosgrave (2008)

## Humanitarian response and disaster risk reduction in New Zealand and the Pacific

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- 2 Department of Internal Affairs (2010). *National Civil Defence Emergency Management Strategy*. Wellington.
- 3 Department of Internal Affairs (2008). *National Civil Defence Emergency Management Strategy*. Wellington. Available from [www.civildefence.govt.nz/memwebsite.NSF/wpg\\_URL/For-the-CDEM-Sector-National-CDEM-Strategy-Index?OpenDocument](http://www.civildefence.govt.nz/memwebsite.NSF/wpg_URL/For-the-CDEM-Sector-National-CDEM-Strategy-Index?OpenDocument).
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- 12 Ministry of Civil Defence and Emergency Management (MCDEM) (2008). *Community Engagement in the CDEM context, Best Practice Guide*. Available from [www.civildefence.govt.nz/memwebsite.nsf/wpg\\_URL/For-the-CDEM-Sector-Publications-Community-Engagement?OpenDocument](http://www.civildefence.govt.nz/memwebsite.nsf/wpg_URL/For-the-CDEM-Sector-Publications-Community-Engagement?OpenDocument).
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- 14 New Zealand Government (2005). *National Civil Defence Emergency Management Plan Order 2005*. Available from [www.legislation.govt.nz/regulation/public/2005/0295/latest/DLM356569.html?search=qs\\_regulation\\_civil+defence\\_resel&p=1&sr=1](http://www.legislation.govt.nz/regulation/public/2005/0295/latest/DLM356569.html?search=qs_regulation_civil+defence_resel&p=1&sr=1).
- 15 The Pacific Ring of Fire is a zone of frequent earthquake and volcanic eruptions that encircles the Pacific Ocean. About 80 per cent of the worlds largest earthquakes occur in this area.
- 16 Officials attending the 12th Pacific Regional Disaster Management Meeting. (2005). *A Framework for Action 2005-2-15: An Investment for Sustainable Development in the Pacific Island Countries, Disaster Risk Reduction and Disaster Management*. Madang: International Strategy for Disaster Recovery.
- 17 Schwartz, E. (2006). A needless toll of natural disasters. *Boston Globe*. Available from [www.boston.com/news/globe/editorial\\_opinion/oped/articles/2006/03/23/a\\_needless\\_toll\\_of\\_natural\\_disasters/](http://www.boston.com/news/globe/editorial_opinion/oped/articles/2006/03/23/a_needless_toll_of_natural_disasters/).
- 18 For example, the estimated population (2010) for Tokelau was 1,400; for Niue 1,600; Tuvalu 12,000 and Tonga 104,000. Flight times to Apia (Samoa) are four hours from Auckland and five hours from Sydney and to get to Tokelau takes a further day by sea from Apia as there is no airstrip. There is one weekly flight from Auckland to Niue.
- 19 Lee, B-Y. (2010). Working Together, Building Capacity – A case study of civil defence emergency management in New Zealand. *Journal of Disaster Research*, 5(5).

## Indonesia: improving investment in communities for risk reduction

- 1 At a rate of IDR9,000 per dollar
- 2 At a rate of IDR9,000 per dollar
- 3 National Agency for Disaster Management. Available from [www.bmpb.go.id](http://www.bmpb.go.id). Accessed on 6 March 2011.
- 4 UNISDR. Available from [www.unisdr.org/disaster-statistics/occurrence-type-disas.htm](http://www.unisdr.org/disaster-statistics/occurrence-type-disas.htm). Accessed on 20 September 2010.
- 5 Indonesia Risk Profile. Available from [www.preventionweb.net/english/countries/statistics/risk.php?cid=80](http://www.preventionweb.net/english/countries/statistics/risk.php?cid=80). Accessed on 5 March 2010.
- 6 Ibid
- 7 As quoted in *Natural Hazards, Un-Natural Disasters: the Economics of Effective Prevention* (World Bank and United Nations, 2010).
- 8 Justifying the cost of disaster risk reduction: a summary of cost-benefit analysis. Courtenay Cabot Venton, Environmental Resources Management. *Humanitarian Exchange Magazine*, Issue 38, June 2007.
- 9 Dealing with Disasters: A Review of Disaster Risk Reduction. In *Investments in West Java and West Sumatra, Indonesia, a Research Report*, Oxfam GB September 2010.

## Disaster Risk Reduction in Gracias a Dios, Honduras

- 1 Damage Assessment Reports completed by CODEMS, CODED in Gracias a Dios
- 2 United Nations Economic Commission for Latin America and the Caribbean. Honduras, Assessment of the Damage caused by Hurricane Mitch 1998

## Disasters – a part of life

Useful links:  
[www.igsu.ro](http://www.igsu.ro) (only in Romanian language)  
[www.meteoromania.ro/index.php?id=0&lang=en](http://www.meteoromania.ro/index.php?id=0&lang=en)  
[www.infp.ro/en](http://www.infp.ro/en)  
[www.mai.gov.ro/engleza/Home\\_eng/english.htm](http://www.mai.gov.ro/engleza/Home_eng/english.htm)  
[www.mdri.ro/index.php?p=1&lang=en](http://www.mdri.ro/index.php?p=1&lang=en)  
[www.mmediu.ro/vechi/index\\_en.html](http://www.mmediu.ro/vechi/index_en.html)

### Cyclone hazard and unpredictability: preparing coastal communities

- 1 A tropical revolving storm occurring in the Indian Ocean, Arabian Sea or BoB is termed a cyclone. A similar storm in the West Indies or off the American seaboard is termed a hurricane and in the Western Pacific, a typhoon. The World Meteorological Organization (WMO, 1976) uses the term 'tropical cyclone' to cover weather systems in which winds exceed 'gale force' (minimum of 34 knots or 63 kilometres per hour).
- 2 In Maldives, no cyclonic events are on record. So far only one local storm has been recorded. For other countries, local storms are not considered.
- 3 Yadava, Y. S., Turner, J.M., Calvert, P. (2000). Report of the Government of India/ Government of Andhra Pradesh/FAO workshop on Measures to Reduce Loss of Life during Cyclones, Visakhapatnam, Andhra Pradesh, India, 4-6 March 1999, FAO Fisheries Report No. 622, Rome, FAO, 2000.70p.
- 4 Source: [www.fao.org/Participation/english\\_web\\_new/content\\_en/.../fisheries.doc](http://www.fao.org/Participation/english_web_new/content_en/.../fisheries.doc).

### Further reading

Aziz Ahmad, H. B., Luqueman, A., Atapattu, A., Chullasorn, S., et al (1998). Regional stewardship for sustainable marine resources management in the Bay of Bengal. In K. Sherman, E. Okemwa and M. Ntiba, eds. *Large Marine Ecosystems of the Indian Ocean: Assessment, Sustainability, and Management*, Blackwell Science. ISBN: 0632043180.

### Reducing vulnerabilities and enhancing resilience in Nigeria

- 1 Wikipedia, 2010.

### An integrated approach to disaster mitigation at Nyachilenda River

- 1 Department of Agriculture. 19th Fortnightly Crop Report, 2010/2011 Season, Nsanje.

### Risk reduction and adaptation: good concepts with great challenges

- 1 Budi Haryanto. Climate Change and Public Health in Indonesia: Impacts and Adaptation. In *Austral Policy Forum 09-055* (Nautilus Institute Australia at RMIT University, Melbourne, 2009).

### Good practices in multi-hazard early warning systems

#### Further reading

- The OFDA/CRED International Disaster Database, available from [www.em-dat.net](http://www.em-dat.net). EM-DAT is the database of Université Catholique de Louvain, Brussels, Belgium.
- First International Conference on Early Warning (Potsdam, 1998). Available from [www.geomuseum.com/ewc98/](http://www.geomuseum.com/ewc98/).
- Second International Conference on Early Warning (Bonn, 2003). Available from [www.ewc2.org/pg000001.htm](http://www.ewc2.org/pg000001.htm).
- Third International Conference on Early Warning (Bonn, 2006). Available from [www.ewc3.org](http://www.ewc3.org).
- First Experts' Symposium on Multi-Hazard Early Warning Systems (Geneva, 2006). Available from [www.wmo.int/pages/prog/dm/events/ews\\_symposium\\_2006](http://www.wmo.int/pages/prog/dm/events/ews_symposium_2006).
- Second Experts' Symposium on Multi-Hazard Early Warning Systems (Toulouse, 2009). Available from [www.wmo.int/pages/prog/dm/events/MHEWS-II/index\\_en.html](http://www.wmo.int/pages/prog/dm/events/MHEWS-II/index_en.html).
- Global Early Warning Survey (2006)
- Global Assessment Report 2009. Available from [www.preventionweb.net/english/hyogo/gar/?pid:34&pid:1](http://www.preventionweb.net/english/hyogo/gar/?pid:34&pid:1).
- Golnaraghi, M. (ed) *Institutional Partnership in Multi-Hazard Early Warning Systems: A compilation of seven national Good Practices and Synthesis of Lessons Learnt*. Forthcoming publication (2011).
- Golnaraghi, M, J. Douris, and J.B. Migraine. *Saving Lives Through Early Warning Systems and Emergency Preparedness*. Risk Wise, Tutor Rose Publishing, pp 137-141

### Building resilience to flood and typhoon hazards in Viet Nam

- 1 Millennium Development Goals 2010 National Report: Viet Nam.
- 2 In 2010, GDP Growth (constant prices, national currency) for Viet Nam was 6.468 per cent, making Viet Nam 33rd in world rankings according to GDP growth for that year. Available from [www.economywatch.com/economic-statistics/country/Vietnam/](http://www.economywatch.com/economic-statistics/country/Vietnam/).
- 3 According to the Germanwatch climate risk index, the GDP purchasing power parity (PPP) in Viet Nam in 2009 was USD257 billion.
- 4 The country currently ranks 113th out of 169 countries in the Human Development Index (HDI) in the 2010 Human Development Report.
- 5 Ibid. Viet Nam has halved its poor, ensured gender equality with even higher targets and made primary education available to all.
- 7 World Bank Viet Nam Disaster Risk Profile (2009)
- 8 UNISDR (2009). *Global Assessment Report on Disaster Risk Reduction, Risk and Poverty in a Changing Climate*. United Nations International Strategy for Disaster Risk Reduction.
- 9 77 per cent of the population growth in the last decade (2000-2009) occurred in the cities.
- 10 According to an update of the IPCC's fourth assessment of 2007. See: Markku Rummukainen, Jouni Räisänen, Halldór Björnsson, Jens Hesselbjerg Christensen (2010). *Physical Climate Science since IPCC AR4: A brief update on new findings between 2007 and April 2010*. Copenhagen: Norden/Nordic Council of Ministers
- 11 UNISDR.
- 12 MoNRE has applied global climate change scenarios to the Vietnamese situation, with support from the United Nations in Viet Nam and other partners. The global scenarios are taken from the Fourth Assessment by the Inter-governmental Panel on Climate Change (IPCC 2007).
- 13 Characteristics of a Disaster Resilient Community, Guidance Note, Version 2, November 2009, John Twigg.
- 14 The National Strategy's main objectives are: the integration of DRM into socio-economic development plans; ensuring sustainable disaster recovery which integrates DRM; planning different regional DRM strategies for the five geographical regions of the country;

combining structural and non-structural measures; and dividing responsibilities and timing for risk reduction among a range of ministries.

- 15 Excluding funds required by other ministries and provinces to implement disaster risk reduction action plans.
- 16 Strategies include the following: In the Red River Delta and the North Central, to 'radically prevent floods'; in the Central Coast, the Eastern South and Islands, 'proactive disaster prevention and adaptation for development'; in the Mekong River Delta, 'living with the floods'; in the mountainous areas and Central Highlands, to 'proactively prevent natural disasters'; and in the Sea areas, 'proactive prevention and response'.
- 17 Mass organizations such as the Fatherland Front, the Viet Nam Red Cross Society, the Viet Nam's Women's Union and others have an increasingly important role in DRM in the country.
- 18 Decision 1002/QĐ-TTg: Community awareness raising and community-based disaster risk management (CBDRM), July 2009.
- 19 Of which, 55 per cent is expected from the State Fund, 5 per cent from residents and 40 per cent in the form of grants from other Governments and international organizations.
- 20 There are two main components: to strengthen capacity for managing and implementing CBDRM for local officers at all levels and to carry out CBDRM activities and to improve the capacity of communities in CBDRM.
- 21 See for example: *Community Based Disaster Risk Management: Good Practice Examples*, JANI, Viet Nam (2007) and also: *Building Community Resilience to Disasters in Upland Areas of Viet Nam, Lessons Learnt in Lao Cai Province and Kon Tum Province*, CEI and ACTED, Viet Nam (2009).
- 22 The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 is currently the main document underpinning disaster risk reduction policy and strategy.
- 23 Flood, flash flood, sea level rise, storm, tropical depression, hurricane and land slide caused by rain, flood, storms and sea waves.
- 24 The Ordinance on Flood and Storm Prevention and Control 1993-2000, drafted in 1993 and amended and revised 17 years later, is the most comprehensive document on natural hazard management in the country.
- 25 In addition to the Ordinance on Flood and Storm Control, DRM policy is addressed in several additional laws and decrees.
- 26 Planned as an activity in MARD's National Strategy.
- 27 In May 1946, President Ho Chi Minh issued a decree to organize the Central Committee for Dyke Protection – now the Central Committee for Flood and Storm Control.
- 28 The CCFCSC reports to the Government and is comprised of a number of ministries and agencies, chaired by the Minister of Agriculture and Rural Development (MARD).
- 29 Under the Ordinance on Flood and Storm Control, all 64 provinces and cities of Viet Nam are tasked with developing their own action plans to implement the National Strategy up to 2020. As of March 2009, approximately 90 per cent of provinces created and approved their own action plans for incorporation into the National Action Plan.
- 30 The World Bank's 2007-2011 Country Partnership Strategy for Viet Nam also contains DRR benchmarks.
- 31 The DMWG consists of a core group that organizes ad-hoc working groups on specific issues when required. Current members: CARE, UN-PCG, Oxfam, IFRC, NLRC, PDC, World Vision, Plan International, CEI, ActionAid Viet Nam, ADRA, Habitat for Humanity and Save the Children.
- 32 The CCWG consists of a core group and three thematic groups: Climate Change Adaptation; Climate Change Awareness and Behaviour Change; and Climate Change Mitigation.
- 33 UNDP, FAO, UNICEF, WHO, UNWOMEN, UNESCO, UN Habitat, IOM and UNFPA.
- 34 In December 2006, Viet Nam was selected as the first of eight countries to pilot UN reform at the country level through the One UN Initiative.
- 35 *Vulnerability and Capacity Assessment (VCA), Manual for Viet Nam Cross Practitioners*, Viet Nam Red Cross (2010).
- 36 See the Central Committee for Flood and Storm Control website: [www.cfsc.gov.vn/KW367A21/Home-page.aspx](http://www.cfsc.gov.vn/KW367A21/Home-page.aspx), and also the ADB-funded DRR Project Portal at [www.drrprojects.net](http://www.drrprojects.net).
- 37 *Disaster risk management programs for priority countries, East Asia And Pacific: Viet Nam*, The World Bank, 2009.
- 38 *Strengthening institutional capacity for disaster risk management in Viet Nam, including climate change-related disasters*, UNDP/MARD, 2009-2011.
- 39 Supported by the International Federation of the Red Cross and Red Crescent Societies.
- 40 See [www.cfsc.gov.vn/KW376B3F/crp/17.aspx](http://www.cfsc.gov.vn/KW376B3F/crp/17.aspx)
- 41 See [www.cfsc.gov.vn/KW376B3F/Publications.aspx](http://www.cfsc.gov.vn/KW376B3F/Publications.aspx)
- 42 Located in the northern and north-central regions (of which 2,400 km is managed by the central-DDMFSC).
- 43 Sea dyke construction plans in the coming years are estimated: to 2015 USD782.25 million and for 2016-2020 USD2,663 million; and for river dykes: to 2015 USD482.8 million, and for 2016-2020 USD482.8 million.
- 44 Current total estimates are about 7,640ha.
- 45 Research in Japan has shown that every 100m of mangrove forest can reduce the height of a tidal wave by up to 50 per cent and its strength by up to 90 per cent. K. Samabuddi (2005).
- 46 Jelligos, S.R., Lunde, G., Kawate, H., Dzung, T.V. (2005). *Final Evaluation: Vietnam Red Cross Mangrove and Disaster Preparedness in the Red River Delta and Northern Coastal Vietnam (1994-2005)*. The Danish Red Cross.
- 47 The Government has made efforts to replant mangroves since the 1960s but with varying success.
- 48 See 31.
- 49 The provinces of Quang Ninh, Hai Phong, Thai Binh, Nam Dinh, Ninh Binh, Thanh Hoa, Nghe An and Ha Tinh.
- 50 This figure is derived by taking the overall VNRC programme budget, annualizing the costs of each year to the present value (using the average inflation rate 1994-2010 of 7.23 per

cent), then taking 50 per cent of that amount (assuming that 50 per cent of all costs were directly or indirectly related to planting), and finally dividing that amount by the number of existing hectares.

- 51 *Breaking the waves: Impact analysis of a coastal afforestation and disaster preparedness programme in Northern Viet Nam, 1994-2010*, P. Bolte, F. Barnaby, F. Rahmadana, et al, International Federation of Red Cross and Red Crescent Societies, February 2011. Personal communications: Patrick Bolte and Dang Van Tao, IFRC, 2011.
- 52 For example, capacity-building initiatives for those involved in the programme have trained more than 6,000 commune and ward officials, 10,000 teachers and 325,000 school children as well as local people.
- 53 Available from [www.preventionweb.net/files/13235\\_13235FouronthespotMotto1.pdf](http://www.preventionweb.net/files/13235_13235FouronthespotMotto1.pdf).
- 54 Personal communications from Graham Adutt, Director, Challenge to Change, [director@challengetochange.org](mailto:director@challengetochange.org).
- 55 Da Nang is one of three cities in Viet Nam participating in the Asian Cities Climate Change Resilience Network (ACCCRN) with support from the Rockefeller Foundation.

#### Disaster risk reduction and the building of a disaster-resilient India

- 1 India has a federal system of governance comprising the central, state and district governments along with a separate layer of elected local governance bodies, referred to as 'municipalities' in urban areas and 'panchayats' in rural areas.
- 2 India appoints Finance Commissions at regular intervals to decide on the transfer of resources from the Centre to the states and to decide on priorities for certain important focus areas.

#### You can't use information you don't have: the role of data in reducing risk

- 1 For example, see UNISDR (2009). UNISDR Terminology on Disaster Risk Reduction. Available from [www.unisdr.org/eng/library/lib-terminology-eng.htm](http://www.unisdr.org/eng/library/lib-terminology-eng.htm).
- 2 For an example of how imagery and GIS techniques are being used to identify and analyse informal settlement patterns, see Vicente, M., J. Villarin, G. Galgana, A. Guzman, and J. De Mesa, *The Urban Poverty Morphology Project: RS-GIS Applications for Metro-Manila, Philippines*. Available from [www.observatory.ph/programs/ged/projects/upm/files/UPM\\_FULL\\_PAPER\\_FOR\\_GSDI-9.pdf](http://www.observatory.ph/programs/ged/projects/upm/files/UPM_FULL_PAPER_FOR_GSDI-9.pdf).
- 3 For examples, see UNOSAT products created in support of the International Charter, Space and Major Disasters. Available from [http://unosat.web.cern.ch/unosat/asp/prod\\_fre.asp?id=65](http://unosat.web.cern.ch/unosat/asp/prod_fre.asp?id=65).
- 4 GPS is the most widely used global navigation satellite system (GNSS). GNSS are satellite-based technologies that enable users to precisely locate the position of a receiver on the ground. See Bolstad, op. cit. for more information.
- 5 For a brief overview, see Rambaldi, G., M. McCall, D. Weiner, P. Mbile and P. Kyem (2004), *Participatory GIS*. Available from [www.iapad.org/participatory\\_gis.htm#PGIS](http://www.iapad.org/participatory_gis.htm#PGIS).
- 6 A variety of manuals and resources are available from [www.preventionconsortium.org/?pageid=43](http://www.preventionconsortium.org/?pageid=43).
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